National Park Service
U.S. Department of the Interior

North Coast and Cascades Network

Revised Vegetation Classification for Mount Rainier, North Cascades, and Olympic National Parks

Descriptions and identification keys for plant associations and wetland alliances



Left: A matrix of *Salix commutate* Wet Shrubland and various herbaceous wetland types along Pelton

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Section A: Key to the plant communities of Mount Rainier, North Cascades, and Olympic National Parks

Instructions for field application of the key:

1. Select a relatively uniform area of vegetation and topography within the stand.
2. This key is not dichotomous. If the stand or plot meets the criteria in a line, read to the right, or (if blank) to the next indented line. If the stand or plot does not meet the criteria, skip to the next line that is not indented from the current line.
3. Some associations may be distinguished by multiple characteristics—these associations may be reached via more than one path in the key.
4. Percentage values refer to crown cover—the vertical projection below the entire crown of the plant. Do not subtract for spaces between leaves and branches
5. "Present" species are typically found in a representative plot (they regularly occur in the stand).
6. "Prominent" species are common within most plots (generally 3-15% cover) but do not make up the dominant vegetation.
7. "Dominant" and "Codominant" species are diagnostic species that have the greatest cover within their physiognomic stratum (tree/shrub/herb)
8. "+" = add the crown cover of each of the species indicated (e.g., 7+22 = 29% cover). Overlap between species is counted twice. Any one species may be absent.
9. Abbreviations for the park(s) in which an association has been documented are listed in brackets after the key criteria (e.g., "[MORA, OLYM]"). If no parks are listed, the association has been documented in all three units.
10. Important note: The USNVC guidelines for differentiating forested formations (e.g., Cool Temperate Forest & Woodland vs. Temperate Grassland & Shrubland) has changed since the publication of Crawford et al. (2009), decreasing from 25% to 10% cover. In other words, stands with greater than 10% tree cover are now considered forests or woodlands, rather than shrublands. This change may create some dissonance between USNVC associations and NCCN map products and plot assignments. To alleviate this, when keying stands with between 10% and 25% tree cover, consider keying through both the forest and shrubland keys to find the best fit. The same applies for the cutoffs between shrublands, herbaceous, and sparse types.
11. Wetland associations: If the wetland association is not described in Section A, the key will direct you to the appropriate alliance description in Section B.
12. The key is not the classification. After keying a stand, always read the association description for additional details on vegetation composition, geographic distribution, and the typical environmental setting. If the descriptions fits in most regards, you have likely made an accurate identification. If there are multiple inconsistencies between the stand and the description, consider trying the key again following slightly different leads or by increasing the flexibility of your cover estimates. Alternatively, the stand might represent an undocumented association, or an expansion of an existing association concept.

Taxonomic standard:

Species listed in association descriptions follow the updated Flora of the Pacific Northwest (Hitchcock & Cronquist, 2018) as presented via the Checklist of Vascular Plants of Washington (Weinmann et al., 2002)

Hitchcock C.L. and A. Cronquist. 2018. *Flora of the Pacific Northwest: An Illustrated Manual*. 2nd Edition. Edited by D.E. Giblin, B.S. Legler, P.F. Zika, and R.G. Olmstead. University of Washington Press, Seattle, WA.

Weinmann F., P.F. Zika, D.E. Giblin, and B. Legler. 2002. Checklist of the Vascular Plants of Washington State. University of Washington Herbarium. http://biology.burke.washington.edu/herbarium/waflora/checklist.php. Accessed: July 8, 2019.

The following closely related species are used interchangeably in the key:
Caltha leptosepala == C. biflora
Eucephalus ledophyllus == E. engelmannii
Cornus stolonifera == C. occidentalis
Oxalis oregana == O. trilliifolia
Glyceria elata == G. striata

US National Vegetation Hierarchy: Version 2.03 (hierarchy 36)

Key to Physiognomic Categories

Trees ≥ 10%, or stand is a tree island in subalpine parkland. Stands with 10-25% tree cover may also be assessed with the shrubland keys below, particularly in areas that have burned or otherwise experienced significant natural disturbance.

Deciduous broadleaf trees typically dominate or codominate in the canopy (if uncertain, try this key first). ..... **Key to Deciduous Forests and Woodlands, p. 6**

Coniferous trees clearly dominate in the canopy.

Stand occurs as a linear or small patch restricted to riparian areas, flooded valley floors, depressional wetlands, springs or seeps, or other areas with high water tables, including ephemeral washes. ..... **Key to Wetland and Riparian Conifer Forests and Woodlands, p. 22**

Stand occurs in an upland setting. Site may be sloping or flat, but lacks a high water table, has no potential for flooding, and vegetation is not influenced by discharging groundwater. ..... **Key to Upland Coniferous Forests and Woodlands, p. 8**

Shrubs or shrub-form trees (krummholz/subalpine scrub) ≥ 10% and stand occurs on a landform where groundwater discharge and/or overbank flooding heavily influences vegetation composition (e.g. seeps/springs, depressions, riparian areas). Soils can be mineral or organic (fibrous or woody peat, or muck). This includes riparian shrublands, shrub swamps, and carrs. ..... **Key to Riparian Shrublands, Shrub Swamps, and Carrs, p. 24**

Tall Shrubs (taller than 0.5 m) or shrub-form trees (krummholz/subalpine scrub) ≥ 10%. Upland habitat. ..... **Key to Upland Shrublands, p. 15**

Dwarf-shrubs (shorter than 0.5 m) ≥ 10%. Upland habitat ..... **Key to Upland Dwarf-shrublands, p. 17**

Herbaceous vegetation ≥ 10%

Aquatic, submerged, or floating-leaved species dominant and emergent vegetation < 10% ..... **Key to Aquatic Vegetation, p. 30**

Stand occurs where surface water accumulates or groundwater discharges during at least part of the year (e.g., marshes, wet meadows, bogs, fens, aquatic beds, and snowbeds). The water table is near, at, or above soil surface for significant portion of growing season; soil is very moist to saturated, though it may dry by late summer; organic soils may be present ..... **Key to Herbaceous Wetlands, p. 27**

Stand occurs in upland environments (steep slopes, rocky and/or well-drained soils, other areas where surface and/or groundwater do not affect vegetation). Sites may be near early melting snowbeds. Soils can be moist, but are rarely saturated (and if so, only in early spring). Organic soils or organic soil horizons are absent..... **Key to Upland Herbaceous Vegetation, p. 18**

Herbaceous vegetation < 10% ..... **Key to Bryophyte and Sparse Vegetation, p. 20**

Key to Deciduous Forests and Woodlands

Populus trichocarpa dominant
- Oplopanax horridus ≥ 10%, [NOCA] ..... **POPBAL/OPLHOR-ACEGLA, p. B-9**

- Acer macrophyllum codominant
  - Picea sitchensis present to codominant and Oxalis oregana present [OLYM] ..... **POPBAL-PICSIT-(ACEMAC)/OXAORE, p. A-137**
  - Symphoricarpos albus dominant shrub [NOCA] ..... **POPBAL-ACEMAC/SYMALB, p. B-14**

- Alnus rubra codominant
  - Rubus spectabilis dominant shrub ..... **POPBAL-ALNRUB/RUBSPE, p. A-136**
  - Carex obnupta prominent to codominant [OLYM] ..... **POPBAL/CORSER/CAROBN, p. A-138**

- Picea sitchensis codominant and Oxalis oregana present [OLYM] ..... **POPBAL-PICSIT-(ACEMAC)/OXAORE, p. A-137**

- Cornus occidentalis or Cornus stolonifera present to dominant shrub [NOCA]
  - Carex obnupta prominent to codominant [OLYM] ..... **POPBAL/CORSER/CAROBN, p. A-138**
  - Not as above. Low-elevation valley bottoms just east of Cascade Crest [NOCA] ..... **POPBAL/CORSER, p. A-119**

- Acer glabrum ≥ 10% ..... **POPBAL/ACEGLA, p. B-9**

- Populus trichocarpa and/or Alnus rubra seedlings and saplings dominate, with variable density. Alluvial bars ..... **ALNRUB Alluvial, p. A-120**

Acer macrophyllum dominant
- Picea sitchensis present to codominant and Oxalis oregana present OR Oxalis oregana ≥ 5% [OLYM] ..... **ACEMAC/OXAORE, p. A-126**

- Rubus spectabilis dominant shrub ..... **ACEMAC/RUBSPE, p. A-128**

- Polystichum munitum ≥ 10%
  - Pseudotsuga menziesii usually codominant, Corylus cornuta and/or Mahonia nervosa usually prominent, non-riparian disturbed settings ..... **ACEMAC-PSEMEN/ACECIR/POLMUN, p. A-31**
  - Tolmiea menziesii present. Riparian [OLYM] ..... **ACEMAC/POLMUN-TOLMEN, p. A-127**

- Symphoricarpos albus + Cornus nuttallii ≥ 10% [NOCA] ..... **ACEMAC/SYMALB, p. A-21**

- Rubus nutkanus + Maianthemum racemosum ≥ 5%, mesic toes slope or avalanche chute [NOCA] ..... **ACEMAC/RUBPAR/MAIRAC, p. A-20**

- Acer circinatum or Acer glabrum codominate shrub layer with scrubby Acer macrophyllum, Paxistima myrsinites present, dry avalanche chute or debris apron [NOCA] ..... **ACEMAC/ACECIR-PAXMYR-(CORCOR), p. A-19**

- Not as above, Maianthemum stellatum present [NOCA] ..... **ACEMAC/MAISTE, p. A-139**

Alnus rubra dominant
- Picea sitchensis codominant and Carex obnupta and/or Lysichiton americanus present to codominant [MORA, OLYM] ..... **PICSIT/RUBSPE/CAROBN-LYSAME, p. A-146**

- Oplopanax horridus ≥ 10%
  - Maritime indicators present (Polystichum munitum, Struthiopteris spicant, Tolmiea menziesii). Rubus spectabilis and/or Ribes bracteosum usually prominent to codominant. West Cascades [MORA, NOCA] ..... **ALNRUB/OPLHOR-RUBSPE, p. A-131**

Athyrium filix-femina dominates herb layer. Maianthemum racemosum usually present. East Cascades. ..... **ALNRUB/OPLHOR/ATHFIL, p. B-16**

Rubus spectabilis dominant shrub
Carex obnupta (always present) and/or Lysichiton americanus ≥ 5% [OLYM] ..... **ALNRUB/RUBSPE/CAROBN-LYSAME, p. A-143**
Chrysosplenium glechomifolium ≥ 25% [OLYM] ..... **ALNRUB/RUBSPE/CHRGLE, p. A-144**
Rubus spectabilis + Ribes bracteosum ≥ 20% ..... **ALNRUB/RUBSPE, p. A-134**

Lysichiton americanus dominates the herb layer OR Athyrium filix-femina dominates and Lysichiton americanus is present ..... **ALNRUB/ATHFIL-LYSAME, p. A-141**

Alnus viridis ≥ 10% [MORA] ..... **ALNRUB/ALNVIR, p. A-140**

Acer circinatum ≥ 10%
Oxalis oregana ≥ 5% [MORA, OLYM] ..... **ALNRUB/OXAORE, p. A-132**
Acer circinatum dominant shrub (often ≥ 40%), Abies grandis absent, Claytonia sibirica usually present ..... **ALNRUB/ACECIR/CLASIB, p. A-129**
Abies grandis, Cornus stolonifera, Moehringia macrophylla, and/or Osmorhiza purpurea present [eastern NOCA] ..... **ALNRUB/ACECIR, p. B-16**

Understory dominated by grasses, Elymus glaucus, or Elymus hirsutus present to dominant, Poa trivialis and/or Rubus ursinus usually present [OLYM] ..... **ALNRUB/ELYGLA, p. A-130**

Glyceria striata and/or Glyceria elata ≥ 30%, Veronica americana usually present [OLYM] ..... **ALNRUB/GLYSTR, p. A-142**

Oxalis oregana and/or O. trilliifolia the dominant herb [MORA, OLYM] ..... **ALNRUB/OXAORE, p. A-132**

Rubus nutkanus ≥ 30% ..... **ALNRUB/RUBPAR, p. A-133**

Achlys triphylla ≥ 10% ..... **ALNRUB/ACHTRI, p. B-16**

Stachys ciliata + Tolmiea menziesii + Tiarella trifoliata + Claytonia sibirica + Circaea alpina + Urtica dioica + Petasites frigidus ≥ 10% ..... **ALNRUB/STACHA-TOLMEN, p. A-135**

Carex obnupta dominant herb beneath open shrub layer. Usually occurs on manipulated soils in Olympic rain shadow, but not always ruderal [OLYM] ..... **ALNRUB/CAROBN, p. B-18**

Populus trichocarpa and/or Alnus rubra seedlings and saplings dominate, with variable density. Alluvial bars ..... **ALNRUB Alluvial, p. A-120**

Exotic grasses dominant [OLYM] ..... **ALNRUB Nonnative, p. B-21**

Polystichum munitum ≥ 10%, upland setting [MORA, OLYM] ..... **ALNRUB/POLMUN, p. A-32**

Populus tremuloides dominant [NOCA]
Populus tremuloides the dominant tall shrub. Talus slopes [NOCA] ..... **POPTRE-PAXMYR, p. A-151**

Cornus stolonifera or C. occidentalis ≥ 10% or Alnus incana ≥ 25% ..... **POPTRE/CORSER, p. B-7**

Symphoricarpos albus prominent ..... **POPTRE/SYMALB, p. A-118**

Betula papyrifera dominant, Acer circinatum + Mahonia nervosa ≥ 10% [NOCA] ..... **BETPAP-(THUPLI)/ACECIR/MAHNER, p. A-59**

Key to Upland Conifer Forests and Woodlands

Larix lyallii ≥ 5%
- Vaccinium deliciosum, Phyllodoce empetriformis, Cassiope mertensiana, or Luetkea pectinata ≥ 5% [NOCA] ..... **LARLYA/VACDEL-CASMER, p. A-9**
- Vaccinium scoparium or Luzula hitchcockii ≥ 5% [NOCA] ..... **LARLYA/VACSCO/LUZGLA, p. A-10**

Pinus albicaulis ≥ 5%, open woodland or tree island in subalpine setting
- Vaccinium scoparium or Vaccinium myrtillus ≥ 5% [NOCA] ..... **PINALB-ABILAS/VACSCO/LUZGLA, p. A-12**
- Juniperus communis ≥ 5% [NOCA]..... **ABILAS-PINALB/JUNCOM, p. A-11**
- Calamagrostis rubescens or Carex geyeri ≥ 5% [NOCA] ..... **PINALB/CALRUB, p. A-13**
- Festuca viridula ≥ 5% [NOCA] ..... **PINALB/FESVIR, p. A-14**

Picea sitchensis ≥ 10%
- Tsuga heterophylla < 25%, Populus trichocarpa ≥ 5%, Oxalis oregana ≥ 5%. Valley bottom [OLYM] ..... **POPBAL-PICSIT-(ACEMAC)/OXAORE, p. A-137**
- Carex obnupta or Lysichiton americanus ≥ 5% and Carex obnupta present. Wetland [OLYM] ..... **PICSIT/RUBSPE/CAROBN-LYSAME, p. A-146**
- Vaccinium ovatum ≥ 10% [OLYM] ..... **PICSIT/VACOVAT, p. A-87**
- Gaultheria shallon ≥ 10% [OLYM]..... **PICSIT/GAUSHA, p. A-85**
- Oxalis oregana ≥ 5% [OLYM]..... **PICSIT-TSUHET/POLMUN-OXAORE, p. A-89**
- Rubus spectabilis ≥ 10%, upland [OLYM]..... **PICSIT-(ALNRUB)/RUBSPE/POLMUN, p. A-125**
- Polystichum munitum ≥ 5% [MORA, OLYM]..... **PICSIT-TSUHET/POLMUN, p. A-90**
- Maianthemum dilatatum ≥ 10% [OLYM] ..... **PICSIT/MAIDIL, p. A-86**

Tsuga mertensiana ≥ 10%, or stand is a tree island in subalpine parkland with Tsuga mertensiana ≥ 5%
- Festuca viridula ≥ 10% [MORA, NOCA] ..... **ABILAS-TSUMER/FESVIR, p. A-101**
- Phyllodoce empetriformis + Vaccinium deliciosum ≥ 10%, both usually present
  - Abies lasiocarpa ≥ 5%, Pinus albicaulis < 1%..... **TSUMER-ABILAS/VACDEL-PHYEMP, p. A-108**
  - Abies lasiocarpa < 5%, Abies amabilis usually present ..... **TSUMER/PHYEMP-VACDEL, p. A-109**
- Rhododendron albiflorum ≥ 5%..... **TSUMER-ABIAMA/RHOALB, p. A-95**
- Rhododendron menziesii ≥ 5% [MORA, NOCA]..... **ABIAMA-TSUMER/MENFER, p. A-91**
- Vaccinium scoparium ≥ 5%..... **ABILAS-TSUMER/VACSCO, p. A-102**
- Vaccinium ovalifolium ≥ 5%
  - Streptopus lanceolatus or Tiarella trifoliata ≥ 3% ..... **ABIAMA-TSUMER/STRLAN, p. A-92**
  - Rubus pedatus or Xerophyllum tenax usually present..... **TSUMER-ABIAMA/VACALA/RUBPED, p. A-96**
- Xerophyllum tenax ≥ 5%, Vaccinium membranaceum present [MORA, OLYM] ..... **TSUMER-ABIAMA/VACMEM/XERTEN, p. A-97**

Vaccinium membranaceum ≥ 5%
Streptopus lanceolatus or Tiarella trifoliata ≥ 3% ..... **ABIAMA-TSUMER/STRLAN, p. A-92**
Valeriana sitchensis ≥ 3%, Heracleum maximum < 10% [NOCA, OLYM]
..... **TSUMER-ABIAMA/VACMEM/VALSIT, p. A-98**
Rubus lasiococcus usually present ..... **ABIAMA-TSUMER/VACMEM/RUBLAS, p. A-93**

Tiarella trifoliata or Streptopus lanceolatus ≥ 4% ..... **ABIAMA-TSUMER/STRLAN, p. A-92**

Abies amabilis or Abies procera ≥ 10%
Lysichiton americanus ≥ 5%, Gaultheria shallon ≥ 10%, Thuja plicata ≥ 20%. Wetland [MORA, OLYM]
..... **TSUHET-THUPLI/VACOVAL-GAUSHA/LYSAME, p. A-149**

Oplopanax horridus ≥ 10%
Callitropsis nootkatensis ≥ 50% of total tree cover, avalanche chute
..... **CALNOO/OPLHOR, p. A-123**
Not as above..... **ABIAMA-TSUHET/OPLHOR, p. A-121**

Rubus spectabilis ≥ 10%. Valley bottoms ..... **ABIAMA/RUBSPE-VACALA, p. A-122**

Abies lasiocarpa ≥ 15%
Xerophyllum tenax ≥ 5% [MORA, OLYM]..... **ABILAS-(ABIAMA)/VACMEM/XERTEN, p. A-99**
Valeriana sitchensis or Arnica latifolia ≥ 1% or Rubus lasiococcus ≥ 5%
..... **ABILAS-ABIAMA/VACMEM/VALSIT, p. A-100**

Rhododendron albiflorum ≥ 5%..... **ABIAMA/RHOALB, p. A-94**

Rhododendron menziesii ≥ 5% ..... **ABIAMA/MENFER, p. A-82**

Oxalis oregana ≥ 5% [OLYM]..... **TSUHET-ABIAMA/OXAORE-BLESPI, p. A-76**

Polystichum munitum ≥ 5% [MORA, OLYM]..... **ABIAMA/POLMUN, p. A-71**

Gaultheria shallon ≥ 5%
Struthiopteris spicant ≥ 1%, Pseudotsuga menziesii usually absent
Thuja plicata ≥ 15% [OLYM] ..... **TSUHET-THUPLI/GAUSHA/BLESPI, p. A-78**
Not as above [MORA, OLYM]..... **TSUHET-(ABIAMA)/GAUSHA/BLESPI, p. A-72**
Not as above..... **TSUHET-ABIAMA-PSEMEN/GAUSHA, p. A-74**

Vaccinium membranaceum ≥ 5%
Xerophyllum tenax ≥ 5% [MORA, OLYM]..... **ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN, p. A-79**
Valeriana sitchensis or Arnica latifolia ≥ 2% or Rubus lasiococcus ≥ 5%
..... **ABIAMA-(TSUHET)/VACMEM/ORTSEC, p. A-81**
Tiarella trifoliata + Maianthemum stellatum ≥ 5% [MORA, OLYM]
..... **ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN, p. A-79**
Vaccinium ovalifolium ≥ 5%..... **ABIAMA-(TSUHET)/VACMEM-VACALA, p. A-80**
Clintonia uniflora, Rubus lasiococcus, or Orthilia secunda present
..... **ABIAMA-(TSUHET)/VACMEM/ORTSEC, p. A-81**

Vaccinium ovalifolium ≥ 5%
Tiarella trifoliata + Streptopus lanceolatus + Maianthemum dilatatum ≥ 3%
..... **TSUHET-ABIAMA/VACALA/TIATRI, p. A-77**
Struthiopteris spicant ≥ 5%, Thuja plicata ≥ 15% .**TSUHET-ABIAMA-(THUPLI)/VACALA/BLESPI, p. A-73**
Clintonia uniflora + Rubus pedatus + Cornus unalaschkensis + Erythronium montanum ≥ 3%
..... **TSUHET-ABIAMA/VACALA/RUBPED, p. A-96**
Not as above..... **TSUHET-ABIAMA-(PSEMEN)/VACALA, p. A-83**

Xerophyllum tenax ≥ 5%, Vaccinium membranaceum present [MORA, OLYM]
..... **ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN, p. A-79**

Achlys triphylla ≥ 5% OR Acer circinatum ≥ 10% and Achlys triphylla present
Tiarella trifoliata + Maianthemum stellatum ≥ 5% [MORA, OLYM]
.....**ABIAMA-(PSEMEN)/ACHTRI-TIATRI, p. A-67**
Not as above [MORA, OLYM] ..... **ABIAMA-PSEMEN/ACHTRI, p. A-68**

Mahonia nervosa ≥ 5%..... **TSUHET-ABIAMA-PSEMEN/MAHNER, p. A-75**

Tiarella trifoliata + Streptopus lanceolatus + Rubus pedatus + Struthiopteris spicant ≥ 5%, Rubus spectabilis < 20%..... **ABIAMA-TSUHET/RUBPED-TIATRI, p. A-70**

Total cover of shrubs and herbs < 15%
Rubus pedatus + Struthiopteris spicant + Streptopus lanceolatus + Tiarella trifoliata ≥ 1%, herb-dominant
.....**ABIAMA-TSUHET/RUBPED-TIATRI, p. A-70**
Vaccinium ovalifolium ≥ Vaccinium membranaceum ..... **TSUHET-ABIAMA-(PSEMEN)/VACALA, p. A-83**
Orthilia secunda or Chimaphila menziesii usually present
..... **ABIAMA-TSUHET/(ORTSEC-CHIMEN), p. A-69**

Tsuga heterophylla or Thuja plicata ≥ 10%
Lysichiton americanus ≥ 5%. Wetland
Gaultheria shallon and Thuja plicata each ≥ 10%
Sphagnum spp. ≥ 10%, open woodland with stunted trees. Wetland [OLYM]
.....**THUPLI-TSUHET/LYSAME/SPHAGN, p. A-187**
Not as above [MORA, OLYM]..... **TSUHET-THUPLI/VACOVAL-GAUSHA/LYSAME, p. A-149**
Rubus spectabilis or Athyrium filix-femina present
.....**TSUHET-(THUPLI-ALNRUB)/LYSAME-ATHFIL, p. A-147**

Oplopanax horridus ≥ 10%. Riparian ..... **TSUHET-(PSEMEN)/OPLHOR/POLMUN, p. A-148**

Arctostaphylos nevadensis ≥ 10% [NOCA]..... **PSEMEN-PINCON/ARCNEV, p. A-29**

Rhododendron macrophyllum ≥ 10% [OLYM] ..... **PSEMEN-TSUHET/RHOMAC, p. A-52**

Rubus spectabilis ≥ 10%, not riparian or floodplain [MORA, OLYM]
.....**PSEMEN-TSUHET-(ALNRUB)/RUBSPE, p. A-33**

Oxalis oregana ≥ 5%
Pseudotsuga menziesii ≥ 10%, Vaccinium ovalifolium ≥ 5% [MORA, OLYM]
.....**TSUHET-PSEMEN/VACALA/OXAORE, p. A-41**
Vaccinium ovalifolium ≥ 10%, Pseudotsuga menziesii < 10% [OLYM]
..... **TSUHET/VACALA/OXAORE, p. A-44**
Gaultheria shallon ≥ 5% [OLYM] ..... **TSUHET/GAUSHA/POLMUN-BLESPI, p. A-42**
Struthiopteris spicant or Vaccinium ovalifolium present, Mahonia nervosa and/or Pseudotsuga menziesii absent [OLYM] ..... **TSUHET/POLMUN-OXAORE, p. A-43**
Not as above [MORA, OLYM] ..... **PSEMEN-TSUHET/POLMUN-OXAORE, p. A-37**

Gaultheria shallon ≥ 10%, Struthiopteris spicant ≥ 1%, Pseudotsuga menziesii not prominent
Vaccinium ovatum ≥ 5% [OLYM]..... **THUPLI-TSUHET/VACOVAT-GAUSHA, p. A-88**
Polystichum munitum ≥ 5% [OLYM]..... **TSUHET/GAUSHA/POLMUN-BLESPI, p. A-42**
Thuja plicata ≥ 15% [OLYM]..... **TSUHET-THUPLI/GAUSHA/BLESPI, p. A-78**
Not as above [OLYM] ..... **TSUHET-(ABIAMA)/GAUSHA/BLESPI, p. A-72**

Vaccinium ovalifolium ≥ 5%
Xerophyllum tenax ≥ 5%, Abies lasiocarpa and Callitropsis nootkatensis absent [MORA, OLYM]
.....**PSEMEN-TSUHET/VACALA/XERTEN, p. A-53**
Polystichum munitum ≥ 5% [NOCA, OLYM] ..... **TSUHET-(PSEMEN)/VACALA/POLMUN, p. A-39**
Mahonia nervosa or Gaultheria shallon ≥ 5%
.....**TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA), p. A-56**
Not as above..... **TSUHET-(PSEMEN)/VACALA/CORUNA, p. A-57**

Polystichum munitum ≥ 10%
- Struthiopteris spicant ≥ 5%, Tiarella trifoliata < 1%, Pseudotsuga menziesii <15% [MORA, OLYM] ..... **TSUHET/POLMUN-BLESPI, p. A-38**
- Tiarella trifoliata + Athyrium filix-femina ≥ 1% AND ≥ Mahonia nervosa + Gaultheria shallon ..... **TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL, p. A-40**
- Gaultheria shallon ≥ 5% ..... **PSEMEN-TSUHET/GAUSHA/POLMUN, p. A-35**
- Mahonia nervosa ≥ 5% ..... **PSEMEN-TSUHET/MAHNER-POLMUN, p. A-36**
- Rubus spectabilis ≥ 2% OR Tiarella trifoliata + Struthiopteris spicant + Athyrium filix-femina + Dryopteris expansa ≥ 3% ..... **TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL, p. A-40**
- Pseudotsuga menziesii present..... **PSEMEN-TSUHET/(ACECIR)/POLMUN, p. A-34**

Gaultheria shallon ≥ 10%
- Polystichum munitum ≥ 3% ..... **PSEMEN-TSUHET/GAUSHA/POLMUN, p. A-35**
- Rhododendron macrophyllum ≥ 5% [OLYM]..... **PSEMEN-TSUHET/RHOMAC, p. A-52**
- Holodiscus discolor ≥ 2% ..... **PSEMEN-TSUHET/GAUSHA-HOLDIS, p. A-61**
- Xerophyllum tenax ≥ 2% [MORA, OLYM]..... **PSEMEN-TSUHET/GAUSHA/XERTEN, p. A-50**
- Mahonia nervosa ≥ 5%..... **PSEMEN-TSUHET/GAUSHA-MAHNER, p. A-49**
- Vaccinium parvifolium usually present ..... **PSEMEN-TSUHET/GAUSHA-VACPAR, p. A-62**

Polystichum munitum and Struthiopteris spicant each ≥ 5%, Pseudotsuga menziesii usually < 15% [MORA, OLYM]..... **TSUHET/POLMUN-BLESPI, p. A-38**

Achlys triphylla ≥ 5%, Tiarella trifoliata < 5%, Gymnocarpium dryopteris <1% [MORA, OLYM] ..... **PSEMEN-TSUHET/ACHTRI, p. A-48**

Xerophyllum tenax ≥ 5%
- Abies lasiocarpa ≥ 10% [MORA, OLYM]..... **ABILAS-(ABIAMA)/VACMEM/XERTEN, p. A-99**
- Not as above (Vaccinium ovalifolium may be absent) [MORA, OLYM] ..... **PSEMEN-TSUHET/VACALA/XERTEN, p. A-53**

Tiarella trifoliata + Gymnocarpium dryopteris ≥ 5% ..... **TSUHET-(PSEMEN)/TIATRI-GYMDRY, p. A-17**

Mahonia nervosa ≥ 5%
- Polystichum munitum ≥ 3% ..... **PSEMEN-TSUHET/MAHNER-POLMUN, p. A-36**
- Gaultheria shallon ≥ 5% ..... **PSEMEN-TSUHET/GAUSHA-MAHNER, p. A-49**
- Not as above..... **PSEMEN-TSUHET/MAHNER, p. A-51**

Tiarella trifoliata or Gymnocarpium dryopteris present ..... **TSUHET-(PSEMEN)/TIATRI-GYMDRY, p. A-17**

Acer circinatum ≥ 5%
- Mahonia nervosa ≥ 3%, Vaccinium membranaceum < 5%..... **PSEMEN-TSUHET/MAHNER, p. A-51**
- Paxistima myrsinites ≥ 1%, Cornus unalaschkensis absent [NOCA] ..... **PSEMEN-(TSUHET)/ACECIR-PAXMYR, p. A-24**

Paxistima myrsinites ≥ 5%, Mahonia nervosa ≥ 3% ..... **PSEMEN-TSUHET/MAHNER, p. A-51**

Vaccinium membranaceum ≥ 5% [MORA, NOCA]..... **PSEMEN-(THUPLI-ABIGRA)/VACMEM, p. A-46**

Shrubs + herbs < 10%, Chimaphila menziesii, Chimaphila umbellata, or Corallorhiza sp. present, moist site indicators absent. Mahonia nervosa usually present. May be entirely depauperate ..... **TSUHET-PSEMEN/MAHNER-CHIMEN, p. A-58**

Betula papyrifera codominant [NOCA]..... **BETPAP-(THUPLI)/ACECIR/MAHNER, p. A-59**

Not as above, subalpine scrub or krummholz..... **TSUMER, p. A-110**

Abies lasiocarpa ≥ 10%, or stand is a tree island in subalpine parkland with Abies lasiocarpa ≥ 5%, OR Picea engelmannii ≥ 10% and > Abies grandis

Acer circinatum ≥ 5, open canopy on talus ..... **ABILAS-PSEMEN/ACECIR, p. A-18**

Mahonia nervosa or Achlys triphylla ≥ 5%, Pseudotsuga menziesii present [OLYM]
..... **ABILAS-PSEMEN/MAHNER, p. A-45**

Veratrum viride ≥ 10%..... **ABILAS/VALSIT-RUBLAS, p. A-104**

Vaccinium deliciosum ≥ 5%
Erythronium montanum ≥ 1%, Tsuga mertensiana ≥ 5% **TSUMER-ABILAS/VACDEL-PHYEMP, p. A-108**
Not as above..... **ABILAS/VACDEL, p. A-103**

Phyllodoce empetriformis and Vaccinium scoparium each ≥ 5%, herbaceous cover low or absent [NOCA]
..... **ABILAS/VALSIT-RUBLAS, p. A-104**

Rhododendron albiflorum ≥ 5%
Picea engelmannii, Vaccinium scoparium, or Vaccinium myrtillus ≥ 1% [NOCA]
..... **ABILAS-(PICENG)/RHOALB, p. A-3**
Rubus lasiococcus or Lupinus latifolius usually present .....**ABILAS/RHOALB/RUBLAS, p. A-2**

Vaccinium scoparium ≥ 5%
Valeriana sitchensis or Luzula hitchcockii ≥ 1% [MORA, NOCA]
..... **ABILAS-(CALNOO)/VACSCO/VALSIT, p. A-1**
Phyllodoce empetriformis ≥ 5%, herbaceous cover low or absent [NOCA]
..... **ABILAS/PHYEMP, p. A-113**

Festuca viridula ≥ 10%, shrub and dwarf-shrubs < 5% [MORA, NOCA].. **ABILAS-TSUMER/FESVIR, p. A-101**

Valeriana sitchensis or Arnica latifolia ≥ 5%
Veratrum viride ≥ 5% ..... **ABILAS/VALSIT-RUBLAS, p. A-104**
Vaccinium membranaceum ≥ 5%..... **ABILAS-ABIAMA/VACMEM/VALSIT, p. A-100**
Not as above..... **ABILAS/VALSIT-RUBLAS, p. A-104**

Rubus lasiococcus ≥ 5% or Erythronium montanum ≥ 10%..... **ABILAS/VALSIT-RUBLAS, p. A-104**

Vaccinium membranaceum ≥ 5%
Xerophyllum tenax ≥ 5% [MORA, OLYM]..... **ABILAS-(ABIAMA)/VACMEM/XERTEN, p. A-99**
Abies amabilis ≥ 1%, Valeriana sitchensis or Veratrum viride present
..... **ABILAS-ABIAMA/VACMEM/VALSIT, p. A-100**
Calamagrostis rubescens or Carex geyeri ≥ 1% [NOCA]..... **ABILAS/VACMEM, p. A-5**
Lupinus latifolius ≥ 1% [MORA, OLYM]..... **ABILAS/VACMEM/LUPARC, p. A-4**

Juniperus communis ≥ 5% and > Lupinus latifolius, Lomatium martindalei usually present [OLYM]
..... **ABILAS-(PINCON)/JUNCOM-LOMMAR, p. A-111**

Lupinus latifolius ≥ 3%, Valeriana sitchensis, Luzula hitchcockii, Carex spectabilis < 3% [OLYM]
..... **ABILAS-(PINCON)/LUPARC, p. A-112**

Vaccinium scoparium + Vaccinium myrtillus ≥ 10%, Picea engelmannii present [NOCA]
.....**ABILAS-PICENG/VACSCO, p. A-6**

Arnica latifolia or Valeriana sitchensis ≥ 1% ..... **ABILAS/VALSIT-RUBLAS, p. A-104**

Pedicularis racemosa, Polemonium pulcherrimum, Bistorta bistortoides ≥ 1% [OLYM]
..... **ABILAS-(PINCON)/LUPARC, p. A-112**

Callitropsis nootkatensis ≥ 10%
Oplopanax horridus ≥ 10%, avalanche chute [OLYM] ..... **CALNOO/OPLHOR, p. A-123**

Valeriana sitchensis ≥ 5%, Abies lasiocarpa often prominent, forest setting
..... **ABILAS-ABIAMA/VACMEM/VALSIT, p. A-100**

Tiarella trifoliata + Streptopus lanceolatus + Rubus pedatus ≥ 2%, Abies lasiocarpa not prominent, avalanche chute ..... **CALNOO-(ACECIR-PAXMYR), p. A-107**

Abies grandis ≥ 10%
Oplopanax horridus ≥ 10%..... **TSUHET-(PSEMEN)/OPLHOR/POLMUN, p. A-148**

Polystichum munitum ≥ 5%
Gaultheria shallon or Mahonia nervosa ≥ 5% [OLYM]
..... **PSEMEN-ABIGRA/MAHNER-GAUSHA/POLMUN, p. A-114**
Acer circinatum ≥ 10% ..... **PSEMEN-ABIGRA/ACECIR/POLMUN, p. A-47**

Vaccinium membranaceum ≥ 5% [MORA, NOCA] ..... **PSEMEN-(THUPLI-ABIGRA)/VACMEM, p. A-46**

Acer circinatum ≥ 5%, Paxistima myrsinites present [NOCA] **PSEMEN-(ABIGRA)/ACECIR-PAXMYR, p. A-22**

Pseudotsuga menziesii ≥ 10%
Pinus contorta ≥ 25% ..... **PINCON key, p. A-14**

Polystichum munitum ≥ 10%
Gaultheria shallon or Mahonia nervosa ≥ 5% [MORA, OLYM]
.....**PSEMEN/GAUSHA-MAHNER/POLMUN, p. A-65**
Acer circinatum ≥ 10%..... **PSEMEN-TSUHET/(ACECIR)/POLMUN, p. A-34**

Arctostaphylos nevadensis ≥ 10%, Pinus contorta > Pinus ponderosa [NOCA]
.....**PSEMEN-PINCON/ARCNEV, p. A-29**

Arctostaphylos nevadensis ≥ 10%, Pinus ponderosa > Pinus contorta [NOCA]
..... **PSEMEN-PINPON/ARCNEV-PAXMYR, p. A-25**

Arctostaphylos uva-ursi ≥ 10%, Racomitrium spp. or Cladonia spp. ≥ 1%, west of Cascade Crest
..... **PSEMEN-(PINCON)/ARCUVA/RACCAN, p. A-60**

Gaultheria shallon ≥ 5%, Holodiscus discolor ≥ 2% [OLYM] ..... **PSEMEN/GAUSHA-HOLDIS, p. A-64**

Gaultheria shallon ≥ 5%, Vaccinium parvifolium present.....**PSEMEN/GAUSHA-VACPAR, p. A-66**

Mahonia nervosa ≥ 5%
Acer circinatum ≥ 10% [MORA, NOCA] ..... **PSEMEN/ACECIR/MAHNER, p. A-54**
Holodiscus discolor + Rosa gymnocarpa ≥ 5%, Polystichum munitum or Festuca occidentalis ≥ 1%, Calamagrostis rubescens absent, west of Cascade Crest
..... **PSEMEN/HOLDIS-ROSGYM/FESOCC, p. A-115**
Achlys triphylla ≥ 1% [MORA, OLYM] ..... **PSEMEN/MAHNER/ACHTRI, p. A-55**
Calamagrostis rubescens or Carex geyeri present, Spiraea lucida ≥ 1% [NOCA]
..... **PSEMEN/HOLDIS/CALRUB, p. A-26**

Vaccinium membranaceum ≥ 5%
Vaccinium parvifolium ≥ 1% [MORA, NOCA] ..... **PSEMEN-(THUPLI-ABIGRA)/VACMEM, p. A-46**
Calamagrostis rubescens or Carex geyeri ≥ 1% [NOCA]..... **PSEMEN/VACMEM, p. A-16**

Acer circinatum ≥ 5%
Cryptogramma acrostichoides usually present. Open woodland on talus.
..... **PSEMEN/ACECIR-(HOLDIS), p. A-63**
Holodiscus discolor + Rosa gymnocarpa ≥ 5%, Polystichum munitum or Festuca occidentalis present
..... **PSEMEN/HOLDIS-ROSGYM/FESOCC, p. A-115**
Paxistima myrsinites present [NOCA] ..... **PSEMEN-(ABIGRA)/ACECIR-PAXMYR, p. A-22**

Symphoricarpos albus ≥ 5%, Spiraea lucida ≥ 2% [NOCA]..... **PSEMEN-(PINPON)/SYMALB, p. A-23**

Holodiscus discolor + Rosa gymnocarpa ≥ 5%
Spiraea lucida, Calamagrostis rubescens, or Arnica cordifolia present [NOCA]
..... **PSEMEN/HOLDIS/CALRUB, p. A-26**
Polystichum munitum, Lathyrus nevadensis, Symphoricarpos mollis, Bromus vulgaris, Adenocaulon bicolor, or Festuca occidentalis present..... **PSEMEN/HOLDIS-ROSGYM/FESOCC, p. A-115**

Paxistima myrsinites ≥ 5% [NOCA]..... **PSEMEN/PAXMYR-SPIBET, p. A-27**

Calamagrostis rubescens ≥ 5% [NOCA]..... **PSEMEN/CALRUB, p. A-28**

Not as above, open woodland on talus..... **PSEMEN/ACECIR-(HOLDIS), p. A-63**

Pinus ponderosa ≥ 10%
Arctostaphylos nevadensis ≥ 10% [NOCA]..... **PSEMEN-PINPON/ARCNEV-PAXMYR, p. A-25**

Pinus contorta ≥ 10%
Rhododendron groenlandicum + Kalmia microphylla ≥ 10% [OLYM]
..... **PINCON/LEDGRO/SPHAGN, p. A-185**

Arctostaphylos uva-ursi ≥ 10%, Racomitrium spp. or Cladonia spp. ≥ 1%, west of Cascade Crest
..... **PSEMEN-(PINCON)/ARCUVA/RACCAN, p. A-60**

Gaultheria shallon ≥ 5% [NOCA, OLYM] ..... **PINCON-PSEMEN/GAUSHA, p. A-30**

Vaccinium membranaceum ≥ 5% [NOCA]..... **PINCON/VACMEM, p. A-8**

Arctostaphylos nevadensis ≥ 10% [NOCA]..... **PSEMEN-PINCON/ARCNEV, p. A-29**

Juniperus communis ≥ 5% and > Lupinus latifolius, Abies lasiocarpa present [OLYM]
..... **ABILAS-(PINCON)/JUNCOM-LOMMAR, p. A-111**

Lupinus latifolius ≥ 3%, Abies lasiocarpa present [OLYM] ..... **ABILAS-(PINCON)/LUPARC, p. A-112**

Paxistima myrsinites ≥ 5% or Calamagrostis rubescens ≥ 1% [NOCA] ..... **PINCON/CALRUB, p. A-7**

Key to Upland Shrublands

Tsuga mertensiana dominant, subalpine scrub or krummholz..... **TSUMER, p. A-110**

Abies lasiocarpa dominant or codominant with Callitropsis nootkatensis, subalpine scrub or krummholz, not avalanche-related..... **ABILAS-(CALNOO), p. A-106**

Pinus albicaulis dominant, subalpine scrub or Krummholz [NOCA]..... **PINALB, p. A-15**

Populus tremuloides the dominant tall shrub, talus slopes [NOCA]..... **POPTRE-PAXMYR, p. A-151**

Acer macrophyllum the dominant tall shrub, Acer circinatum or Acer glabrum often codominate [NOCA]
Rubus nutkanus + Maianthemum racemosum ≥ 5%, mesic toes slope or moist avalanche chute [NOCA]
..... **ACEMAC/RUBPAR/MAIRAC, p. A-20**

Paxistima myrsinites present, debris apron or dry avalanche chute [NOCA]
..... **ACEMAC/ACECIR-PAXMYR-(CORCOR), p. A-19**

Shrub-form Callitropsis nootkatensis (scrubby, but not krummholz) ≥ 15%, Alnus viridis + Oplopanax horridus ≥ 10%, avalanche chute [OLYM] ..... **CALNOO/OPLHOR, p. A-123**

Alnus viridis ≥ 10%
Oplopanax horridus ≥ 10% or Rubus spectabilis or Ribes bracteosum present, often avalanche chute
..... **ALNVIR-RUBSPE-(OPLHOR), p. A-190**

Acer circinatum ≥ 10% ..... **ALNVIR-ACECIR, p. A-191**

Thalictrum occidentale + Viola glabella + Hydrophyllum fendleri + Heracleum maximum + other mesic forbs ≥ 5% AND Athyrium filix-femina < 1%. Sambucus racemosa, Rubus nutkanus, Sorbus spp. usually present AND Athyrium filix-femina and other ferns absent or minor ..... **ALNVIR Mesic, p. A-205**

Acer circinatum dominant
Rubus spectabilis, Oplopanax horridus, Athyrium filix-femina, Tolmiea menziesii, Maianthemum stellatum or Stachys cooleyae present. Riparian..... **ACECIR/ATHFIL-TOLMEN, p. A-189**

Acer macrophyllum prominent [NOCA]..... **ACEMAC/ACECIR-PAXMYR-(CORCOR), p. A-19**

Not as above. Little or no understory. Pteridium aquilinum, Ribes bracteosum, Rubus nutkanus, Achlys triphylla, Linnaea borealis, Mahonia nervosa, Rosa pisocarpa often present but usually < 10% each
..... **ACECIR/(PTEAQU), p. A-188**

Salix sitchensis dominant. Riparian [MORA, OLYM]..... **SALSIT/EQUARV-PETFRI, p. A-195**

Rubus nutkanus dominant, Chamaenerion angustifolium or Pteridium aquilinum ≥ 1%
..... **RUBPAR/CHAANG-HERMAX, p. A-152**

Oplopanax horridus dominant ..... **OPLHOR Pacific, p. A-193**

Spiraea splendens dominant; Carex spectabilis or Bistorta bistortoides dominate or codominate herb layer
..... **SPISPL/CARSPE-(POLBIS), p. A-155**

Vaccinium membranaceum + Vaccinium deliciosum ≥ 15% and Xerophyllum tenax ≥ 5% [MORA, OLYM]
..... **VACMEM/XERTEN, p. A-158**

Vaccinium membranaceum ≥ 15%, Xerophyllum tenax absent..... **VACMEM-(SORSIT)/(CALRUB), p. A-157**

Arctostaphylos columbiana the dominant shrub [OLYM] ..... **ARCCOL, p. A-171**

Ceanothus velutinus ≥ 15%

Prunus emarginata and/or Amelanchier alnifolia codominant, Maianthemum racemosum, Eucephalus engelmannii, and or Prosartes hookeri usually present [NOCA]..... **CEAVEL-AMEALN/MAIRAC, p. A-180**

Not as above, Calamagrostis rubescens usually dominates herb layer [NOCA]..... **CEAVEL, p. A-181**

Salix scouleriana and/or Acer glabrum dominant, Amelanchier alnifolia and/or Paxistima myrsinites usually prominent to codominant [NOCA] ..... **SALSCO-ACEGLA-(CEAVEL), p. A-182**

Paxistima myrsinites ≥ 10%, Phlox diffusa ≥ 5% [NOCA, OLYM] ..... **PAXMYR/PHLDIF, p. A-161**

Sorbus sitchensis ≥ 10%, Phyllodoce empetriformis or Vaccinium deliciosum ≥ 5%, often avalanche chute/slope ..... **SORSIT/VACDEL-(PHYEMP), p. A-154**

Symphoricarpos albus ≥ 10%, Holodiscus discolor ≥ 3%, avalanche chute or debris apron [OLYM] ..... **SYMALB-HOLDIS, p. A-153**

Gaultheria shallon ≥ 25%, coastal bluffs [OLYM] ..... **GAUSHA-VACOVAT/PTEAQU, p. A-163**

Acer circinatum and/or Holodiscus discolor most abundant, open woodland on talus ..... **PSEMEN/ACECIR-(HOLDIS), p. A-63**

Key to Upland Dwarf-shrublands

Kalmia microphylla dominant, Carex nigricans ≥ 10%, Vaccinium deliciosum and Phyllodoce empetriformis often present [MORA, NOCA] ..... **KALMIC/CARNIG, p. A-198**

Empetrum nigrum dominant, alpine ..... **EMPNIG-LUPSEL, p. A-210**

Arctostaphylos uva-ursi or Arctostaphylos nevadensis the dominant dwarf-shrub
- Dasiphora fruticosa, Empetrum nigrum, Carex nigricans, and/or Artemisia furcata present, alpine [MORA] ..... **ARCUVA, p. A-217**

- Paxistima myrsinites, Calamagrostis rubescens, and/or Pseudoroegneria spicata prominent, middle elevations [NOCA] ..... **ARC(NEV,UVA)-PAXMYR/PSESPI, p. A-159**
- Juniperus communis, Penstemon davidsonii, and Arctostaphylos nevadensis absent, Fragaria virginiana or Festuca roemeri present, low to middle elevations [NOCA, OLYM] ..... **ARCUVA-FRAVIR-(FESROE), p. A-169**

Phyllodoce glanduliflora ≥ 10% ..... **PHYGLA/OREALP, p. A-211**

Phyllodoce empetriformis ≥ 10%
- Lupinus latifolius > Vaccinium deliciosum + Cassiope mertensiana, at or above treeline ..... **PHYEMP/LUPLAT, p. A-214**

- Vaccinium deliciosum > Cassiope mertensiana, tree cover often ≥ 5%, subalpine parkland ..... **PHYEMP-VACDEL, p. A-213**

- Vaccinium deliciosum < Cassiope mertensiana, trees usually absent, alpine ..... **CASMER-PHYEMP, p. A-212**

Cassiope mertensiana ≥ 10%
- Vaccinium deliciosum > Cassiope mertensiana, tree cover often ≥ 5%, subalpine parkland ..... **PHYEMP-VACDEL, p. A-213**

- Not as above ..... **CASMER-PHYEMP, p. A-212**

Vaccinium membranaceum + Vaccinium deliciosum ≥ 15% and Xerophyllum tenax ≥ 5% [MORA, OLYM] ..... **VACMEM/XERTEN, p. A-158**

Spiraea splendens dominant; Carex spectabilis or Bistorta bistortoides dominate or codominate herb layer ..... **SPISPL/CARSPE-(POLBIS), p. A-155**

Vaccinium deliciosum dominant
- Tauschia stricklandii ≥ 5% [MORA] ..... **TAUSTR-VACDEL, p. A-215**

- Festuca viridula prominent [MORA, NOCA] ..... **VAC(DEL,SCO)/FESVIR, p. A-156**

- Spiraea splendens codominant ..... **SPISPL/CARSPE-(POLBIS), p. A-155**

- Phyllodoce empetriformis + Cassiope mertensiana < 10%, Vaccinium deliciosum clearly > herbaceous cover, otherwise see Upland Herbaceous Vegetation Key (p. A-18) ..... **VACDEL, p. A-216**

Vaccinium scoparium dominant, Festuca viridula prominent [MORA, NOCA] ..... **VAC(DEL,SCO)/FESVIR, p. A-156**

Juniperus communis dominant [MORA, OLYM] ..... **JUNCOM-PHLDIF, p. A-160**

Dasiphora fruticosa ≥ 10% [MORA, OLYM] ..... **DASFRU-(PHLDIF), p. A-220**

Key to Upland Herbaceous Vegetation

Calamagrostis nutkaensis dominant ..... **CALNUT-ELYGLA, p. A-162**

Carex breweri dominant ..... **CARBRE, p. A-234**

Juncus parryi dominant
- Lewisia columbiana ≥ 3% [NOCA] ..... **LEWCOL-(JUNPAR), p. A-225**
- Not as above [MORA, OLYM] ..... **JUNPAR-(POLBIS), p. A-230**

Luetkea pectinata dominant ..... **LUEPEC-SAXTOL, p. A-232**

Antennaria lanata dominant
- Juncus parryi codominant [MORA, OLYM] ..... **JUNPAR-(POLBIS), p. A-230**
- Not as above [MORA, OLYM] ..... **ANTLAN, p. A-229**

Festuca roemeri ≥ 10%
- Phlox diffusa ≥ 1%, or Arenaria capillaris and/or Delphinium glareosum present, alpine/subalpine [OLYM] ..... **FESROE-PHLDIF-ARECAP, p. A-235**
- Plectritis congesta ≥ 5% [OLYM] ..... **FESROE-PLECON, p. A-166**
- Cerastium arvense or Koeleria macrantha usually present [OLYM] ..... **FESROE-CERARV-KOEMAC, p. A-165**

Bromus sitchensis dominant, Carex phaeocephala usually prominent to codominant, avalanche chutes [OLYM] ..... **BROSIT-CARPHA, p. A-227**

Festuca viridula ≥ 10%
- Valeriana sitchensis ≥ 10% ..... **VALSIT-LIGGRA, p. A-177**
- Eucephalus (engelmannii, ledophyllus) ≥ 5% [MORA, NOCA] ..... **FESVIR-EUC(ENG,LED), p. A-174**
- Eremogone capillaris and/or Phlox diffusa ≥ 5%, Carex spectabilis < 5% [NOCA] ..... **FESVIR-(PHLDIF-ARECAP) p. A-235**
- Lupinus latifolius ≥ 5% [MORA, NOCA] ..... **FESVIR-LUPLAT, p. A-175**

Saussurea americana ≥ 10% [OLYM] ..... **SAUAME-HERMAX, p. A-202**

Veratrum viride dominant ..... **VALSIT-VERVIR, p. A-178**

Carex spectabilis ≥ 10%
- Phlox diffusa ≥ 3%, Lupinus lepidus var. lobbii or Pedicularis contorta ≥ 2%, alpine [MORA, OLYM] ..... **PHLDIF-LUPSEL-(PEDCON), p. A-236**
- Carex nigricans present, Potentilla flabellifolia ≥ 5% and > Caltha leptosepala and Leptarrhena pyrolifolia, Salix commutata and other high elevation dwarf willows typically absent ..... **CARSPE-POTFLA, p. A-200**
- Lupinus latifolius and Bistorta bistortoides present (at least one ≥ 5%), subalpine ..... **CARSPE-POLBIS, p. A-228**
- Veratrum viride ≥ 5% ..... **VALSIT-VERVIR, p. A-178**
- Valeriana sitchensis ≥ 15% ..... **VALSIT-CARSPE, p. A-176**
- Eucephalus ledophyllus ≥ 5%, Festuca viridula > Carex spectabilis [MORA]

..... **FESVIR-EUC(ENG,LED), p. A-174**

Lupinus latifolius or Bistorta bistortoides ≥ 1% ..... **CARSPE-POLBIS, p. A-228**

Xerophyllum tenax ≥ 15%
Vaccinium membranaceum + Vaccinium deliciosum ≥ 10% ..... **VACMEM/XERTEN, p. A-158**

Valeriana sitchensis ≥ 10%
Festuca viridula, Ligusticum grayi, or Eucephalus ledophyllus ≥ 3% ..... **VALSIT-LIGGRA, p. A-177**

Carex spectabilis ≥ 5%..... **VALSIT-CARSPE, p. A-176**

Carex nigricans ≥ 10%
Kalmia microphylla ≥ 5%, Vaccinium deliciosum and Phyllodoce empetriformis often present [MORA, NOCA]
..... **KALMIC/CARNIG, p. A-198**

Carex nigricans ≥ 25%, Caltha leptosepala absent ..... **CARNIG, p. A-199**

Micranthes tolmiei and/or Luzula piperi prominent, rocky sites ..... **SAXTOL-LUZPIP, p. A-233**

Eucephalus paucicapitatus dominant [OLYM]..... **EUCPAU-(PHAHAS-CASMIN), p. A-222**

Phlox diffusa ≥ 10%
Lupinus lepidus var. lobbii or Pedicularis contorta ≥ 2%, alpine [MORA, OLYM]
..... **PHLDIF-LUPSEL-(PEDCON), p. A-236**

Carex phaeocephala ≥ 1%, Arenaria capillaris, subalpine and lower..... **PHLDIF-(LOMMAR), p. A-224**

Festuca roemeri ≥ 5%, subalpine/alpine [OLYM]..... **FESROE-PHLDIF-ARECAP, p. A-235**

Luina hypoleuca ≥ 1%, unstable slopes..... **LUIHYP-(LOMMAR-CASPAR), p. A-223**

Lomatium martindalei present, subalpine and lower ..... **PHLDIF-(LOMMAR), p. A-224**

Heracleum maximum dominant..... **HERMAX, p. A-201**

Luina hypoleuca dominant..... **LUIHYP-(LOMMAR-CASPAR), p. A-223**

Paxistima myrsinites dominant (or most abundant), Saxifraga divergens often present**PAXMYR/PHLDIF, p. A-161**

Artemisia ludoviciana dominant..... **ARTLUD-LOMMAR, p. A-218**

Polygonum davisiae dominant..... **ERIPYR-POLDAV, p. A-231**

Danthonia intermedia ≥ 10%
Potentilla flabellifolia or Oreostemma alpigenum codominant [MORA] ..**DANINT-POTFLA-(FESVIR), p. A-172**

Racomitrium spp. dominates nonvascular layer [MORA, NOCA]..... **DANINT-RACCAN, p. A-164**

Koeleria macrantha ≥ 10% or dominant [MORA, NOCA]..... **KOEMAC-(AGRPAL-RACCAN), p. A-167**

Pseudoroegneria spicata ≥ 10% or dominant [NOCA]..... **PSESPI-(CALRUB)/(RACCAN), p. A-150**

Athyrium distentifolium ssp. americanum the most abundant vascular plant
..... **ATHAME-CRYACR, p. A-208**

Carex scirpoidea dominant, Valeriana sitchensis and/or Veratrum viride present..... **VALSIT-VERVIR, p. A-178**

Exotic pasture grasses (e.g., Agrostis stolonifera, Agrostis capillaris, Holcus lanatus) dominant
..... **AGR(CAP,STO), p. A-179**

Key to Upland Bryophyte and Sparse Vegetation

Lewisia columbiana most abundant herb [NOCA] ..... **LEWCOL-(JUNPAR), p. A-225**

Luetkea pectinata dominant vascular plant ..... **LUEPEC-SAXTOL, p. A-232**

Micranthes tolmiei and Luzula piperi present (Carex nigricans may have higher cover), rocky alpine sites ..... **SAXTOL-LUZPIP, p. A-233**

Eriogonum pyrolifolium and/or Polygonum davisiae dominant vascular plant [MORA, NOCA] ..... **ERIPYR-POLDAV, p. A-231**

Athyrium distentifolium ssp. americanum dominant vascular plant ..... **ATHAME-CRYACR, p. A-208**

Chamaenerion latifolium and/or Oxyria digyna dominant vascular plants, Valeriana sitchensis may codominate [NOCA] ..... **CHALAT-OXYDIG-(VALSIT), p. A-219**

Elmera racemosa dominant vascular plant [NOCA, OLYM] ..... **ELMRAC, p. A-221**

Dasiphora fruticosa dominant vascular plant [MORA, OLYM] ..... **DASFRU-(PHLDIF), p. A-220**

Racomitrium spp. dominant, Penstemon davidsonii present [NOCA] ..... **RACCAN-(PENDAV), p. A-170**

Phlox diffusa ≥ 10%, Carex phaeocephala ≥ 1%, Arenaria capillaris usually present, subalpine ..... **PHLDIF-(LOMMAR), p. A-224**

Juniperus communis dominant vascular plant [MORA, OLYM] ..... **JUNCOM-PHLDIF, p. A-160**

Saxifraga bronchialis dominant vascular plant ..... **SAXBRO, p. A-209**

Luina hypoleuca dominant vascular plant ..... **LUIHYP-(LOMMAR-CASPAR), p. A-223**

Artemisia ludoviciana dominant vascular plant ..... **ARTLUD-LOMMAR, p. A-218**

Phlox diffusa dominant vascular plant ..... **PHLDIF-(LOMMAR), p. A-224**

Carex spectabilis dominant vascular plant ..... **LUEPEC-SAXTOL, p. A-232**

Valeriana sitchensis dominant vascular plant ..... **VALSIT-CARSPE, p. A-176**

Polygonum minimum dominant vascular plant, Racomitrium elongatum dominant moss ..... **POLMIN-RACELO, p. A-168**

Penstemon davidsonii most abundant vascular plant ..... **PENDAV, p. A-226**

The following associations were not sampled during map training data collection, but may be found in very small patches in alpine areas. Several are restricted to the Olympic Mountains and dominated by rare endemic plants. For full descriptions, see Crawford et al. (2009):

Arnica ovata most abundant vascular plant [OLYM] ..... **ARNXDIV Lithomorphic, Crawford et al. (2009) p. A-333**

Astragalus australis var. cottonii most abundant vascular plant [OLYM] ..... **ASTCOT Lithomorphic, Crawford et al. (2009) p. A-334**

Delphinium glareosum most abundant vascular plant ..... **DELGLA Lithomorphic, Crawford et al. (2009) p. A-329**

Campanula piperi most abundant vascular plant [OLYM]
.....**CAMPIP Lithomorphic, Crawford et al. (2009) p. A-323**

Petrophytum hendersonii most abundant vascular plant [OLYM]
..... **PETHEN Lithomorphic, Crawford et al. (2009) p. A-341**

Key to Wetland and Riparian Conifer Forests and Woodlands

Sphagnum prominent to dominant in ground layer [OLYM]

Pinus contorta dominant, Rhododendron groenlandicum ≥ 10%, Sphagnum ≥ 20% ..... **PINCON/LEDGRO/SPHAGN, p. A-185**

Tsuga heterophylla or **Thuja plicata** dominant

Carex spp. prominent to dominant (C. obnupta, C. echinata, C. aquatilis var. dives, and/or C. utriculata are typical) AND Rhododendron groenlandicum present to codominant. Outer Coast ..... **TSUHET-(THUPLI)/LEDGRO/CAR(OBN,UTR)/SPHAGN, p. B-31**

Lysichiton americanus and Struthiopteris spicant abundant. Gaultheria shallon, Rhododendron menziesii, Frangula purshiana, and Vaccinium ovalifolium dominate the shrub layer AND > Rhododendron groenlandicum. Shrubs often rooted on woody debris. Sphagnum ≥ 10%. Trees can be large, but often have broken tops..... **THUPLI-TSUHET/LYSAME/SPHAGN, p. A-187**

Rhododendron groenlandicum + Kalmia microphylla ≥ 10% AND Sphagnum ≥ 25% beneath open canopy of stunted to moderately tall Tsuga heterophylla and/or Thuja plicata. Gaultheria shallon may codominate shrub layer..... **TSUHET-(THUPLI)/LEDGRO/SPHAGN, p. A-186**

Picea sitchensis ≥ 10%

Tsuga heterophylla and Alnus rubra codominant AND Oxalis oregana and Chrysosplenium glechomifolium ≥ 15% [OLYM] ..... **PICSIT-ALNRUB/LYSAME-CHRGLE, p. B-19**

Carex obnupta and/or Lysichiton americanus present to dominant, Alnus rubra usually present to codominant [OLYM]..... **PICSIT/RUBSPE/CAROBN-LYSAME, p. A-146**

Oplopanax horridus ≥ 25% [OLYM] ..... **PICSIT-TSUHET-(ALNRUB)/OPLHOR/POLMUN, p. A-145**

Rubus spectabilis dominant shrub [OLYM]..... **PICSIT-(ALNRUB)/RUBSPE/POLMUN, p. A-125**

Oxalis oregana ≥ 5% [OLYM]..... **PICSIT-TSUHET/POLMUN-OXAORE, p. A-89**

Polystichum munitum ≥ 5% [MORA, OLYM]..... **PICSIT-TSUHET/POLMUN, p. A-90**

Callitropsis nootkatensis dominant and Oplopanax horridus or Alnus viridis dominant shrubs. Avalanche chutes [OLYM] ..... **CALNOO/OPLHOR, p. A-123**

Tsuga mertensiana ≥ 10% and Caltha leptosepala or C. biflora ≥ 5% ..... **TSUMER-ABIAMA/CALLEP, p. A-124**

Abies amabilis or Abies procera ≥ 10%

Oplopanax horridus ≥ 10%..... **ABIAMA-TSUHET/OPLHOR, p. A-121**

Rubus spectabilis ≥ 10%. Valley bottoms ..... **ABIAMA/RUBSPE-VACALA, p. A-122**

Lysichiton americanus ≥ 5%, Gaultheria shallon ≥ 10%, Thuja plicata ≥ 20% [MORA, OLYM] ..... **TSUHET-THUPLI/VACOVAL-GAUSHA/LYSAME, p. A-149**

Tsuga heterophylla or Thuja plicata ≥ 10%
Oplopanax horridus ≥ 10%
Rubus spectabilis present. Other maritime species prominent (e.g. Polystichum munitum, Struthiopteris spicant, Vaccinium parvifolium, V. ovalifolium, Gaultheria shallon, Oxalis oregana, and/or Maianthemum dilatatum)..... **TSUHET-(PSEMEN)/OPLHOR/POLMUN, p. A-148**

Maritime-associated species generally absent or low in cover. Abies grandis, Asarum caudatum, and/or Ribes lacustre present. Near Cascade Crest and east [NOCA] . **THUPLI-TSUHET/OPLHOR, p. A-117**

Lysichiton americanus ≥ 5%, usually dominant or codominant herb
Picea engelmannii ≥ 10% [NOCA]..... **PICENG-TSUHET/LYSAME, p. B-5**
Gaultheria shallon ≥ 10% [MORA, OLYM] ..... **TSUHET-THUPLI/VACOVAL-GAUSHA/LYSAME, p. A-149**
Rubus spectabilis or Athyrium filix-femina dominant [OLYM] ..... **TSUHET-(THUPLI-ALNRUB)/LYSAME-ATHFIL, p. A-147**

Acer circinatum ≥ 10%, Abies grandis and/or Picea engelmannii ≥ 5% [eastern NOCA] ..... **THUPLI-(ABIGRA)/ACECIR, p. B-8**

Athyrium filix-femina ≥ 5%, Abies grandis, Picea engelmannii, Asarum caudatum, Alnus incana, or Actaea rubra present ..... **THUPLI/ATHFIL, p. B-6**

Polystichum munitum + Athyrium filix-femina + Tiarella trifoliata ≥ 15%. Rubus spectabilis often present ..... **TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL, p. A- 40**

Abies lasiocarpa ≥ 10% OR Picea engelmannii ≥ 10% and > Abies grandis
Lysichiton americanus ≥ 5% ..... **PICENG-TSUHET/LYSAME, p. B-5**

Equisetum arvense ≥ 10%, Carex disperma may be present to prominent ..... **PICENG/EQUARV, p. A-116**

Callitropsis nootkatensis ≥ 10%
Oplopanax horridus ≥ 10%, avalanche chute ..... **CALNOO/OPLHOR, p. A-123**

Abies grandis ≥ 10%, Oplopanax horridus ≥ 10%..... **TSUHET-(PSEMEN)/OPLHOR/POLMUN, p. A-148**

Key to Shrub Swamps and Carrs

Betula glandulosa ≥ 50%, Carex aquatilis var. dives ≥ 30%. Cascades ..... **BETGLA/CARAQUD, p. B-27**

Kalmia microphylla ≥ 5%, Carex nigricans ≥ 10%, Vaccinium deliciosum and Phyllodoce empetriformis often present [MORA, NOCA] ..... **KALMIC/CARNIG, p. A-198**

Oplopanax horridus ≥ 30%. Acer circinatum, Ribes bracteosum, or Rubus nutkanus often ≥ 10% ..... **OPLHOR Pacific, p. A-193**

Rhododendron groenlandicum or Kalmia microphylla dominant, Sphagnum dominant or codominant in ground layer [OLYM]

- Empetrum nigrum prominent to codominant, Pinus contorta absent or minor ..... **KALMIC-VACOXY/EMPNIG/SPHAGN, p. B-22**
- Carex livida or C. obnupta prominent .....**KALMIC-VACOXY/CAR(LIV,OBN)/SPHAGN, p. B-22**
- Myrica gale ≥ 25%.....**LEDGRO-MYRGAL/SPHAGN, p. B-24**
- Carex aquatilis var. dives, Carex echinata, or other sedges present. Caltha biflora or C. leptosepala often present. Montane to subalpine .....**KALMIC/CAREX-CALLEP/SPHAGN, p. B-26**
- Rhododendron groenlandicum ≥ 10% and stunted Pinus contorta var. contorta ≥ 10% (many individuals < 5m tall) ..... **PINCON/LEDGRO/SPHAGN, p. A-185**
- Site is most often a floating/quaking mat, often adjacent to open water. The shrub layer is usually open and short (< 50 cm). Sphagnum forms low hummocks. Rhynchospora alba is sometimes prominent throughout the site (not limited to hollows or low points) .....**KALMIC-VACOXY/SPHAGN, p. B-22**
- Sphagnum forms moderate to well-developed hummocks. The shrub layer is open to quite dense and usually ≥ 50 cm tall. Rhyncospora alba, if present, is limited to a few individuals or small patches in hollows or low points ..... **LEDGRO-KALMIC/SPHAGN, p. A-183**

Myrica gale dominant to codominant [OLYM]

- Rhododendron groenlandicum codominant. Kalmia microphylla may be present to codominant. Spiraea douglasii absent or minor (always < 10 %) AND Sphagnum codominant .....**LEDGRO-MYRGAL/SPHAGN, p. B-24**
- Spiraea douglasii ≥ 10% and Sphagnum codominant ..... **MYRGAL-SPIDOU/SPHAGN, p. B-24**
- Sanguisorba officinalis and Sphagnum both present to codominant. Carex aquatilis var. dives or C. utriculata often codominant ..... **MYRGAL/SANOFF/SPHAGN, p. B-24**
- Boykinia sp. present to codominant, Carex obnupta present to codominant ..... **MYRGAL/BOYINT-CAROBN, p. B-37**
- Carex utriculata or Carex aquatilis var. dives codominant (typically ≥ 10%) .....**MYRGAL/CAR(AQUD,UTR), p. B-24**
- Lysichiton americanus ≥ 25% .....**MYRGAL/LYSAME, p. B-24**

Malus fusca dominant to codominant [OLYM]

- Carex obnupta ≥ 25%, Salix hookeriana usually present to codominant ..... **SALHOO-(MALFUS)/CAROBN-LYSAME, p. B-37**
- Malus fusca thicket AND Understory sparse to absent .....**MALFUS, p. B-37**

Alnus viridis or A. incana dominant (≥ 10%)
Oplopanax horridus ≥ 10%, or Rubus spectabilis or Ribes bracteosum present. Often avalanche chute ..... **ALNVIR-RUBSPE-(OPLHOR), p. A-190**

Scirpus microcarpus ≥ 25% and Carex amplifolia sometimes codominant [NOCA].... **ALNINC/SCIMIC, p. B-54**

Cornus occidentalis or C. stolonifera ≥ 10%, or Ribes lacustre ≥ 5% [NOCA] ..... **ALNVIR-RIBLAC-(CORSER), p. B-52**

Salix sitchensis codominant. Angelica arguta, Viola glabella, Heracleum maximum, Thalictrum occidentale, and other mesic forbs ≥ 10% [NOCA] ..... **SALSIT-(ALNINC)/ANGARG, p. A-206**

Acer circinatum codominant (≥ 10%) ..... **ALNVIR-ACECIR, p. A-191**

Thalictrum occidentale + Viola glabella + Hydrophyllum fendleri + Heracleum maximum + other mesic forbs ≥ 5% AND Athyrium filix-femina < 1%. Sambucus racemosa, Rubus nutkanus, Sorbus spp. usually present AND Athyrium filix-femina and other ferns absent or minor ..... **ALNVIR Mesic, p. A-205**

Herbaceous cover < 10%. Alluvial bars ..... **ALNVIR Alluvial, p. B-52**

Acer circinatum dominant (usually ≥ 50%)
Athyrium filix-femina present and Tolmiea menziesii ≥ 10% OR Oplopanax horridus and/or Rubus spectabilis codominant ..... **ACECIR/ATHFIL-TOLMEN, p. A-189**

Not as above. Little or no understory. Pteridium aquilinum, Ribes bracteosum, Rubus nutkanus, Achlys triphylla, Linnaea borealis, Mahonia nervosa, Rosa pisocarpa often present but usually < 10% each ..... **ACECIR/(PTEAQU), p. A-188**

Cornus occidentalis or C. stolonifera ≥ 10% and Spiraea douglasii present to codominant. Swamps [OLYM] ..... **CORSER-SALIX-SPIDOU, p. B-37**

Cornus occidentalis or C. stolonifera ≥ 25%
Athyrium filix-femina and/or Dryopteris spp. ≥ 5% AND > Equisetum spp. [NOCA].. **CORSER/ATHFIL, p. B-55**

Cornus occidentalis or C. stolonifera ≥ 50%, Spiraea douglasii absent. Usually riparian [NOCA] ..... **CORSER Pacific, p. A-192**

Salix spp. dominant
Salix commutata ≥ 20%. Subalpine/Alpine
Fen indicators dominate. Carex aquatilis var. dives + C. kelloggii + Leptarrhena pyrolifolia + Caltha biflora + Pedicularis groenlandica + Triantha occidentalis ssp. brevistyla ≥ 10% ..... **SALCOM, p. A-204**
Mesic indicators dominate. Valeriana sitchensis + Senecio triangularis + Potentilla flabellifolia + Arnica latifolia ≥ 5% ..... **SALCOM/SENTRI, p. A-203**

Salix pedicellaris dominant or codominant. Vaccinium uliginosum ≥ 40% and Carex aquatilis var. dives usually ≥ 5%. Sphagnum sometimes ≥ 5% ..... **VACULI/CARAQUD, p. B-27**

Salix hookeriana dominant to codominant
Carex obnupta ≥ 25%. Lysichiton americanus present to codominant. Malus fusca usually present to codominant..... **SALHOO-(MALFUS)/CAROBN-LYSAME, p. B-37**
Mixed willows. Otherwise not as above..... **SAL(HOO,LUC,SIT), p. B-37**

Spiraea douglasii codominant AND Carex spp. prominent to dominant [OLYM, NOCA] ..... **SALIX-SPIDOU/CAR(AQUD,OBN,UTR), p. A-197**

Salix sitchensis dominant
Lysichiton americanus and Carex aquatilis var. dives usually present to codominant. Soils usually mucky ..... **SALSIT, p. A-196**

Angelica arguta, Viola glabella, Heracleum maximum, Thalictrum occidentale, and other mesic forbs ≥ 10%, Alnus incana or A. viridis occasionally codominant [NOCA] ..... **SALSIT-(ALNINC)/ANGARG, p. A-206**

Glyceria striata, G. elata, or Cinna latifolia ≥ 10% ..... **SALSIT/GLYELA, p. B-52**

Shrub cover ≥ 50%, Equisetum arvense usually present AND overall herb cover low. Coarse sediment abundant ..... **SALSIT/EQUARV-PETFRI, p. A-195**

Shrub cover < 50%. Bare alluvium abundant [NOCA] ..... **SAL(MEL,SIT), p. A-207**

Mixed willows. Otherwise not as above ..... **SAL(HOO,LUC,SIT), p. B-37**

Spiraea douglasii dominant to codominant

Rhododendron groenlandicum codominant AND Kalmia microphylla, Vaccinium oxycoccos, or Drosera rotundifolia present ..... see **Rhododendron / Kalmia lead, p. 24**

Salix spp. codominant AND Carex spp. prominent to dominant [OLYM, NOCA] ..... **SALIX-SPIDOU/CAR(AQUD,OBN,UTR), p. A-197**

Carex aquatilis var. dives present to codominant. Lysichiton americanus can be codominant [OLYM] ..... **SPIDOU/CARAQUD, p. B-24**

Not as above. Spiraea often dense and other species sparse ..... **SPIDOU, p. B-37**

Rubus spectabilis dominant. Ribes bracteosum usually present (often codominant and ≥ 50%). ..... **RIBBRA-RUBSPE, p. A-194**

Vaccinium uliginosum ≥ 40% AND Carex aquatilis var. dives usually ≥ 5%. Sphagnum sometimes ≥ 5% ..... **VACULI/CARAQUD, p. B-27**

Key to Herbaceous Wetlands

Sphagnum spp. codominant with vascular species
- Juncus supiniformis ≥ 10% AND Carex livida and/or Rhynchospora alba present [OLYM] ..... **JUNSUP-(CARLIV-RHYALB), p. B-24**

- Carex livida ≥ 15% [OLYM] ..... **CAR(LIV,UTR)/SPHAGN, p. B-24**

- Trichophorum caespitosum ≥ 20% and Triantha occidentalis ssp. brevistyla usually present ..... **TRICAE, p. B-27**

- Carex utriculata ≥ 10% AND Carex kelloggii, Juncus ensifolius, Calamagrostis canadensis, Pedicularis groenlandica, Cicuta douglasii, Viola palustris, Eriophorum angustifolium, or Angelica genuflexa present ..... **CARUTR Pacific, p. B-26**

- Carex aquatilis var. dives dominant or codominant (≥ 20%) AND Carex nigricans and Caltha biflora (or C. leptosepala) present. Sphagnum spp. and Carex utriculata may be present to prominent. Montane to subalpine ..... **CAR(AQUD,NIG,UTR)-CALLEP, p. A-184**

- Eriophorum angustifolium spp. subarcticum var. majus ≥ 10%. Montane to subalpine ..... **ERIANG/SPHAGN, p. B-26**

- Eriophorum chamissonis ≥ 20% ..... **ERICHA/SPHAGN, p. B-22**

- Rhynchospora alba ≥ 15%. Vaccinium oxycoccos often codominant [OLYM] ..... **RHYALB-(VACOXY)/SPHAGN, p. B-22**

Ranunculus flammula ≥ 15%, Carex obnupta ≥ 5%, AND Juncus nevadensis present. Brackish/salt marsh or beach/coastal spit wetlands [OLYM] ..... **RANFLA-JUNNEV-CARLEN, p. B-40**

Sedges (Carex, Eleocharis, Dulichium, Schoenoplectus, Scirpus, or Trichophorum spp.) dominant or codominant
- Carex saxatilis ≥ 25% and Eriophorum spp. sometimes prominent (≥ 15%) [OLYM] ..... **CARSAX, p. B-34**

- Carex scopulorum var. prionophylla ≥ 25% and Senecio triangularis often present [MORA] ..... **CARSCOP, p. B-34**

- Carex cusickii ≥ 25% and Carex utriculata or Polemonium occidentale usually present ..... **CARCUS, p. B-34**

- Carex aquatilis var. dives dominant or codominant (≥ 20%)
  - Carex utriculata ≥ 25% ..... **CARAQUD-CARUTR, p. B-27**
  - Comarum palustre present ..... **CARAQUD-COMPAL, p. B-27**
  - Carex nigricans and Caltha leptosepala (or C. biflora) present. Sphagnum spp. and Carex utriculata may be present to prominent. Montane to subalpine ..... **CAR(AQUD,NIG,UTR)-CALLEP, p. A-184**
  - Oenanthe sarmentosa often present ..... **CARAQUD, p. B-27**

- Carex exsiccata ≥ 20%. Frequently monotypic.
  - Hemic or fibric peat layer present. Nearly permanently saturated ..... **CAREXS Fen, p. B-24**
  - Muck/sapric peat present along with mineral soils. Subject to greater hydrological fluctuation than CAREXS Fen. ..... **CAREXS Montane, p. B-48**

- C. kelloggii ≥ 20% ..... **CARLEN, p. B-48**

- Carex obnupta ≥ 20% [OLYM]
  - Ranunculus flammula ≥ 15% AND Juncus nevadensis present ..... **RANFLA-JUNNEV-CARLEN, p. B-40**
  - Carex obnupta ≥ 50% ..... **CAROBN, p. B-40**

- Kalmia microphylla ≥ 5%, Vaccinium deliciosum and/or Phyllodoce empetriformis typically prominent [MORA, NOCA] ..... **KALMIC/CARNIG, p. A-198**

Carex nigricans dominant

Caltha leptosepala or C. biflora present. Sphagnum spp. usually present. Montane to subalpine. ..... **CAR(AQUD,NIG,UTR)-CALLEP, p. A-184**

Petasites frigidus var. frigidus, Erythranthe lewisii, and/or Juncus mertensianus often present. Philonotis fontana abundant. Seeps and springs ..... **CARNIG-(PETFRI)/PHIFON, p. B-46**

Carex spectabilis and Potentilla flabellifolia codominant, Caltha leptosepala or Juncus drummondii often present ..... **CARSPE-POTFLA, p. A-200**

Carex nigricans often monotypic, though other subalpine wetland species may be present. Frequent in snow beds. ..... **CARNIG, p. A-199**

Carex spectabilis and Potentilla flabellifolia codominant, Caltha leptosepala or Juncus drummondii often present ..... **CARSPE-POTFLA, p. A-200**

Dulichium arundinaceum ≥ 10% [OLYM] ..... **DULARU Shore, p. B-33**

Schoenoplectus subterminalis ≥ 20% ..... **SCHSUB, p. B-66**

Eleocharis quinqueflora ≥ 25%, frequently monotypic. Montane to subalpine fens. Primarily found in eastern Washington, but present near Cascade Crest [NOCA] ..... **ELEQUI, p. B-34**

Eleocharis palustris ≥ 25% (frequently monotypic)

Juncus acicularis, J. articulatus, J. bufonius, J. ensifolius, or J. patens usually present. West of Cascade Crest ..... **ELEPAL Pacific, p. B-40**

Carex utriculata, Cicuta douglasii, Comarum palustre, Glyceria borealis, and/or Lemna minor usually present. East of Cascade Crest ..... **ELEPAL Marsh, p. B-48**

Eriophorum angustifolium spp. subarcticum var. majus ≥ 10%. Montane to subalpine ..... **ERIANG/SPHAGN, p. B-26**

Trichophorum caespitosum ≥ 20% and Triantha occidentalis ssp. brevistyla usually present ..... **TRICAE, p. B-27**

Carex utriculata ≥ 25%

Organic soils (typically hemic peat) and other herbaceous species usually ≥ 5% (Carex aquatilis var. dives, Hypericum anagalloides, Calamagrostis canadensis, etc.). Montane or lowland fens. ..... **CARUTR Pacific, p. B-26**

Mineral or sapric muck soils. Carex utriculata is generally tall and few other species present. Marshes. ..... **CARUTR Marsh, p. B-48**

Scirpus microcarpus ≥ 25% (often much higher)

Spiraea douglasii or Bromus sitchensis often present. West of Cascade Crest ..... **SCIMIC Pacific, p. B-40**

Equisetum arvense often present. East of Cascade Crest [NOCA] ..... **SCIMIC Marsh, p. B-48**

Ranunculus flammula ≥ 15%, Carex obnupta ≥ 5%, AND Juncus nevadensis present [OLYM] ..... **RANFLA-JUNNEV-CARLEN, p. B-40**

Schoenoplectus acutus ≥ 25% ..... **SCHACU, p. B-42**

Schoenoplectus tabernaemontani ≥ 25% ..... **SCHTAB, p. B-42**

Sedges dominate on organic soils

..... Return to lead **'Sphagnum spp. codominant with vascular species', p. 27**

Juncus effusus ≥ 20% ..... **JUNEFF, p. B-40**

Deschampsia caespitosa dominant or codominant. Montane wetland species are codominant and may include Carex aquatilis var. dives, C. utriculata, Pedicularis groenlandica, and/or Dodecatheon jeffreyi. ..... **DESCAE Meadow, p. B-48**

Calamagrostis canadensis ≥ 25%
Spiraea douglasii prominent. Rhododendron groenlandicum or Comarum palustre typically present ..... **CALCAN Pacific, p. B-24**

Not as above. Diverse montane wetland species (e.g. Caltha leptosepala/biflora, Alnus incana, Carex kelloggii) present..... **CALCAN Western, p. B-48**

Saussurea americana + Hydrophyllum fendleri + Bromus sitchensis ≥ 35%, Heracleum maximum usually codominant [OLYM] ..... **SAUAME-HERMAX, p. A-202**

Heracleum maximum dominant..... **HERMAX, p. A-201**

Ranunculus flammula ≥ 15%, Carex obnupta ≥ 5%, AND Juncus nevadensis present ..... **RANFLA-JUNNEV-CARLEN, p. B-40**

Menyanthes trifoliata dominant (≥ 25%). Nuphar polysepala typically present..... **MENTRI, p. B-63**

Caltha biflora or C. leptosepala ≥ 25% OR Trollius laxus ≥ 10%. Dodecatheon jeffreyi usually present and often ≥ 5% ..... **CALLEP, p. B-43**

Equisetum telmateia ≥ 50%..... **EQUTEL, p. B-40**

Hippuris vulgaris ≥ 25%. Nuphar polysepala and/or Sparganium angustifolium often present. Monotypic stands may occur..... **HIPVUL, p. B-58**

Oenanthe sarmentosa ≥ 20%..... **OENSAR, p. B-40**

Petasites frigidus ≥ 25% ..... **PETFRI, p. B-39**

Persicaria amphibium ≥ 30% and often monotypic ..... **POLAMP, p. B-65**

Sparganium angustifolium, S. emersum, or S. natans ≥ 20% (often much higher) ..... **SPA(ANG,EME), p. B-58**

Sparganium eurycarpum ≥ 20%..... **SPAEUR, p. B-58**

Lysichiton americanus ≥ 50% and Athyrium filix-femina, Glyceria striata, or Senecio triangularis often present ..... **LYSAME, p. B-48**

Corydalis scouleri ≥ 30% ..... **CORSCO, p. B-47**

Micranthes odontoloma or M. nelsoniana ≥ 20%, Senecio triangularis often ≥ 10% ..... **SAXODO, p. B-47**

Senecio triangularis ≥ 5%..... **SENTRI, p. B-47**

Erythranthe lewisii ≥ 25%. Subalpine to alpine streambanks..... **MIMLEW, p. B-46**

Adiantum pedatum ≥ 10% ..... **ADIPED, p. B-47**

Equisetum arvense ≥ 30% (often much higher) ..... **EQUARV Meadow, p. B-48**

Typha latifolia ≥ 20% (often much higher/monotypic) ..... **TYPLAT Pacific, p. B-40**

Juncus balticus ≥ 25% Disturbance-tolerant species such as Geum macrophyllum, Deschampsia caespitosa, Potentilla gracilis, Achillea millefolium, Persicaria hydropiperoides, Carex nebrascensis, C. pellita, and/or Epilobium ciliatum usually present to prominent. Montane..... **JUNBAL Meadow, p. B-48**

Fontinalis antipyretica forms extensive submerged (sometimes seasonally) beds ..... **FONANT, p. B-57**

Key to Aquatic Vegetation

Lemna minor ≥ 40%. Emergent species may be present..... **LEMMIN, p. B-56**

Schoenoplectus subterminalis ≥ 20%..... **SCHSUB, p. B-66**

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Menyanthes trifoliata dominant (≥ 25%) AND Nuphar polysepala typically present .....**MENTRI, p. B-63**

Nuphar polysepala ≥ 25% or > other aquatic species.....**NUPPOL, p. B-64**

Potamogeton natans ≥ 25% .....**POTNAT, p. B-65**

Fontinalis antipyretica forms extensive submerged (sometimes only seasonally) beds.....**FONANT, p. B-57**

Callitriche heterophylla ≥ 75%. Emergent or woody species may be present ..... **CAL(HET,PAL), p. B-59**

Utricularia macrorhiza ≥ 40% .....**UTRMAC, p. B-60**

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Hippuris vulgaris ≥ 25%. Nuphar polysepala and/or Sparganium angustifolium often present. Monotypic stands may occur..... **HIPVUL, p. B-58**

Stand does not key to an existing association

Relax cover estimate cutoffs and try once again.....**Return to the top of the key**

Stand is dominated by nonnative plants OR dominated by an assemblage of native plants that is the result of anthropogenic disturbance and does not have a known natural analogue .**Undescribed Ruderal Association**

Stand is dominated by native plants AND anthropogenic disturbance is absent or minor ..... **Undescribed Native Association**

Descriptions of Plant Associations of Mount Rainier, North Cascades, and Olympic National Parks

Each plant association description includes the following:

- **Association Scientific Name** — Following USNVC conventions (Federal Geographic Data Committee, 2008; Jennings et al., 2009), association scientific names generally follow Kartez (Kartesz, 1999; USDA NRCS, 2006). Associations are defined by "diagnostic species, usually from multiple growth forms or layers, and narrowly similar composition that reflect topo-edaphic climate, substrates, hydrology, and disturbance regimes" (Faber-Langendoen et al., 2009).
    - At least one species from the dominant and/or uppermost stratum is included in each name. A hyphen ("-") separates species occurring in the same stratum. A forward-slash ("/") separates species occurring in different strata. Species that occur in the uppermost stratum are listed first, followed successively by those in lower strata. Order of species names generally reflects decreasing levels of dominance, constancy, or indicator value.
- **Association common name** — Translation of scientific name, using common name that is officially recognized by NatureServe.
- **Abbreviation** — Constructed using the first three letters of the genus and species for each taxon in the name. These abbreviations are used in the keys and crosswalks to map classes, as well as in the classification comments in the association descriptions.
- **EL Code** — The element code used to track USNVC associations.
    - Codes starting with '**CEGL'** — Associations that have passed peer review. These associations are in the USNVC hierarchy (viewable at http://www.usnvc.org).
    - Codes starting with '**CWWA'**— Associations in the Washington wetland classification that have yet to go through peer-review, but have verified positions in the USNVC hierarchy (i.e. the alliance and all higher levels of the hierarchy have gone through peer-review).
    - **Provisional** — Associations that are not formally described in the USNVC due to insufficient validation (e.g. few plots). Most associations that remain provisional in this classification are alpine types that are difficult to access and/or occur in patches smaller than the minimum plot size for the NCCN mapping project (100 m^2).
- **Macrogroup** — USNVC Macrogroup, distinguished by "diagnostic plant species and growth forms, and sub-continental to regional differences in mesoclimate, geology, substrates, hydrology and disturbance regimes" (Faber-Langendoen et al., 2009).
- **Group** — USNVC Group, defined by "relatively narrow sets of diagnostic plant species (including dominants and codominants), broadly similar composition, and diagnostic growth forms that reflect regional mesoclimate, geology, substrates, hydrology and disturbance regimes" (Faber-Langendoen et al., 2009).
- **Alliance** — USNVC Alliance, defined by "diagnostic species, including some from the dominant growth form or layer, and moderately similar composition that reflect regional to subregional climate, substrates, hydrology, moisture/nutrient factors, and disturbance regimes" (Faber-Langendoen et al., 2009).
- **Range** — Geographic range, with a focus on range within Washington State.
- **Plots** — Total number of NCCN classification and mapping plots for this association, subdivided by park unit. Only plots included in WNHP's USNVC analysis (e.g. plots with full species lists, etc.) are included here, so these numbers may differ from the number of plots used in map modeling. If concept is new since Crawford (2009), only plots used in WNHP analysis are reported
- **Environmental Description** — Typical range of environmental settings in which the association may develop, with a focus on its environmental template within Washington State.

- **Vegetation Description** — Typical physiognomy and floristics of the association, including dominant, diagnostic, and differential species, with a focus on its expression in Washington State.
- **Classification Comments** — Guidance for distinguishing this association from similar associations. This section may also contain ongoing classification questions.
- **Conservation Status Rank & Justification** — An assessment of an association's risk of being eliminated from the landscape. A "1" indicates critical imperilment, while a "5" indicates that the association is demonstrably secure. "G" ranks are at a global scale, while "S" ranks are subnational (i.e. state or province). For example, G5/S3 = "Globally demonstrably secure, but vulnerable in Washington." The term "protected lands" generally refers to conservation lands set aside by local, state, federal, or non-profit entities wherein anthropogenic disturbance is primarily limited to light recreational or educational use.
- **Synonyms** — Relationship of this association to concepts from previous classification efforts. Crawford et al. (2009) references preceded by ">" indicate that our association concept is more broadly defined than the 2009 version of this classification. Crawford et al. (2009) references preceded by "<" indicate the opposite (i.e. our association is more narrowly defined). All other referenced synonyms are equivalent to the association concept presented in this report.

The following terms are used to describe the distribution and abundance of individual species:

- **Dominant**: Clearly the most abundant species in a well-developed stratum
- **Codominant**: A species sharing dominance with other species in a well-developed stratum, usually with cover between 5-50%
- **Prominent**: Common species that are readily observed (but not dominant) in most plots, generally with cover between 3-15%.
- **Present**: Species that are typically found in a representative plot, but with less than 3% cover.
- **Usually**: Found with > 60% constancy in a given association
- **Sometimes/Often**: Found with 40-60% constancy in a given association
- **Occasionally**: Found with 10-40% constancy in a given association
- **Well-developed**: A stratum of vegetation with > 10% cover

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WETLAND ALLIANCE DESCRIPTIONS B-1

***Abies lasiocarpa* - (*Callitropsis nootkatensis*) / *Vaccinium scoparium* / *Valeriana sitchensis* Woodland**

Subalpine Fir - (Alaska Cedar) / Grouse Whortleberry Woodland



Abbrev: ABILAS-(CALNOO)/VACSCO/VALSIT

EL Code: CEGL008264

Macrogroup: Rocky Mountain Subalpine-High Montane Conifer Forest

Group: Rocky Mountain Subalpine Moist Spruce - Fir Forest & Woodland

Alliance: *Abies lasiocarpa - Picea engelmannii* Rocky Mountain Moist Forest

Range: Documented at Mount Rainier and North Cascades National Parks. It is unlikely to develop in British Columbia, but may occur in the Oregon Cascades.

Plots: MORA (7), NOCA (2), Other (1)

Environmental Description: Occurs in parkland settings at subalpine elevations (1700 to 2200 m), on moderate slopes. Sites have well-drained soils and often have southern aspects.

Vegetation Description: *Abies lasiocarpa* is dominant and *Picea engelmannii* or *Pinus contorta* may occur in the canopy. *Vaccinium scoparium* is prominent to dominant. *Vaccinium deliciosum* can be codominant. *Juniperus communis* is never present. The herbaceous understory is relatively diverse, but typically has low cover. *Valeriana sitchensis*, *Lupinus latifolius*, *Luzula hitchcockii* (= *glabrata* var. *hitchcockii*), *Xerophyllum tenax*, *Arnica latifolia*, and *Polemonium pulcherrimum* are usually present to prominent.

Classification Comments: ABILAS-PICENG/VACSCO is similar, but occurs at lower elevations and/or further east, with shallower snowpacks and an understory with little or no *Luzula hitchcockii* (= *glabrata* var. *hitchcockii*), *Valeriana sitchensis*, and *Arnica latifolia*. Crawford et al. (2009) notes, "This is a Cascadian version of the Northern and Central Rocky Mountain *Abies lasiocarpa - Picea engelmannii* / *Vaccinium scoparium* / *Thalictrum occidentale* Forest (CEGL005919). The Rocky Mountain association has an abundance of *Thalictrum occidentale* and lacks more Cascadian species such as *Rubus lasiococcus*." Crawford proposed this association within the *Abies lasiocarpa - Picea engelmannii* / *Rubus lasiococcus* Cascadian Forest Alliance (A3729). In plot data from the Washington national parks, this type does not ordinate with the two (primarily Olympic Mountain) types documented in A3729. Instead, it groups between Rocky Mountain Spruce Fir forests (A3614 and A3643) and A3726 *Abies amabilis - Tsuga mertensiana - Abies lasiocarpa* Cascadian Forest & Woodland. Because *Picea engelmannii* is often prominent and *Vaccinium scoparium* is dominant, we propose placing it in A3614, but note that the concept for A3729 may need some region-wide clarification. Also note that this association DOES have Cascadian indicators like *Rubus lasiococcus*, *Vaccinium deliciosum*, and *Callitropsis* (= *Cupressus*) *nootkatensis* that fit with the concept for A3729.

Conservation Status Rank: GNR/S3Q

Rank Justification: Occurs within a limited range, with few known. Climate change will likely affect this vegetation.

Synonyms:

Abies lasiocarpa / *Vaccinium scoparium* / *Valeriana sitchensis* Woodland (Crawford et al., 2009)

***Abies lasiocarpa* / *Rhododendron albiflorum* / *Rubus lasiococcus* Forest**

Subalpine Fir / Cascade Azalea / Rough-fruit Berry Forest



Abbrev: ABILAS/RHOALB/RUBLAS

EL Code: CEGL005635

Macrogroup: Rocky Mountain Subalpine-High Montane Conifer Forest

Group: Rocky Mountain Subalpine Moist Spruce - Fir Forest & Woodland

Alliance: *Abies lasiocarpa - Picea engelmannii* Rocky Mountain Moist Forest

Range: Occurs in the Northeastern Olympics and Cascades, including northeastern Mount Rainier

Plots: MORA (6), OLYM (21)

Environmental Description: Occurs from 1300 to 1800 m elevation, often on northwest to east-facing slopes with well-drained, shallow soils.

Vegetation Description: The canopy is dominated by *Abies lasiocarpa* with *Callitropsis* (= *Cupressus*) *nootkatensis* as a frequent codominant. *Pinus contorta* and *Pseudotsuga menziesii* have been recorded as codominants outside the parks. *Abies lasiocarpa* usually dominates tree regeneration and always has over 10% total cover. The moderate to dense shrub layer is dominated by *Rhododendron albiflorum*, with *Vaccinium membranaceum* usually present and occasionally codominant. *Paxistima myrsinites* is very frequent. The herb layer is sparse to moderately dense and is usually codominated by *Rubus lasiococcus*. *Xerophyllum tenax* occasionally codominates.

Classification Comments: This association differs from ABILAS-(PICENG)/RHOALB by having greater cover of *Rubus lasiococcus*, *Callitropsis* (= *Cupressus*) *nootkatensis*, and *Lupinus latifolius* (= *arcticus*), and little to no *Picea engelmannii*, *Vaccinium scoparium*, and *Vaccinium myrtillus*.

Conservation Status Rank: GNR/S3

Rank Justification: Natural-origin stands occur on protected lands and few are subject to logging or development.

Synonyms:
Abies lasiocarpa/*Rhododendron albiflorum*/*Rubus lasiococcus* (Meidinger et al., 2005) [PNWCOAST_030]
Abies lasiocarpa/*Rhododendron albiflorum*/*Rubus lasiococcus* Forest (Crawford et al., 2009)
Abies lasiocarpa/*Rhododendron albiflorum* Association (Henderson et al., 1989)

Abies lasiocarpa - (*Picea engelmannii*) / *Rhododendron albiflorum* Forest

Subalpine Fir - (Engelmann Spruce) / Cascade Azalea Forest



Abbrev: ABILAS-(PICENG)/RHOALB

EL Code: CEGL008286

Macrogroup: Rocky Mountain Subalpine-High Montane Forest

Group: Rocky Mountain Subalpine Moist Spruce - Fir Forest & Woodland

Alliance: *Abies lasiocarpa - Picea engelmannii* Rocky Mountain Moist Forest

Range: Occurs in the coast-interior transition area of the East Cascades in Washington, possibly extending into British Columbia.

Plots: NOCA (11)

Environmental Description: Occurs at high elevations (155 to 1900 m) on middle to upper slopes with deep, late-melting snowpacks.

Vegetation Description: These variably dense woodlands or forests are usually codominated by *Abies lasiocarpa* and *Picea engelmannii*. *Tsuga mertensiana* and *Abies amabilis* are frequently absent; when present, they average less than 5% cover. The shrub layer is frequently dense and is dominated by *Rhododendron albiflorum*, typically with *Vaccinium membranaceum*. Low shrubs *Vaccinium scoparium* or *Vaccinium myrtillus* are usually present. The herb layer is sparse to moderately dense. A few areas at higher elevations or on west-facing sites with deep snowpack may be dominated by *Luzula hitchcockii* (= *glabrata* var. *hitchcockii*), with *Valeriana sitchensis*.

Classification Comments: ABILAS/VACMEM occurs on drier sites with *Calamagrostis rubescens* and/or *Carex geyeri* in the understory and without dominant mesic/moist species like *Rhododendron albiflorum* or *Rubus lasiococcus*. *Abies lasiocarpa* / *Rhododendron albiflorum* / *Senecio triangularis* (CEGL002613) is similar, but occurs in riparian settings in valley bottoms (rather than mid to upper slopes) and is characterized by moist herbs like *Senecio triangularis* (always present), *Pectiantia* (= *Mitella*) *pentandra*, *Trautvetteria caroliniensis*, *Athyrium filix-femina*, and/or *Gymnocarpium dryopteris* (sometimes dominant). ABILAS-(PICENG)/RHOALB may have occasional *Senecio triangularis*, *Dodecatheon jeffreyi*, etc., indicating the presence of small seeps or rivulets. ABILAS/RHOALB/RUBLAS is a similar association that occurs in the northeastern Olympic Mountains and in the rain shadow northeast of Mount Rainier—it lacks *Picea engelmannii*, *Vaccinium scoparium*, and *Vaccinium myrtillus*. The exact relationship between ABILAS-(PICENG)/RHOALB and *Abies lasiocarpa* / *Rhododendron albiflorum* / *Luzula glabrata*

Conservation Status Rank: GNR/S4

Rank Justification: This association is widespread in eastern Washington with few known, though logging occurs in parts of its range.

Synonyms:

Abies lasiocarpa - (*Picea engelmannii*) / *Rhododendron albiflorum* Forest (Crawford et al., 2009)
Abies lasiocarpa / *Rhododendron albiflorum* / *Luzula glabrata* (Kovalchik & Clausnitzer, 2004)
Abies lasiocarpa / *Rhododendron albiflorum* / *Luzula hitchcockii* (Lillybridge et al., 1995)
Abies lasiocarpa / *Rhododendron albiflorum* (Williams & Lillybridge, 1983; Lillybridge et al., 1995; Williams et al., 1995)
Abies lasiocarpa - Picea engelmannii / *Rhododendron albiflorum - Vaccinium membranaceum* Community (del Moral et al., 1976)

Abies lasiocarpa / *Vaccinium membranaceum* / *Lupinus arcticus* ssp. *subalpinus* Woodland

Subalpine Fir / Thinleaf Huckleberry / Subalpine Lupine Woodland



Abbrev: ABILAS/VACMEM/LUPARC

EL Code: CEGL005637

Macrogroup: Rocky Mountain Subalpine-High Montane Forest

Group: Rocky Mountain Subalpine Moist Spruce - Fir Forest & Woodland

Alliance: *Abies lasiocarpa - Picea engelmannii* Rocky Mountain Moist Forest

Range: Occurs in the northern and eastern Olympic Mountains, northern and eastern slopes of Mount Rainier, North Cascades National Park, and elsewhere in the Washington Cascades.

Plots: MORA (5), NOCA (8), OLYM (9)

Environmental Description: Woodland or open forest stands at high elevations (1500 to 1800 m), mostly on southeastern-facing slopes on shallow well-drained soils.

Vegetation Description: The canopy is usually dominated by *Abies lasiocarpa* or codominated by *Abies lasiocarpa* and *Pseudotsuga menziesii*. *Abies lasiocarpa* usually dominates tree regeneration and always has over 10% total cover. *Pinus contorta* is occasionally prominent. The typically well-developed shrub layer is dominated by *Vaccinium membranaceum*. *Paxistima myrsinites* is always present and often prominent. The herb layer ranges from sparse to dense and always has *Lupinus latifolius* var. *subalpinus* (= *arcticus* ssp. *subalpinus*). *Xerophyllum tenax* can dominate the herb layer (though this has not been documented in the parks). Other frequent species are *Achillea millefolium*, *Juncus parryi*, *Hieracium albiflorum*, and *Phlox diffusa*. Stands with low cover of *Vaccinium membranaceum* and low cover of herbs are included here.

Classification Comments: ABILAS/VALSIT-RUBLAS is similar, but lacks a well-developed shrub layer dominated by *Vaccinium membranaceum*. It also has Cascadian indicators such as *Rubus lasiococcus*.

Conservation Status Rank: G3/S3

Rank Justification: Natural-origin stands occur on protected lands within a restricted range. Climate change will like affect this vegetation.

Synonyms:

Abies lasiocarpa - Tsuga mertensiana / *Vaccinium membranaceum* Community Type (Dose) (Henderson et al., 1979)

Abies lasiocarpa / *Vaccinium membranaceum* / *Lupinus* (*arcticus* ssp. *subalpinus*, *latifolius*) Woodland (Crawford et al., 2009)

Abies lasiocarpa / *Vaccinium membranaceum* Association (Henderson et al., 1989)

Abies lasiocarpa / *Vaccinium membranaceum* / *Lupinus arcticus* ssp. *subalpinus* Woodland (Meidinger et al., 2005) [PNWCOAST_032]

***Abies lasiocarpa* / *Vaccinium membranaceum* Forest**

Subalpine Fir / Thinleaf Huckleberry Forest



Abbrev: ABILAS/VACMEM

EL Code: CEGL000342

Macrogroup: Rocky Mountain Subalpine-High Montane Forest

Group: Rocky Mountain Subalpine Moist Spruce - Fir Forest & Woodland

Alliance: *Abies lasiocarpa - Picea engelmannii* Rocky Mountain Moist Forest

Range: Occurs in the eastern Cascades of Washington and Oregon.

Plots: NOCA (1), Other (2)

Environmental Description: Middle to high elevations, on relatively cool sites with moderate slopes.

Vegetation Description: *Abies lasiocarpa* is dominant in the semi-open to closed tree canopy. *Picea engelmannii* and/or *Pseudotsuga menziesii* are usually present in the canopy. The shrub layer is typically moderately dense and dominated by *Vaccinium membranaceum* with *Paxistima myrsinites*. *Vaccinium scoparium* may be present. The herb layer is usually poorly developed with *Calamagrostis rubescens*, *Carex geyeri,* and *Orthilia secunda* most common.

Classification Comments: PINCON/VACMEM appears to be an early seral version of this association. PSEMEN/VACMEM is also similar, but lacks dominant *Abies lasiocarpa*.

Conservation Status Rank: G4/S3Q

Rank Justification: This association is represented within NPS boundaries, but most other occurrences are not protected from land use impacts.

Synonyms:

Abies lasiocarpa - Vaccinium membranaceum Plant Community (Hall, 1973)
Abies lasiocarpa / *Vaccinium membranaceum* (Henderson et al., 1989; Bourgeron & Engelking, 1994)
Abies lasiocarpa / *Vaccinium membranaceum* Habitat Type (Henderson et al., 1976)
Abies lasiocarpa / *Vaccinium membranaceum* Plant Association (Henderson et al., 1986; Johnson & Simon, 1987; Johnson & Clausnitzer, 1992; Williams et al., 1995)
Abies lasiocarpa - (*Pseudotsuga menziesii*) / *Vaccinium membranaceum* / *Calamagrostis rubescens* Forest (Crawford et al., 2009)

Abies lasiocarpa - Picea engelmannii / *Vaccinium scoparium* Forest

Subalpine Fir - Engelmann Spruce / Grouse Whortleberry Forest



Abbrev: ABILAS-PICENG/VACSCO

EL Code: CEGL000344

Macrogroup: Rocky Mountain Subalpine-High Montane Forest

Group: Rocky Mountain Subalpine Dry-Mesic Spruce - Fir Forest & Woodland

Alliance: *Abies lasiocarpa - Picea engelmannii* Rocky Mountain Dry-Mesic Forest

Range: Occurs throughout the Rocky Mountains extending to the mountains in the eastern Cascades

Plots: NOCA (5)

Environmental Description: Occurs at upper montane to high subalpine elevations (1650 to 2000 m), on sites characterized by deep snowpack and brief, cool summers. Sites are relatively xeric and cold. Soils are variable but are often shallow, rocky, well-drained, sandy loam (to sandy clay) soils derived from andesite, conglomerate, granite, quartzite, sandstone, shale, and various other rocks. Litter, duff, and downed wood cover a significant portion of the ground surface.

Vegetation Description: The woodland or open forest canopy is usually dominated by *Abies lasiocarpa*. *Pinus contorta* is occasionally prominent to codominant. *Picea engelmannii* and/or *Pseudotsuga menziesii* may also be present in the canopy. The dwarf-shrub layer is well-developed. *Vaccinium scoparium* is diagnostically prominent or dominant. *Vaccinium myrtillus* may be present, but usually only in trace amounts or up to half the cover of *V. scoparium*. *Paxistima myrsinites* is occasionally prominent. The variable herb layer may contain *Carex geyeri* or *Polemonium pulcherrimum*.

Classification Comments: Areas at higher elevations or further west, with deep snowpacks and understories dominated by *Luzula hitchcockii* (= *glabrata* var. *hitchcockii*), *Arnica latifolia*, and/or *Valeriana sitchensis* are included in ABILAS-(CALNOO)/VACSCO/VALSIT.

Conservation Status Rank: G5/S3S4

Rank Justification: This association occurs within a restricted range with few known. Climate change may affect this vegetation.

Synonyms:

Abies lasiocarpa - Picea engelmannii / *Vaccinium scoparium* (Jones & Ogle, 2000)
Abies lasiocarpa - Picea engelmannii / *Vaccinium scoparium* Plant Association (Baker, 1984; Johnston, 1987)
Abies lasiocarpa / *Vaccinium scoparium* Community Type (Cole, 1982)
Abies lasiocarpa / *Vaccinium scoparium* Habitat Type (Cooper, 1975; Mauk & Henderson, 1984; Alexander, 1986; Komárková, 1988)
Abies lasiocarpa / *Vaccinium scoparium* Habitat Type/Association (Komárková, 1986)
Abies lasiocarpa / *Vaccinium scoparium* Plant Association (Johnson & Simon, 1987; Johnson & Clausnitzer, 1992)
Abies lasiocarpa / *Vaccinium scoparium* Plant Community (Hall, 1973)
Abies lasiocarpa-Picea engelmannii/*Vaccinium scoparium* Woodland (Crawford et al., 2009)
Abies lasiocarpa/*Vaccinium scoparium* (Bourgeron & Engelking, 1994)
Picea engelmannii / *Vaccinium scoparium* Habitat Type (Hess, 1981)

***Pinus contorta* / *Calamagrostis rubescens* Forest**

Lodgepole Pine / Pinegrass Forest



Abbrev: PINCON/CALRUB

EL Code: CEGL000139

Macrogroup: Rocky Mountain Subalpine-High Montane Forest

Group: Rocky Mountain Lodgepole Pine Forest & Woodland

Alliance: *Pinus contorta* Rocky Mountain Forest

Range: Occurs in the upper montane and subalpine zone of the Central and Northern Rocky Mountains and at lower montane elevations in the East Cascades.

Plots: NOCA (4)

Environmental Description: In Washington, this association occurs at lower montane elevations, on cool, dry sites on lower slopes, benches, and valley bottoms where soils are better developed. Topography is rolling with gentle to moderately steep slopes. Soils may be gravelly, sandy, silt loams, or clay-based and derived from a variety of parent materials.

Vegetation Description: In Washington, *Pinus contorta* dominates the forest canopy with only trace amounts of *Pseudotsuga menziesii*. The ground cover is patchy with *Paxistima myrsinites* prominent to dominant. Other shrubs such as *Shepherdia canadensis*, *Mahonia nervosa*, and *Vaccinium membranaceum* are often present. *Calamagrostis rubescens*, *Chimaphila umbellata*, *Lysimachia* (= *Trientalis*) *latifolia* and other herbaceous species occur with low cover.

Classification Comments: PINCON/VACMEM is very similar, but has more high-elevation species like *Pedicularis racemosa*, *Abies lasiocarpa*, and *Vaccinium membranaceum* and fewer low-elevation associates such as *Spiraea lucida* (= *betulifolia*), *Pinus ponderosa*, and *Lomatium nudicaule*. Crawford et al. 2009 proposed a *Pinus contorta* / *Paxistima myrsinites* / *Calamagrostis rubescens* Forest association (in G210, A3396) to describe stands from North Cascades National Park with prominent *Paxistima myrsinites* and Cascadian indicators like *Acer circinatum* and *Mahonia nervosa*. *Pseudotsuga menziesii* was present in the canopy of all sampled stands, with 7% average cover. Those stands are considered here as variation in this association, but these stands may represent a separate association or subtype.

Conservation Status Rank: G5/SNR

Rank Justification:

Synonyms:

***Pinus contorta* / *Vaccinium membranaceum* Rocky Mountain Forest**

Lodgepole Pine / Thinleaf Huckleberry Woodland



Abbrev: PINCON/VACMEM

EL Code: CEGL000169

Macrogroup: Rocky Mountain Subalpine-High Montane Forest

Group: Rocky Mountain Lodgepole Pine Forest & Woodland

Alliance: *Pinus contorta* Rocky Mountain Forest

Range: This association is widely distributed from Wyoming to the East Cascades of Washington

Plots: NOCA (7)

Environmental Description: In Washington, this association occurs on dry, rocky, relatively flat sites, from 800 to 1750 m elevation.

Vegetation Description: These are open forests dominated by *Pinus contorta*. *Abies lasiocarpa* occurs in some locations, but is never prominent and usually in the subcanopy. *Vaccinium membranaceum* and *Arctostaphylos nevadensis* dominate the patchy shrub layer. The abundance of *Arctostaphylos nevadensis* is inversely related to canopy density, with *A*. *nevadensis* completely replaced by *Vaccinium membranaceum* in more closed canopies. *Paxistima myrsinites* and *Amelanchier alnifolia* are frequent. Although the herb layer is generally sparse, *Calamagrostis rubescens* can be abundant in some sites.

Classification Comments: This is apparently a seral stage of ABILAS/VACMEM. PINCON/CALRUB is very similar, but has more low-elevation associates such as *Spiraea lucida* (= *betulifolia*), *Pinus ponderosa*, and *Lomatium nudicaule* and fewer high-elevation species like *Pedicularis racemosa*, *Abies lasiocarpa*, and *Vaccinium membranaceum*.

Conservation Status Rank: G3G4/S4Q

Rank Justification: This fire-dependent association is relatively common in the East Cascades and Rocky Mountains.

Synonyms:

Pinus contorta - (*Abies lasiocarpa*) / *Vaccinium membranaceum* / *Calamagrostis rubescens* Plant Association (Johnson & Clausnitzer, 1992)

Pinus contorta - (*Abies lasiocarpa*) / *Vaccinium membranaceum* Plant Association (Johnson & Clausnitzer, 1992)

Pinus contorta - *Vaccinium membranaceum* Plant Community (Hall, 1973)

Pinus contorta / *Vaccinium globulare* Habitat Type (Steele et al., 1983)

Pinus contorta / *Vaccinium globulare* (Bourgeron & Engelking, 1994)

Pinus contorta / *Vaccinium membranaceum* Woodland (Crawford et al., 2009)

Larix lyallii / *Vaccinium deliciosum* - *Cassiope mertensiana* Woodland

Subalpine Larch / Cascade Bilberry - Western Moss-heather Woodland



Abbrev: LARLYA/VACDEL-CASMER

EL Code: CEGL000952

Macrogroup: Rocky Mountain Subalpine-High Montane Forest

Group: Central Rocky Mountain Whitebark Pine - Subalpine Larch Woodland

Alliance: *Larix lyallii* Woodland

Range: Occurs in the high northeast Cascades of Washington from the Stuart Range north.

Plots: NOCA (42), Other (1)

Environmental Description: Occur above continuous forest, on southwestern aspects, at elevations averaging 1940 m (1750 – 2100 m), with deep snowpacks. They occur on moderate slopes (19* average) and ridgelines, primarily with granitic substrates.

Vegetation Description: This parkland association has a very open tree canopy, often with less than 25% cover. *Larix lyallii* is always present and often accompanied by *Abies lasiocarpa*, *Picea engelmannii*, *Pinus albicaulis*, or *Tsuga mertensiana*. Dwarf-shrubs dominate the ground cover, typically with less than 50% total cover. *Vaccinium deliciosum* and *Cassiope mertensiana* are always present, often with *Phyllodoce empetriformis*, or *Vaccinium scoparium*. Graminoids, such as *Luzula glabrata* var. *hitchcockii* (= *Luzula hitchcockii*), *Carex nigricans*, or *Vahlodea atropurpurea* (= *Deschampsia atropurpurea*), commonly appear among the short shrubs. *Luetkea pectinata* is usually present to prominent.

Classification Comments: Crawford et al. 2009 proposed a separate *Larix lyallii* / *Cassiope mertensiana* - *Luetkea pectinata* Woodland association, found on drier, warmer, more wind-swept sites with shallower snowpacks, with *Vaccinium deliciosum* < 10% cover and diagnostic *Cassiope mertensiana*. Such stands are considered here as variation, or perhaps a subtype, within the existing CEGL000952. Harsher sites tend to have more *Cassiope mertensiana* and less *Vaccinium deliciosum*, but overall species turnover between the two is minimal and does not necessitate separate associations.

Conservation Status Rank: G3/S2S3

Rank Justification: Occurs within a narrow environmental range, though threats are few. Currently, the greatest threat is site alteration associated with increased recreation activities. Many, if not most, occurrences are in Federal wilderness areas. Climate change will likely affect this vegetation.

Synonyms:

Larix lyallii / *Vaccinium deliciosum* - *Cassiope mertensiana* (Lillybridge et al., 1995)
Larix lyallii / *Vaccinium deliciosum* (Bourgeron & Engelking, 1994)
> *Larix lyallii* / *Vaccinium deliciosum* Woodland (Crawford et al., 2009)
> *Larix lyallii* / *Cassiope mertensiana* - *Luetkea pectinata* Woodland (Crawford et al., 2009)

Larix lyallii / *Vaccinium scoparium* / *Luzula glabrata* var. *hitchcockii* Woodland

Subalpine Larch / Grouse Whortleberry / Hitchcock's Smooth Woodrush Woodland



Abbrev: LARLYA/VACSCO/LUZGLA

EL Code: CEGL000951

Macrogroup: Rocky Mountain Subalpine-High Montane Forest

Group: Central Rocky Mountain Whitebark Pine - Subalpine Larch Woodland

Alliance: *Larix lyallii* Woodland

Range: Occurs in the northeastern Cascades in Washington and possibly in pockets in the mountains of Idaho, Montana, and adjacent Canada.

Plots: NOCA (12), Other (1)

Environmental Description: Sites lie between 1980 and 2290 m in the Cascades and may extend to 2410 m in the Northern Rockies. Sites are on mid to lower slopes in environments with high winds and moderate to deep snow accumulation.

Vegetation Description: The open tree canopy is usually dominated by *Larix lyallii* with *Picea engelmannii* and/or *Abies lasiocarpa* usually present. *Pinus albicaulis* is absent or low in cover. The well-developed dwarf-shrub layer is codominated by the diagnostic shrubs *Vaccinium scoparium* or *Vaccinium cespitosum*. *Phyllodoce empetriformis* is often present. *Luzula hitchcockii* (= *glabrata* var. *hitchcockii*) is the most prominent herb. Other common herbs are *Valeriana sitchensis*, *Erigeron glacialis* (= *peregrinus*), *Lupinus* spp., *Juncus parryi*, *Arenaria capillaris*, *Arnica latifolia*, and *Carex rossii*.

Classification Comments: Plots from the North Cascades of Washington frequently have *Vaccinium membranaceum* (42% constancy, 10% average cover) and appear to be similar to *Larix lyallii* / *Vaccinium membranaceum* / *Luzula glabrata* Woodland (CEGL005884).

Conservation Status Rank: G2G3/S2

Rank Justification: Appears to be widely distributed, but occurs in isolated patches. It is located in the high elevations of the eastern Cascades in northern Washington into British Columbia. Its habitat is restricted by a limited area above closed forests and within a maritime-influenced climate. It occupies a relatively small acreage across this wide distribution. Threats to the community are changes in fire frequency, wilderness recreation, and climate change. Currently, threats are local and not rangewide. Some of these communities are in wildernesses or parks in the Cascades.

Synonyms:

Larix lyallii / *Vaccinium scoparium* / *Luzula hitchcockii* (Lillybridge et al., 1995)
Larix lyallii / *Luzula hitchcockii* (Bourgeron & Engelking, 1994)
Larix lyallii / *Vaccinium scoparium* / *Luzula glabrata* var. *hitchcockii* Woodland (Crawford et al., 2009)

Abies lasiocarpa var. *lasiocarpa - Pinus albicaulis* / *Juniperus communis* Woodland

Whitebark Pine / Common Juniper Woodland



Abbrev: ABILAS-PINALB/JUNCOM

EL Code: CEGL002326

Macrogroup: Rocky Mountain Subalpine-High Montane Forest

Group: Central Rocky Mountain Whitebark Pine - Subalpine Larch Woodland

Alliance: *Pinus albicaulis* Forest & Woodland

Range: Occurs on the western slopes of the Fraser River drainage in British Columbia and the eastern North Cascades of Washington State.

Plots: NOCA (15), Other (1)

Environmental Description: Occurs on ridge crests and warm-aspect upper slopes of variable steepness. Soils are variably textured, developed from morainal and colluvial veneers over bedrock. Sites are dry to very dry and nutrient-poor. Elevational range is from 1500 to 1900 m.

Vegetation Description:

This subalpine woodland community is characterized by an open canopy of *Pinus albicaulis*, *Abies lasiocarpa* var. *lasiocarpa*, and minor *Pinus contorta* var. *latifolia*. *Tsuga mertensiana* is only occasionally present. The moderate understory is dominated by *Juniperus communis*, *Paxistima myrsinites*, and *Vaccinium membranaceum* in the shrub layer and scattered *Penstemon davidsonii*, *Juncus parryi*, *Festuca viridula*, *Lupinus latifolius* var. *subalpinus* (= *arcticus* ssp. *subalpinus*), *Achillea millefolium*, and *Sedum lanceolatum* in the herb layer. The sparse nonvascular layer consists of scattered lichens.

Classification Comments: The high constancy and dominance of *Pinus albicaulis* and *Juniperus communis* differentiate this association from other related associations.

Conservation Status Rank: G3/S2?

Rank Justification: Widely distributed but restricted to the high elevations of the eastern Cascades in northern Washington and the western slopes of the Fraser River drainage in British Columbia. Ecological condition is declining due to *Pinus albicaulis* mortality from fire exclusion and white pine blister rust (*Cronartium ribicola*).

Synonyms:

Abies lasiocarpa var. *lasiocarpa - Pinus albicaulis* / *Juniperus communis* (British Columbia Ministry of Forests Research Branch, 1992)

Pinus albicaulis / *Juniperus communis* Woodland (Crawford et al., 2009)

***Pinus albicaulis - Abies lasiocarpa* / *Vaccinium scoparium* / *Luzula glabrata* var. *hitchcockii* Woodland**

Whitebark Pine - Subalpine Fir / Grouse Whortleberry / Hitchcock's Smooth Woodrush Woodland



Abbrev: PINALB-ABILAS/VACSCO/LUZGLA

EL Code: CEGL005839

Macrogroup: Rocky Mountain Subalpine-High Montane Forest

Group: Central Rocky Mountain Whitebark Pine - Subalpine Larch Woodland

Alliance: *Pinus albicaulis* Forest & Woodland

Range: Occurs in the Cascade Mountains.

Plots: NOCA (8)

Environmental Description: This association is broadly distributed throughout the mid to upper subalpine zones of the Rocky Mountains, concentrated in northern Idaho and western Montana and extending into the Canadian Rockies of southwestern Alberta. It also occurs in the East Cascades and Okanogan Mountains of Washington, as well.

Vegetation Description: These are very open woodland sites with the tree component often occurring as scattered clumps and, at the highest and coldest extremes, approaching a krummholz form with trees as short as 5.5 m (18 feet) in height when "mature." The canopy is generally dominated by *Abies lasiocarpa* with prominent to codominant *Pinus albicaulis*. *Pinus contorta* and *Picea engelmannii* may be present. The understory consists of an open dwarf-shrub layer dominated by *Vaccinium scoparium* (or *Vaccinium myrtillus*, in plots sampled outside of the Washington national parks). *Phyllodoce empetriformis* may be present. *Vaccinium membranaceum* is frequently present (averaging 5% cover). Herb cover and composition is variable, depending on snow accumulation and timing of snowmelt. In Washington, *Luzula hitchcockii* (= *glabrata* var. *hitchcockii*) is frequently present, but averages only 1% cover (reaching as high as 60% in plots from the Rockies). *Xerophyllum tenax* is almost invariably the dominant herb in the Rockies, but seldom occurs in stands from Washington.

Classification Comments: Many (or most) of the stands within this association are merely seral representatives of *Abies lasiocarpa - Picea engelmannii* / *Luzula glabrata* var. *hitchcockii* Woodland (CEGL000317); the association described here is recognized as having at least 5% canopy cover of *Pinus albicaulis*. Recognition of a type based on a very minimal cover of a seral tree species (*Pinus albicaulis*) of broad distribution should provoke questions; the intent of this broadly inclusive type was to capture stands (specifically their locations, particularly in mapping efforts) wherein this highly threatened species occurs or will have once occurred. Stands with little or no *Vaccinium scoparium* and the presence of *Tsuga mertensiana* may represent occurrences of *Pinus albicaulis* - (*Tsuga mertensiana*) / *Luzula glabrata* var. *hitchcockii* Woodland (CEGL007352), which has yet to be documented in the Washington national parks.

Conservation Status Rank: G3?/S2

Rank Justification: This somewhat widespread but unevenly distributed association occurs in Washington as isolated stands within the East Cascades and Okanogan Highlands. The ecological condition of occurrences is declining due to *Pinus albicaulis* mortality from fire exclusion and white pine blister rust (*Cronartium ribicola*).

Synonyms:

Pinus albicaulis - Abies lasiocarpa / *Vaccinium scoparium* / *Luzula glabrata* var. *hitchcockii* Woodland (Hop et al., 2007)

Pinus albicaulis - (*Abies lasiocarpa*) / *Vaccinium scoparium - Luzula glabrata* var. *hitchcockii* Woodland (Crawford et al., 2009)

Pinus albicaulis / *Calamagrostis rubescens* Woodland

Whitebark Pine / Pinegrass Woodland



Abbrev: PINALB/CALRUB

EL Code: CEGL000753

Macrogroup: Rocky Mountain Subalpine-High Montane Forest

Group: Central Rocky Mountain Whitebark Pine - Subalpine Larch Woodland

Alliance: *Pinus albicaulis* Forest & Woodland

Range: Occurs in the eastern North Cascades

Plots: NOCA (2)

Environmental Description: Occurs on south-facing subalpine slopes at 1730 to 2000 m, with relatively well-developed soils. Sites characteristically have little snow accumulation due to high winds and sublimation.

Vegetation Description: The canopy is dominated by *Pinus albicaulis* in open woodlands or tree islands. *Abies lasiocarpa* is often present particularly in stands with taller trees. *Pseudotsuga menziesii* or *Pinus contorta* are occasionally present. A sparse, low-growing shrub layer may be present, usually with *Paxistima myrsinites*, *Vaccinium scoparium*, or *Vaccinium myrtillus*. The herb layer is variable in cover, but usually poorly developed. *Calamagrostis rubescens* and/or *Carex geyeri* dominate. Frequent associate species include *Achillea millefolium*, *Castilleja miniata*, *Agoseris glauca*, *Lupinus latifolius*, *Packera streptanthifolia*, and *Sedum lanceolatum*.

Classification Comments:

Conservation Status Rank: G2/S2

Rank Justification: This community is widely distributed, but its habitat is limited to high, dry elevations and it occupies relatively few acres. Late-seral communities are rare because of the death of dominant trees from widespread fires (or fire exclusion) and the introduced pathogen white pine blister rust (*Cronartium ribicola*). Community recovery following disturbances is slow because *Pinus albicaulis* re-invades sites through animal-disseminated seeds.

Synonyms:

Pinus albicaulis / *Calamagrostis rubescens* (Lillybridge et al., 1995)
Pinus albicaulis / *Calamagrostis rubescens* (Bourgeron & Engelking, 1994)
Pinus albicaulis / *Calamagrostis rubescens* Woodland (Crawford et al., 2009)

Pinus albicaulis / *Festuca viridula* Woodland

Whitebark Pine / Greenleaf Fescue Woodland



Abbrev: PINALB/FESVIR

EL Code: CEGL007314

Macrogroup: Rocky Mountain Subalpine-High Montane Forest

Group: Central Rocky Mountain Whitebark Pine - Subalpine Larch Woodland

Alliance: *Pinus albicaulis* Forest & Woodland

Range: This woodland association is widely distributed. In Washington, it is restricted to the high elevations of the eastern North Cascades.

Plots: NOCA (9)

Environmental Description: Occurs in high-elevation (1850 to 2200 m) parkland settings above continuous forest. Stands usually occur on windblown, moderate slopes (24° average) with south-facing aspects (176° average). Soils are well-drained.

Vegetation Description: Tree islands consist of *Pinus albicaulis* and lesser amounts of *Abies lasiocarpa*. *Vaccinium membranaceum* and *Paxistima myrsinites* are usually present to prominent and some stands sampled in the North Cascades have a prominent dwarf shrub layer of *Vaccinium deliciosum* and *Phyllodoce empetriformis*. The herb layer is dominated or codominated by *Festuca viridula*. *Eremogone* (= *Arenaria*) *capillaris* and *Lupinus latifolius* are typically present to prominent and may be joined by *Juncus parryi*, *Luetkea pectinata*, *Carex rossii*, and/or *Luzula hitchcockii* (= *glabrata*).

Classification Comments: PINALB/CALRUB is similar, but *Calamagrostis rubescens* replaces *Festuca viridula*.

Conservation Status Rank: GNR/S1S2

Rank Justification: This community is widely distributed, but its habitat is limited to high, dry elevations and it occupies relatively few acres. Late-seral communities are rare because of the death of dominant trees from widespread fires (or fire exclusion) and the introduced pathogen white pine blister rust (*Cronartium ribicola*). Community recovery following disturbances is slow because *Pinus albicaulis* re-invades sites through animal-disseminated seeds.

Synonyms:

Pinus albicaulis / *Festuca viridula* Herbaceous Vegetation with Sparse Trees (Meidinger et al., 2005) [PNWCOAST_090]

Pinus albicaulis / Festuca viridula Woodland (Crawford et al., 2009)

Pinus albicaulis Krummholz Shrubland [Provisional]

Whitebark Pine Krummholz Shrubland [Provisional]



Abbrev: PINALB

EL Code: Provisional

Macrogroup: Rocky Mountain Subalpine-High Montane Forest

Group: Central Rocky Mountain Whitebark Pine - Subalpine Larch Woodland

Alliance: *Pinus albicaulis* Forest & Woodland

Range: Occurs in the East Cascades

Plots: NOCA (1)

Environmental Description: Occurs at high elevations at the upper edge of subalpine parkland and the lower part of the alpine zone. Soils are well-drained.

Vegetation Description: Vegetation is dominated by shrub-form *Pinus albicaulis*. Upright trees are absent or restricted to flagged individuals. Associate understory species are variable. Usually this vegetation occurs as well-defined patches near upper treeline.

Classification Comments: This association remains provisional, as only one plot was documented in the course of NCCN fieldwork.

Conservation Status Rank: GNR/S2S3

Rank Justification: Geographically restricted but perhaps widely distributed in the eastern Cascades. White pine blister rust (*Cronartium ribicola*), an exotic fungus, has caused extensive mortality in *Pinus albicaulis* within the range of this association and its impact in these harsh habitats are drastic. Climate change will very likely affect this vegetation.

Synonyms:

Pinus albicaulis Krummholz Shrubland (Crawford et al., 2009)

Pseudotsuga menziesii / *Vaccinium membranaceum* Forest

Douglas-fir / Thinleaf Huckleberry



Abbrev: PSEMEN/VACMEM

EL Code: CEGL000466

Macrogroup: Central Rocky Mountain Mesic Lower Montane Forest

Group: Central Rocky Mountain Mesic Grand Fir - Douglas-fir Forest

Alliance: *Abies grandis* - *Pseudotsuga menziesii* Central Rocky Mountain Forest & Woodland

Range: Occurs in the Rocky Mountains of northern and eastern Idaho, western and central Montana, western Wyoming, and Washington, as well as the eastern North Cascades of Washington.

Plots: NOCA (26)

Environmental Description: In Washington, this association occurs 700 to 1600 m elevation on moderate to steep slopes (9-34°) of any aspect. Sites are typically in dry topographic positions, with well-drained soils. Stands often have an apparent history of fire.

Vegetation Description: These are tall forests dominated by *Pseudotsuga menziesii*. In Washington, *Pinus monticola* or *Pinus contorta* are often present in the subcanopy. *Abies amabilis*, *Abies lasiocarpa* or *Tsuga heterophylla* may also be present, but never prominent. The understory is relatively open and dominated by *Vaccinium membranaceum*. *Paxistima myrsinites* can be codominant. Other shrubs may include *Amelanchier alnifolia*, *Spiraea lucida* (= *betulifolia*), *Acer glabrum*, and *Sorbus scopulina*. *Calamagrostis rubescens* is the most common graminoid and most abundant species in the herb layer. Other frequent associate species include *Hieracium albiflorum*, *Pedicularis racemosa*, and *Rubus lasiococcus*.

Classification Comments: ABILAS/VACMEM has dominant or codominant *Abies lasiocarpa*, occurs at generally higher elevations, and has a more open canopy and a shorter shrub layer.

Conservation Status Rank: G5?/S3S5Q

Rank Justification: Occurs in the eastern North Cascades and Central Rockies, where it is relatively abundant. The Cascadian variant described here may occur only in the northeastern Cascades of Washington and adjacent British Columbia.

Synonyms:

Pseudotsuga menziesii / *Vaccinium globulare* Habitat Type (Cooper, 1975; Pfister et al., 1977; Steele et al., 1983; Cooper et al., 1991)

Pseudotsuga menziesii / *Vaccinium globulare* Plant Association (Johnston, 1987)

Pseudotsuga menziesii / *Vaccinium globulare* (Bourgeron & Engelking, 1994)

Pseudotsuga menziesii / *Vaccinium membranaceum* Forest (Crawford et al., 2009)

***Tsuga heterophylla* - (*Pseudotsuga menziesii*) / *Tiarella trifoliata* - *Gymnocarpium dryopteris* Forest**

Western Hemlock - (Douglas-fir) / Threeleaf Foamflower - Western Oakfern Forest



Abbrev: TSUHET-(PSEMEN)/TIATRI-GYMDRY

EL Code: CEGL007305

Macrogroup: Central Rocky Mountain Mesic Lower Montane Forest

Group: East Cascades Mesic Grand Fir - Douglas-fir Forest

Alliance: *Tsuga heterophylla* - *Abies grandis* Cascadian Mesic Cove Forest

Range: Occurs in the Washington Cascades and Olympic Mountains

Plots: MORA (19), NOCA (8), OLYM (18), Other (2)

Environmental Description: Occurs at low to middle elevations (500 to 1100 m) on valley bottoms, riverine terraces, and floodplains, as well as on gentle toeslopes. Soils are typically subirrigated.

Vegetation Description: The canopy is usually dominated by *Tsuga heterophylla* and *Pseudotsuga menziesii*, although *Pseudotsuga menziesii* can be absent. *Thuja plicata* is usually prominent to codominant, and *Abies grandis* is often present to prominent. The shrub layer is poorly developed and usually has small amounts of *Acer circinatum*, *Oplopanax horridus*, and *Vaccinium parvifolium*. The herb layer tends to be well developed and usually includes *Tiarella trifoliata*, *Gymnocarpium dryopteris*, *Struthiopteris* (= *Blechnum*) *spicant*, *Linnaea borealis*, *Polystichum munitum* (low percent cover), *Athyrium filix-femina*, and *Cornus unalaschkensis*. *Tiarella trifoliata* and *Gymnocarpium dryopteris* each occupy over 1% cover.

Classification Comments: This association occurs frequently west of the Cascade Crest and may be a better fit in the Vancouverian Forest & Woodland division.

Conservation Status Rank: G2G3/S2S3

Rank Justification: Occurs within a narrow environmental range in western Washington, with many occurrences impacted by logging.

Synonyms:

Tsuga heterophylla - (*Pseudotsuga menziesii*) / *Tiarella trifoliata* - *Gymnocarpium dryopteris* (Meidinger et al., 2005) [PNWCOAST_256]

Tsuga heterophylla - (*Pseudotsuga menziesii*) / *Tiarella trifoliata* - *Gymnocarpium dryopteris* Forest (Crawford et al., 2009)

Tsuga heterophylla / *Tiarella trifoliata* - *Gymnocarpium dryopteris* Association (Henderson et al., 1992)

Abies lasiocarpa - Pseudotsuga menziesii / *Acer circinatum* Talus Woodland

Subalpine Fir - Douglas-fir / Vine Maple Talus Woodland



Abbrev: ABILAS-PSEMEN/ACECIR

EL Code: CEGL000921

Macrogroup: Central Rocky Mountain Mesic Lower Montane Forest

Group: East Cascades Mesic Grand Fir - Douglas-fir Forest

Alliance: Abies grandis - Pseudotsuga menziesii Mesic Cascadian Forest

Range: Occurs in the North Cascades south to OR. It may also occur in British Columbia.

Plots: NOCA (13)

Environmental Description: Occurs on mid-elevation talus fields in the Cascades. The substrate consists of well-consolidated boulders or occasionally scree. Exposed talus ranges from 15% to 75%. Stands frequently occur on south-facing valley walls (176° average aspect) at elevations ranging from 684-1313 m. Slopes may be steep (up to 45°), but stands also occur on more moderate lower slopes (25° average, one stand was essentially flat).

Vegetation Description: These open talus woodlands occur as small patches/islands within montane forests (or may occur as larger patches on large lava flows). *Abies lasiocarpa* dominates a short, open canopy. *Picea engelmannii* or *Abies grandis* occasionally codominate and *Pseudotsuga menziesii* is commonly prominent. In Oregon, *Pseudotsuga menziesii* may dominate, with *Abies lasiocarpa* merely present. Combined canopy cover averages 22%. When present, *Acer macrophyllum* is low in cover. Shrubs have sparse to moderate cover (average cover = 22%), though scattered dense patches may be present. *Acer circinatum* usually dominates, though shrub composition is variable. In plots from Washington, only *Acer circinatum* (92%), *Rubus leucodermis* (77%), and *Paxistima myrsinites* (85%) reach 50% constancy. While mosses and lichens average roughly 50% combined cover, the herb layer is very sparse and only *Cryptogramma acrostichoides* is present in 40% or more plots. *Cystopteris fragilis* is another diagnostic fern.

Classification Comments: PSEMEN/ACECIR-(HOLDIS) occurs in climatically warmer settings, but at elevations (300 to 1200 m) only slightly lower than ABILAS-PSEMEN/ACECIR. It is characteristically dominated by *Pseudotsuga menziesii*. Cover of *Acer glabrum*, *Symphoricarpos albus*, and *Rubus nutkanus* (= *parviflorus*) are also differential, while *Abies lasiocarpa*, *Callitropsis* (= *Cupressus*) *nootkatensis, Picea engelmannii*, and *Vaccinium membranaceum* are usually absent. Compared to other *Abies lasiocarpa*-dominated woodlands, physiognomy (very open conifer woodland), substrate (talus, fractured bedrock, and occasionally scree), and high moss and lichen cover are primary diagnostics. *Acer circinatum*, *Paxistima myrsinites*, *Rubus leucodermis*, and the ferns *Cryptogramma acrostichoides* and *Cystopteris fragilis* are also differential. These communities also occur well below the typical elevation range for *Abies lasiocarpa*-dominated forests in the Olympics and Cascades. Surrounding forests are usually dominated by montane species like *Pseudotsuga menziesii*, *Tsuga heterophylla*, and *Abies amabilis*.

Conservation Status Rank: GNR/SNR

Rank Justification:

Synonyms:

Abies lasiocarpa - Pseudotsuga menziesii / *Acer circinatum* (Bourgeron & Engelking, 1994)

Pseusotsugeto - Abietum lasiocarpae (Roach, 1952)

Acer macrophyllum / *Acer circinatum* - *Paxistima myrsinites* - (*Corylus cornuta*) Woodland

Bigleaf Maple / Vine Maple - Oregon Boxleaf - (Beaked Hazelnut) Woodland



Abbrev: ACEMAC/ACECIR-PAXMYR-(CORCOR)

EL Code: CEGL008233

Macrogroup: Central Rocky Mountain Mesic Lower Montane Forest

Group: East Cascades Mesic Grand Fir - Douglas-fir Forest

Alliance: *Abies grandis* - *Pseudotsuga menziesii* Mesic Cascadian Forest

Range: Documented primarily at NOCA, with two plots at MORA. It may also occur elsewhere in the Cascade Mountains of Washington, Oregon, and British Columbia. Most stands occur east of the Cascade Crest.

Plots: MORA (2), NOCA (21)

Environmental Description: Stands frequently occur on steep slopes (26° average) on southwest-facing aspects (192° average) at lower montane elevations (500 to 1000 m). Substrates are typically rocky, with very little soil development. Evidence of past fire may be present, but these stands are less fire-obligated than other dry eastside shrub/scrubby woodland associations—they frequently occur on debris aprons and in relatively dry avalanche chutes.

Vegetation Description: *Acer macrophyllum* dominates a scrubby canopy layer and/or codominates a tall shrub layer with *Acer circinatum*, *Acer glabrum*, and/or *Corylus cornuta*. *Salix scouleriana* is occasionally codominant. *Paxistima myrsinites* is characteristically present to dominant in a short shrub layer beneath. Herbs are typically sparse and only *Maianthemum racemosum* and *Cryptogramma acrostichoides* occur in more than 40% of sampled stands.

Classification Comments: Physiognomy (short-statured, open woodlands) and substrate (rocks with little soil development) help distinguish this association. *Acer macrophyllum* always dominates the canopy and/or tall shrub layer, with *Acer circinatum* or *A. douglasii* codominant. *Corylus cornuta* and *Prunus emarginata* are strong differential species when present. *Paxistima myrsinites* is usually present to dominant, but that species is also common in many other dry woodland/shrubland associations of the Cascades.

Conservation Status Rank: GNR/SNR

Rank Justification:

Synonyms:

> *Acer macrophyllum* / *Paxistima myrsinites* Shrubland (Crawford et al., 2009)

Acer macrophyllum / *Rubus parviflorus* / *Maianthemum racemosum* Woodland

Bigleaf Maple / Thimbleberry / Feathery False Lily-of-the-Valley Woodland



Abbrev: ACEMAC/RUBPAR/MAIRAC

EL Code: CEGL008239

Macrogroup: Central Rocky Mountain Mesic Lower Montane Forest

Group: East Cascades Mesic Grand Fir - Douglas-fir Forest

Alliance: *Abies grandis* - *Pseudotsuga menziesii* Mesic Cascadian Forest

Range: North Cascades

Plots: NOCA (9)

Environmental Description: Occurs at middle elevations (500 to 1000 m), most commonly on relatively mesic toeslopes and avalanche chute runout zones (16° average slope) and southwest-facing aspects (220° average).

Vegetation Description: These are generally open (though occasionally closed) broad-leaved woodlands (average canopy cover = 44%). *Acer macrophyllum* dominates a usually open canopy and/or a dense tall shrub layer, often with multiple broken stems from avalanche or mass-wasting activity. The shrub layer is codominated by a diverse array of species including *Rubus nutkanus* (= *parviflorus*), *Acer glabrum*, *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*), and/or *Acer circinatum*. *Salix scouleriana* and *Paxistima myrsinites* are often prominent. *Symphoricarpos albus* and *Cornus nuttallii* are generally absent or at low cover. Conifers average 12% cover, mainly *Pseudotsuga menziesii*. The herb layer can be diverse and variable, but *Maianthemum racemosum*, *Pteridium aquilinum*, *Maianthemum stellatum*, *Thalictrum occidentale*, and *Prosartes hookeri* frequently occur.

Classification Comments: ACEMAC/SYMALB is similar. It occurs on high floodplain terraces and gentle south-facing slopes with dominant *Symphoricarpos albus*, but is actually drier than ACEMAC/RUBPAR/MAIRAC and shows more frequent signs of recent fire. Additional differential indicators include *Osmorhiza berteroi*, *Pinus ponderosa*, *Cornus nuttallii*, and *Elymus glaucus*.

Conservation Status Rank: GNR/SNR

Rank Justification:

Synonyms:

Acer macrophyllum / *Symphoricarpos albus* Woodland

Bigleaf Maple / Common Snowberry Woodland



Abbrev: ACEMAC/SYMALB

EL Code: CEGL008240

Macrogroup: Central Rocky Mountain Mesic Lower Montane Forest

Group: East Cascades Mesic Grand Fir - Douglas-fir Forest

Alliance: *Abies grandis - Pseudotsuga menziesii* Mesic Cascadian Forest

Range: Occurs in the Stehekin River watershed of North Cascades National Park. It may also occur elsewhere in the Cascade Mountains of Washington, British Columbia, and Oregon.

Plots: NOCA (16)

Environmental Description: Occur at low elevations (350 to 800 m) on the east side of the Cascade Crest. Stands occur on gentle to moderate (10° average slope) south-facing aspects (176° average), often in areas recovering from recent fires. Stands may occupy floodplains, but they are apparently very rarely inundated.

Vegetation Description: These broad-leaved woodlands have open canopies. *Acer macrophyllum* dominates the canopy, with a dense understory of *Cornus nuttallii* and a low shrub layer dominated by *Symphoricarpos albus*. *Pseudotsuga menziesii* usually codominates in the canopy. *Rubus nutkanus* (= *parviflorus*) is usually prominent. *Paxistima myrsinites*, *Rosa gymnocarpa*, *Philadelphus lewisii*, and *Amelanchier alnifolia* are frequently present. *Acer circinatum* and *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*) are rarely present, but were each codominant one sampled stand. *Pteridium aquilinum* usually dominates the herb layer and *Elymus glaucus* is often prominent. Additional common herbs include *Adenocaulon bicolor*, *Osmorhiza berteroi*, *Prosartes* (= *Disporum*) *hookeri*, and *Galium triflorum*.

Classification Comments: *Acer macrophyllum* and other Vancouverian indicator species are prominent due to the biogeographic convergence of Rocky Mountain and Vancouverian floristic provinces in the eastern North Cascades. When present, *Pinus ponderosa* is a strong differential indicator compared to similar types. Other diagnostics include *Pteridium aquilinum*, *Philadelphus* lewisii, *Rubus ursinus*, and *Elymus glaucus*. This association is similar to (and perhaps seral to) PSEMEN-(PINPON)/SYMALB, which shares many species and also occurs on high, dry floodplain terraces, but has much greater cover of *Pseudotsuga menziesii* and lacks a deciduous component of *Acer macrophyllum* and *Cornus nuttallii*. *Pteridium aquilinum*, *Prosartes* (= *Disporum*) *hookeri*, and *Rubus nutkanus* (= *parviflorus*) are usually absent. *Mahonia aquifolium* and *Spiraea lucida* (= *betulifolia*) are additional indicators of this type.

Conservation Status Rank: GNR/SNR

Rank Justification:

Synonyms:

Acer macrophyllum / *Symphoricarpos albus* Forest (Crawford et al., 2009)

***Pseudotsuga menziesii* - (*Abies grandis*) / *Acer circinatum* - *Paxistima myrsinites* Forest**

Douglas-fir - (Grand Fir) / Vine Maple - Oregon Boxleaf Forest



Abbrev: PSEMEN-(ABIGRA)/ACECIR-PAXMYR

EL Code: CEGL008267

Macrogroup: Central Rocky Mountain Mesic Lower Montane Forest

Group: East Cascades Mesic Grand Fir - Douglas-fir Forest

Alliance: *Abies grandis* - *Pseudotsuga menziesii* Mesic Cascadian Forest

Range: Documented in the Stehekin River watershed and along Ross Lake at North Cascades National Park. It may also occur elsewhere in the Cascade Mountains of Washington, British Columbia, and Oregon.

Plots: NOCA (15), Other (2)

Environmental Description: These apparently mid-seral forests are found at low to mid-montane elevations (350 to 1000 m) on the east side of the Cascade Crest. Stands occur on gentle to moderate (12° average slope) south-facing aspects (188° average). Soils are well-drained and often derived from glacial, alluvial, or debris flow material.

Vegetation Description: *Pseudotsuga menziesii* dominates the canopy, or codominates with *Abies grandis* (depending on stand age). *Abies grandis* usually dominates tree regeneration. At higher elevations near the Cascade Crest, *Abies amabilis* may replace *Abies grandis*. *Pinus ponderosa* and *Acer macrophyllum* are often present. When present, *Thuja plicata* is very low in cover. The tall shrub layer is dominated by *Acer circinatum* over abundant *Paxistima myrsinites*. *Rosa gymnocarpa*, *Spiraea lucida* (= *betulifolia*), *Chimaphila umbellata*, *Mahonia nervosa*, and *Vaccinium membranaceum* are frequent. The herb layer is occasionally well-developed on relatively moist sites, with *Clintonia uniflora*, *Trillium ovatum*, and *Maianthemum stellatum*. However, herbs are typically sparse or absent in dense stands, with only *Pteridium aquilinum*, *Chimaphila menziesii*, and/or *Goodyera oblongifolia* frequently present. *Achlys triphylla* is diagnostically absent.

Classification Comments: Stands are located on generally drier sites than PSEMEN-(TSUHET)/ACECIR-PAXMYR, with little or no cover from *Tsuga heterophylla or Thuja plicata*. Those canopy species are instead replaced by *Abies grandis* or occasionally *Abies amabilis*. Additionally, PSEMEN-(ABIGRA)/ACECIR-PAXMYR has a more open canopy (44% v. 56% average cover).

Conservation Status Rank: GNR/S3Q

Rank Justification: Appears to have a narrow range in the East Cascades.

Synonyms:

Pseudotsuga menziesii - (*Abies grandis*) / *Acer circinatum* / *Paxistima myrsinites* Forest (Crawford et al., 2009)

***Pseudotsuga menziesii* - (*Pinus ponderosa*) / *Symphoricarpos albus* Forest**

Douglas-fir - (Ponderosa Pine) / Common Snowberry Forest



Abbrev: PSEMEN-(PINPON)/SYMALB

EL Code: CEGL008269

Macrogroup: Central Rocky Mountain Mesic Lower Montane Forest

Group: East Cascades Mesic Grand Fir - Douglas-fir Forest

Alliance: Abies grandis - Pseudotsuga menziesii Mesic Cascadian Forest

Range: Occurs from the Wenatchee Mountains to the eastern North Cascades and Okanogan Highlands.

Plots: NOCA (7), Other (1)

Environmental Description: Occur at low elevations (350 to 1000 m) east of the Cascade Crest. Stands occur on low-angled (7° average slope), frequently west-facing aspects (266° average), usually on high terraces above significant rivers.

Vegetation Description: *Pseudotsuga menziesii* dominates, often with prominent *Pinus ponderosa*, and *Acer macrophyllum* is typically present. Scattered tall shrubs such as *Amelanchier alnifolia*, *Acer glabrum*, and *Holodiscus discol*or may be present, but *Symph*o*ricarpos albus* characteristically dominates the shrub layer. *Spiraea lucida* (= *betulifolia*), *Paxistima myrsinites*, and *Mahonia aquifolium* are also typically present. The herb layer is sparse, but *Calamagrostis rubescens* and/or *Elymus glaucus* are usually present.

Classification Comments: This association may represent an ecotone between upland and riparian systems. PSEMEN-PINPON-POPBAL/ACECIR has *Acer circinatum* dominant in the understory. PSEMEN-(PINPON)/SYMALB is in G212 due to the presence of Vancouverian indicators such as *Acer macrophyllum*. As noted in Crawford et al. 2009, this association likely represents stands on the periphery of the range of *Pseudotsuga menziesii* / *Symphoricarpos albus* Forest (CEGL000459)—regional analysis may ultimately combine the two. This type may also be equivalent to *Pseudotsuga menziesii* / *Symphoricarpos albus* Riparian Woodland (CWWA000021) in G796 Northern Rocky Mountain Lowland & Foothill Riparian Forest (Crowe & Clausnitzer, 1997 p66; Crowe et al., 2004 p309; Kovalchik & Clausnitzer, 2004 p101). However, this association lacks riparian indicators such as *Alnus incana* and *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*). In addition, *Calamagrostis rubescens* (a dry upland indicator) is often prominent.

Conservation Status Rank: GNR/S4

Rank Justification: This association appears to be widespread in the East Cascades. Logging has removed large trees from many stands.

Synonyms:

Pseudotsuga menziesii - (*Pinus ponderosa*) / *Symphoricarpos albus* Forest (Crawford et al., 2009)

***Pseudotsuga menziesii* - (*Tsuga heterophylla*) / *Acer circinatum* - *Paxistima myrsinites* Forest**

Douglas-fr - (Western Hemlock) / Vine Maple - Oregon Boxleaf Forest



Abbrev: PSEMEN-(TSUHET)/ACECIR-PAXMYR

EL Code: CEGL008271

Macrogroup: Central Rocky Mountain Mesic Lower Montane Forest

Group: East Cascades Mesic Grand Fir - Douglas-fir Forest

Alliance: Abies grandis - Pseudotsuga menziesii Mesic Cascadian Forest

Range: This association has been ocumented in the Stehekin River and Little Beaver watersheds and along Ross Lake at North Cascades National Park and in the Wenatchee Mountains. It may also occur elsewhere in the Cascade Mountains of Washington, British Columbia, and Oregon.

Plots: NOCA (13), Other (1)

Environmental Description: Occur at low- to mid-montane elevations (600 to 1000 m) east of the Cascade Crest. Stands occur on moderate (19° average slope), frequently southwest-facing aspects (211° average), often on toeslopes and benches that are moist, but well-drained.

Vegetation Description: *Pseudotsuga menziesii* dominates or codominates (depending on stand age) with *Tsuga heterophylla* and/or *Thuja plicata*. *Tsuga heterophylla* or *Thuja plicata* always occupy over 10% total cover and usually dominate regeneration. A tall shrub layer is dominated by *Acer circinatum*. Several shorter shrub species may be present, primarily *Paxistima myrsinites*, *Mahonia nervosa*, *Rubus nutkanus* (= *parviflorus*), and/or *Rosa gymnocarpa*. Subshrubs *Chimaphila umbellata* and *Linnaea borealis* are common. On moist sites, the herb layer can be well-developed, often with *Clintonia uniflora*, *Asarum caudatum*, *Maianthemum stellatum*, and/or *Goodyera oblongifolia*.

Classification Comments: PSEMEN-(ABIGRA)/ACECIR-PAXMYR is quite similar, but occurs on somewhat drier sites, with a more open canopy, and lacks prominent to codominant *Tsuga heterophylla* and *Thuja plicata*.

Conservation Status Rank: GNR/S3S4

Rank Justification: Occurs in the East Cascades within a relatively narrow range.

Synonyms:

Pseudotsuga menziesii - (*Tsuga heterophylla*) / *Acer circinatum* - *Paxistima myrsinites* Forest (Crawford et al., 2009)

Tsuga heterophylla / *Acer circinatum* / *Clintonia uniflora* Association (Lillybridge et al., 1995)

***Pseudotsuga menziesii - Pinus ponderosa* var. *ponderosa* / *Arctostaphylos nevadensis - Paxistima myrsinites* Woodland**

Douglas-fir - Ponderosa Pine / Pinemat Manzanita - Oregon Boxleaf Woodland



Abbrev: PSEMEN-PINPON/ARCNEV-PAXMYR

EL Code: CEGL008276

Macrogroup: Central Rocky Mountain Dry Lower Montane-Foothill Forest

Group: Central Rocky Mountain Douglas-fir - Pine Forest

Alliance: Pseudotsuga menziesii - Pinus ponderosa / Shrub Understory Central Rocky Mountain Forest & Woodland

Range: This association has been documented in the Stehekin River and Bridge Creek watersheds and along Ross Lake at North Cascades National Park. It is likely restricted to the East Cascades of Washington.

Plots: NOCA (19)

Environmental Description: Occur at low- to mid-montane elevations (350 to 1250 m) east of the Cascade Crest, on rocky sites often associated with exposed glacial outwash or till in cold-air drainages. Stands occur on flat to very steep (2 to 43°) frequently south-facing aspects (175° average).

Vegetation Description: The open canopy is codominated by *Pseudotsuga menziesii* and *Pinus ponderosa* var. *ponderosa.* A low shrub layer is dominated by *Arctostaphylos nevadensis*, typically with *Paxistima myrsinites* and *Spiraea lucida* (= *betulifolia*) *present*. Patchy *Calamagrostis rubescens*, *Carex geyeri*, and *Festuca occidentalis* are common. *Arnica cordifolia*, *Hieracium scouleri*, *Heuchera cylindrica*, and *Cryptogramma acrostichoides* may be present.

Classification Comments: *Pinus ponderosa - Pseudotsuga menziesii* / *Arctostaphylos nevadensis* Woodland (CEGL000208) is found in California and as far north as Mount Hood in Oregon. PSEMEN-PINPON/ARCNEV-PAXMYR never has *Pinus lambertiana*, *Abies concolor*, or *Calocedrus decurrens* and the shrub layer lacks *Arctostaphylos patula* and *Chrysolepis chrysophylla*. *Abies grandis* / *Arctostaphylos nevadensis* Woodland (CEGL000915) is a 'potential natural vegetation' (PNV) type that occurs from the Wenatchee Mountains south. No *Abies grandis* were documented in plots from the North Cascades assigned to PSEMEN-PINPON/ARCNEV-PAXMYR.

Conservation Status Rank: GNR/S2

Rank Justification: This community is restricted to the East Cascades of Washington. This is a mid- to late-seral woodland that depends upon a relatively specific topography and/or parent material. Individual sites are small, and there are few representative stands throughout the community's range.

Synonyms:

Pseudotsuga menziesii - Pinus ponderosa var. *ponderosa* / *Arctostaphylos nevadensis* Woodland (Crawford et al., 2009)

***Pseudotsuga menziesii* / *Holodiscus discolor* / *Calamagrostis rubescens* Forest**

Douglas-fir / Oceanspray / Pinegrass Forest



Abbrev: PSEMEN/HOLDIS/CALRUB

EL Code: CEGL008268

Macrogroup: Central Rocky Mountain Dry Lower Montane-Foothill Forest

Group: Central Rocky Mountain Douglas-fir - Pine Forest

Alliance: Pseudotsuga menziesii - Pinus ponderosa / Shrub Understory Central Rocky Mountain Forest & Woodland

Range: Documented near Ross and Diablo Lakes and in the Stehekin River watershed at North Cascades National Park. It may also occur elsewhere in the East Cascades.

Plots: NOCA (25), Other (1)

Environmental Description: Occur at low- to mid-montane elevations (400 to 1000 m) east of the Cascade Crest, on rocky and typically moss-covered soil. Stands occur on moderately steep (26° average slope), frequently south-facing aspects (171° average), in dry topographic positions. Evidence of past fire is often present.

Vegetation Description: *Pseudotsuga menziesii* is the dominant overstory species. The variable density tall-shrub layer is dominated by *Holodiscus discol*or. Shorter shrubs are also variable in their cover and usually include *Spiraea lucida* (= *betulifolia*), *Paxistima myrsinites*, *Mahonia aquifolium* and *Rosa gymnocarpa*. *Arctostaphylos uva-ursi* and *Lonicera ciliosa* may be prominent. The herb layer is dominated by *Calamagrostis rubescens*. *Achlys triphylla* is absent.

Classification Comments: PSEMEN/HOLDIS-ROSGYM/FESOCC is similar, but with East Cascades and Rocky Mountain floristic elements. *Rosa gymnocarpa*, *Lonicera ciliosa*, *Lysimachia latifolia*, *Mahonia nervosa*, *Mahonia aquifolium*, *Fragaria virginiana*, *Goodyera oblongifolia*, and *Festuca occidentalis* are all strong differential indicators within this alliance. A separate *Pseudotsuga menziesii* / *Mahonia nervosa* / *Calamagrostis rubescens* Forest association was included in Crawford et al. 2009, but further sampling failed to support that as a separate association.

Conservation Status Rank: GNR/S3S4Q

Rank Justification: Occurs within a narrow geographic range.

Synonyms:

> *Pseudotsuga menziesii* / *Mahonia nervosa* / *Calamagrostis rubescens* Forest (Crawford et al., 2009)

> *Pseudotsuga menziesii* / *Holodiscus discolor* / *Calamagrostis rubescens* Forest (Crawford et al., 2009)

Pseudotsuga menziesii / *Paxistima myrsinites - Spiraea betulifolia* Woodland

Douglas-fir / Oregon Boxleaf - Shinyleaf Meadowsweet Woodland



Abbrev: PSEMEN/PAXMYR-SPIBET

EL Code: CEGL008274

Macrogroup: Central Rocky Mountain Dry Lower Montane-Foothill Forest

Group: Central Rocky Mountain Douglas-fir - Pine Forest

Alliance: *Pseudotsuga menziesii - Pinus ponderosa* / Shrub Understory Central Rocky Mountain Forest & Woodland

Range: Documented in the Wenatchee Mountains, as well as the Stehekin River, Bridge Creek, and Rainbow Creek drainages and near Ross Lake at North Cascades National Park. It may also occur elsewhere in the East Cascades and Okanogan Mountains of Washington, British Columbia, and Oregon.

Plots: NOCA (17)

Environmental Description: These apparently mid-seral forests and woodlands occur at low- to mid-montane elevations (650 - 1500 m) east of the Cascade Crest. Stands occur on moderately steep (25° average slope) mid to upper slopes, frequently with southwest-facing aspects (197° average). Sites are topographically dry and usually have evidence of past fire.

Vegetation Description: A relatively open canopy is dominated by *Pseudotsuga menziesii* with *Pinus ponderosa* or *Pinus contorta* sometimes abundant. *Paxistima myrsinites* is the most dominant shrub, often with scattered *Acer glabrum*, *Amelanchier alnifolia*, *Mahonia aquifolium*, *Lonicera ciliosa*, *Rosa gymnocarpa* or *Spiraea lucida* (= *betulifolia*). *Ceanothus velutinus* and *Prunus emarginata* are usually present and may be prominent, particularly following recent fires. *Calamagrostis rubescens* occurs frequently but is rarely more than prominent. *Carex geyeri* is characteristically absent.

Classification Comments:

Conservation Status Rank: GNR/S3S4

Rank Justification: Relatively common within a narrow geographic range. Current ecological condition and threats to existing occurrences are unknown.

Synonyms:
Pseudotsuga menziesii / *Paxistima myrsinites* - *Spiraea betulifolia* Woodland (Crawford et al., 2009)
Pseudotsuga menziesii / *Paxistima myrsinites* Association (Williams & Lillybridge, 1983; Lillybridge et al., 1995)

Pseudotsuga menziesii / *Calamagrostis rubescens* Woodland

Douglas-fir / Pinegrass Forest



Abbrev: PSEMEN/CALRUB

EL Code: CEGL000429

Macrogroup: Central Rocky Mountain Dry Lower Montane-Foothill Forest

Group: Central Rocky Mountain Douglas-fir - Pine Forest

Alliance: Pseudotsuga menziesii - Pinus ponderosa / Herbaceous Understory Central Rocky Mountain Woodland

Range: Occurs in the Central and Northern Rocky Mountains from western Montana to northeastern Washington and British Columbia, and south to western Wyoming, Idaho, and eastern Oregon. This association also occurs on the eastern edge of the North Cascades.

Plots: NOCA (28)

Environmental Description: In Washington, this type occurs at low to mid-montane elevations on cool, dry benches and mid to upper slopes. At low elevations, stands are restricted to north aspects, while at upper elevations stands are found on warm and dry southerly exposures. Substrates are variable, but are generally well-drained, coarse-textured, and gravelly and may be derived from a variety of acidic parent materials. Surficial rock usually has low to moderate cover, while litter cover is usually high.

Vegetation Description: The typically open tree canopy is dominated by *Pseudotsuga menziesii* or codominated by *Pseudotsuga menziesii* and *Pinus ponderosa*. *Pinus contorta* may be present in the upper canopy. *Pseudotsuga menziesii* comprises the subcanopy. Scattered dwarf-shrubs such as *Arctostaphylos uva-ursi*, *Paxistima myrsinites*, and *Spiraea lucida* (= *betulifolia*) may be present but are less abundant than graminoids. Perennial graminoids with at least moderately dense cover comprise most of the understory and *Calamagrostis rubescens* dominates. *Pseudoroegneria spicata* is prominent in about half of sampled stands. Forbs are often diverse, but are typically low in cover. The most common forb species are *Achillea millefolium*, Hieracium scouleri, *Antennaria* spp., and *Arnica cordifolia*. Recently burned stands may have relatively sparse herbaceous cover.

Classification Comments: Crawford et al. 2009 proposed a separate *Pseudotsuga menziesii - Pinus ponderosa* / *Calamagrostis rubescens* Forest, with the comment that “this association is similar to the *Pseudotsuga menziesii* / *Calamagrostis rubescens* forest (CEGL000429) that may occur near Lake Chelan. A regional assessment is needed to clarify this relationship.” Additional sampling in the North Cascades showed these associations to be indistinguishable. Some stands in the North Cascades appear to be transitional to *Pinus ponderosa* / *Pseudoroegneria spicata* Woodland (CEGL000865). These patches are at low elevations (2400 to 2800’) on south-facing slopes. They are dominated of *Pinus ponderosa* and *Pseudoroegneria spicata*, with prominent *Balsamorhiza sagittata*, and reduced prominence of *Pseudotsuga menziesii*. Overall, floristic turnover was insufficient to pull out these stands as a separate association.

Conservation Status Rank: G5/S5

Rank Justification: This widespread, montane forest association occurs in the East Cascades and Central to Northern Rocky Mountains. Large trees have been removed from many stands, affecting the overall condition of the type. Fire exclusion has also had negative impacts.

Synonyms:

Pseudotsuga menziesii / *Calamagrostis rubescens* Plant Association (Johnson & Simon, 1987; Johnson & Clausnitzer, 1992)

Pseudotsuga menziesii / *Calamagrostis rubescens* (Bourgeron & Engelking, 1994)

Pseudotsuga menziesii - Pinus contorta / *Arctostaphylos nevadensis* Woodland

Douglas-fir - Lodgepole Pine / Pinemat Manzanita Woodland



Abbrev: PSEMEN-PINCON/ARCNEV

EL Code: CEGL008275

Macrogroup: Central Rocky Mountain Dry Lower Montane-Foothill Forest

Group: Central Rocky Mountain Douglas-fir - Pine Forest

Alliance: *Pseudotsuga menziesii - Pinus contorta* var. *latifolia* Central Rocky Mountain Forest

Range: Occurs in the East Cascades within a relatively narrow geographic range. It has been documented near Lake Chelan and along Ross Lake at North Cascades National Park. It may also occur to the south in the central Cascade Mountains of Washington.

Plots: NOCA (12)

Environmental Description: Occur at low- to mid-montane elevations (500 to 1400 m) east of the Cascade Crest, mostly from Lake Chelan southward, on very rocky substrates. Stands are typically on flat to moderately steep (3-30° slope), southwest-facing aspects (223° average).

Vegetation Description: *Pseudotsuga menziesii* codominates with *Pinus contorta* (var. *latifolia*), while *Abies lasiocarpa* may occasionally be prominent on the upper end of the elevation range. *Arctostaphylos nevadensis* forms sprawling mats, with occasional *Vaccinium membranaceum*, *Paxistima myrsinites*, *Chimaphila umbellata* and *Spiraea lucida* (= *betulifolia*). The sparse herb layer may have patches of *Pteridium aquilinum*, *Calamagrostis rubescens*, and/or *Hieracium albiflorum*.

Classification Comments: *Tsuga heterophylla* / *Arctostaphylos nevadensis* Woodland (CEGL000913) is a 'potential natural vegetation' (PNV) type of mesic sites (G212) with *Tsuga heterophylla* and/or *Abies grandis*. *Pinus contorta* / *Arctostaphylos nevadensis* Forest (CEGL000133) occurs on pumice soils of the South Cascades, with codominant *Arctostaphylos patula* and *Achnatherum occidentale*. *Pseudotsuga menziesii* is absent from that type.

Conservation Status Rank: GNR/S2S3

Rank Justification: Occurs in the East Cascades within a relatively narrow geographic range.

Synonyms:

Pseudotsuga menziesii - Pinus contorta / *Arctostaphylos nevadensis* Woodland (Crawford et al., 2009)

Pinus contorta - Pseudotsuga menziesii / *Gaultheria shallon* Forest

Lodgepole Pine - Douglas-fir / Salal Forest



Abbrev: PINCON-PSEMEN/GAUSHA

EL Code: CEGL000150

Macrogroup: Vancouverian Lowland & Montane Forest

Group: Vancouverian Dry Coastal Beach Pine Forest & Woodland

Alliance: *Pinus contorta* var. *contorta* Sand Dune Woodland

Range: Restricted to the Puget Lowlands of Washington and the Georgia Depression of British Columbia

Plots: NOCA (15), OLYM (10), Other (17)

Environmental Description: Occurs in a wide range of environments, mostly below 850 m elevation. Sites vary from flat terrain to steep slopes on variable aspects. Sites are dry to moderately dry, apparently with relatively nutrient-poor and often quite shallow soil (gravelly, sandy loam outwash deposits, glacial till, and sedimentary residuum).

Vegetation Description: *Pinus contorta* usually dominates the tree layer with *Pseudotsuga menziesii* typically prominent to codominant. *Pinus monticola* is often present and can be prominent in the canopy. *Tsuga heterophylla* is usually present but with low abundance. The understory is a dense layer of *Gaultheria shallon*, often with scattered *Vaccinium parvifolium*. *Vaccinium ovatum* is common in Puget Lowland stands. *Pteridium aquilinum*, *Mahonia nervosa*, *Gaultheria ovatifolia*, and *Pyrola picta* are frequent species in the typically depauperate ground cover. The lichen *Cladonia bellidiflora* occurs in most plots.

Classification Comments: This may be a persistent fire-maintained seral stage of PSEMEN/GAUSHA-VACPAR.

Conservation Status Rank: G1G2/S1

Rank Justification: This community has a somewhat restricted natural range. This is a mid-seral forest community that naturally depends upon a relatively specific fire regime or a fire mosaic landscape for its regeneration. Its area has been reduced by industrial forestry practices that emphasize monocultures of *Pseudotsuga menziesii*. There are very few viable occurrences remaining, at least in Washington. Fire suppression is a long-term threat that may result in the future extinction of this community type. Management of the community with fire is currently unfeasible at most sites because of landscape conditions and societal constraints associated with high-intensity fire.

Synonyms:

Pinus contorta var. *contorta* - *Pseudotsuga menziesii* / *Gaultheria shallon* (Meidinger et al., 2005) [PNWCOAST_096]

Pinus contorta var. *contorta* - *Pseudotsuga menziesii* / *Gaultheria shallon* (Chappell, 2006a)

Pinus contorta var. *contorta* - *Pseudotsuga menziesii* / *Gaultheria shallon* Forest (Crawford et al., 2009)

Pinus contorta / *Gaultheria shallon* (Bourgeron & Engelking, 1994)

***Acer macrophyllum - Pseudotsuga menziesii* / *Acer circinatum* / *Polystichum munitum* Forest**

Bigleaf Maple - Douglas-fir / Vine Maple / Western Swordfern Forest



Abbrev: ACEMAC-PSEMEN/ACECIR/POLMUN

EL Code: CEGL003394

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Red Alder - Bigleaf Maple - Douglas-fir Forest

Alliance: *Alnus rubra - Acer macrophyllum - Pseudotsuga menziesii* Forest

Range: Occurs in Olympic and North Cascades National Parks and throughout the low elevations of western Washington and Oregon. It likely occurs in British Columbia, as well.

Plots: NOCA (12), OLYM (11), Other (10)

Environmental Description: These are seral stands at low elevations (100 to 550 m) that often develop after logging, or less commonly after fire. Stands occur on many aspects, on slopes ranging from flat to fairly steep (1-33°), often on high riparian terraces.

Vegetation Description: These are closed forests codominated by broadleaf, deciduous *Acer macrophyllum* and coniferous *Pseudotsuga menziesii*. *Tsuga heterophylla* and *Thuja plicata* are usually the dominant regenerating trees in the understory. In Oregon, *Abies grandis* and *Calocedrus decurrens* may be prominent. *Acer circinatum* usually dominates an open tall shrub layer. *Mahonia nervosa* is occasionally prominent. *Corylus cornuta* is sometimes prominent and (along with *Symphoricarpos mollis*) may be dominant in plots sampled in Oregon. *Rubus ursinus* is commonly present. *Polystichum munitum* characteristically dominates the understory and may appear to be the only understory species, though typically an assortment of other ferns and forbs (*Lysimachia latifolia*, *Claytonia sibirica*, *Circaea alpina*, *Dryopteris expansa*, *Tolmiea menziesii*, *Pteridium aquilinum*, *Athyrium filix-femina*, etc.) are present in small amounts. This is an upland plant association. When present, *Rubus spectabilis* has little cover and is restricted to isolated depressions.

Classification Comments: ACEMAC/RUBSPE is a riparian forest association with a shrub layer dominated by *Rubus spectabilis* and/or *Ribes bracteosum* and *Tolmiea menziesii* differential in the herb layer. ACEMAC-ALNRUB/POLMUN-TELGRA is confined to coastal bluffs or landslide slopes and is characterized by substantial *Tellima grandiflora*, with much greater abundance *of Rubus spectabilis*, *Sambucus racemosa*, *Oemleria cerasiformis* and *Urtica dioica*.

Conservation Status Rank: G4/S4

Rank Justification: Occurs in a wide range of environments associated with past disturbances.

Synonyms:

Acer macrophyllum - (Pseudotsuga menziesii) / Polystichum munitum Forest (Crawford et al., 2009)

Pseudotsuga menziesii / Corylus cornuta - Symphoricarpos mollis / Polystichum munitum Forest (Hawk, 1973)

Alnus rubra / *Polystichum munitum* Forest

Red Alder / Western Swordfern Forest



Abbrev: ALNRUB/POLMUN

EL Code: CEGL000638

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Red Alder - Bigleaf Maple - Douglas-fir Forest

Alliance: *Alnus rubra - Acer macrophyllum* Forest

Range: Puget Lowlands, Mount Rainier, Olympics

Plots: MORA (1), OLYM (14), Other (5)

Environmental Description: Occurs on upland slopes (varying steepness) usually with mesic, well- drained soils. It is not associated with riparian landforms. Instead, this type results from succession after fires, logging, landslides, or slope failures.

Vegetation Description: The canopy is dominated by *Alnus rubra*. The herb layer is always dominated by *Polystichum munitum*. Other frequently occurring species include *Claytonia sibirica*, *Athyrium filix-femina*, *Anaphalis margaritacea*, and *Tellima grandiflora*. If present, a well-developed shrub layer is usually dominated by *Rubus spectabilis*.

Classification Comments: ACEMAC-PSEMEN/ACECIR/POLMUN is similar, but has little or no *Alnus rubra* and is dominated or codominated by *Acer macrophyllum*. ACEMAC-ALNRUB/POLMUN-TELGRA is similar, but *Acer macrophyllum*, *Holodiscus discolor*, *Rubus nutkanus* (= *parviflorus*), *Struthiopteris* (= *Blechnum*) *spicant*, and *Tiarella trifoliata* are differential. INR proposed restricting this association to coastal bluffs, but this type has been widely sampled as a post-logging—and frequently naturally occurring—successional association throughout the Puget Lowlands. It is likely more common outside of the parks, in disturbed landscapes.

Conservation Status Rank: G4/S4

Rank Justification: Occurs over a wide range, associated with past disturbance.

Synonyms:
Alnus rubra / *Polystichum munitum* Forest (Crawford et al., 2009)
Alnus rubra / *Polystichum munitum* (Bourgeron & Engelking, 1994; Chappell, 2001, 2006a)

***Pseudotsuga menziesii - Tsuga heterophylla* - (*Alnus rubra*) / *Rubus spectabilis* Forest**

Douglas-fir - Western Hemlock - (Red Alder) / Salmonberry Forest



Abbrev: PSEMEN-TSUHET-(ALNRUB)/RUBSPE

EL Code: CEGL005534

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Rubus spectabilis* Mesic Forest

Range: Occurs in Western Oregon and Washington

Plots: MORA (2), OLYM (12)

Environmental Description: Occurs on lower or toeslopes or valley bottoms with moist, but not wet, soils—it does not typically occur on floodplains. Most stands are relatively young, having regenerated after fire, blowdown or logging.

Vegetation Description: This is a conifer-dominated or mixed conifer-hardwood association. The canopy is dominated by *Pseudotsuga menziesii*, *Alnus rubra*, and/or *Tsuga heterophylla*. One or more of the conifers is always at least codominant. The well-developed shrub layer is dominated or codominated by *Rubus spectabilis*. *Gaultheria shallon* or *Acer circinatum* are sometimes codominant. The well-developed herb layer is dominated or codominated by *Polystichum munitum*. *Oxalis oregana* can be codominant in the western Olympics. *Claytonia sibirica* and *Galium triflorum* are usually present.

Classification Comments: ABIAMA/RUBSPE-VACALA is similar, but is dominated by *Abies amabilis*.

Conservation Status Rank: GNR/S4S5

Rank Justification: Occurs within a narrow geographic and ecological range. Most occurrences outside the national parks are a result of regeneration after logging, though there are probably some natural-origin stands.

Synonyms:

Pseudotsuga menziesii - (*Alnus rubra - Tsuga heterophylla*) / *Rubus spectabilis* (Meidinger et al., 2005) [PNWCOAST_158]

Pseudotsuga menziesii - (*Alnus rubra - Tsuga heterophylla*) / *Rubus spectabilis* Forest (Crawford et al., 2009)

***Pseudotsuga menziesii - Tsuga heterophylla* / (*Acer circinatum*) / *Polystichum munitum* Forest**

Douglas-fir - Western Hemlock / (Vine Maple) / Western Swordfern Forest



Abbrev: PSEMEN-TSUHET/(ACECIR)/POLMUN

EL Code: CEGL005542

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Rubus spectabilis* Mesic Forest

Range: In Washington, this association occurs in the western Cascades and on the Olympic Peninsula (except for the western coastal plain). It also extends into the lowlands of western Oregon and British Columbia.

Plots: MORA (1), NOCA (8), OLYM (15)

Environmental Description: Occurs at relatively low elevations (200 to 750 m) with soils that are well-drained and mesic to moist.

Vegetation Description: The canopy is dominated by *Pseudotsuga menziesii* and/or *Tsuga heterophylla*. Both are always present and *Tsuga heterophylla* always contributes over 10% total cover. Tree regeneration is mostly *Tsuga heterophylla*. A well-developed tall-shrub layer dominated by *Acer circinatum* is often present. Other shrubs have low cover if they are present. The herb layer is dominated by *Polystichum munitum*. Other herbs are usually not very abundant. If present, *Tiarella trifoliata*, *Struthiopteris* (= *Blechnum*) *spicant*, *Dryopteris expansa*, and *Athyrium filix-femina* have very low cover.

Classification Comments:

Conservation Status Rank: G4/S4

Rank Justification: This association is idespread in the southern Cascades in Washington and in the Olympics.

Synonyms:

Pseudotsuga menziesii-Tsuga heterophylla/(*Acer circinatum*)/ *Polystichum munitum* (Meidinger et al., 2005) [PNWCOAST_195]

Pseudotsuga menziesii-Tsuga heterophylla/(*Acer circinatum*)/*Polystichum munitum* Forest (Crawford et al., 2009)

***Pseudotsuga menziesii - Tsuga heterophylla* / *Gaultheria shallon* / *Polystichum munitum* Forest**

Douglas-fir - Western Hemlock / Salal / Western Swordfern Forest



Abbrev: PSEMEN-TSUHET/GAUSHA/POLMUN

EL Code: CEGL005536

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Rubus spectabilis* Mesic Forest

Range: Occurs on the western slopes of the Cascades and on the eastern Olympic Peninsula. It is absent from the outer coastal strip and infrequent to rare on the western side of the Olympics. Also found in the western lowlands of Oregon and British Columbia.

Plots: MORA (2), NOCA (1), OLYM (22), Other (32)

Environmental Description: Occurs at low to moderate elevations (150 to 700 m) on mesic soils.

Vegetation Description: The canopy is dominated by *Pseudotsuga menziesii* or a mixture with *Tsuga heterophylla*. *Thuja plicata* is often present and sometimes prominent to codominant. *Tsuga heterophylla* typically dominates tree regeneration and always has over 10% total cover. The moderate to dense shrub layer is dominated by *Gaultheria shallon*. *Acer circinatum*, *Vaccinium parvifolium*, and *Mahonia nervosa* are usually present and often prominent to codominant. The variably dense herb layer is dominated by *Polystichum munitum*, which always occupies over 3% cover. *Struthiopteris* (= *Blechnum*) *spicant* is usually absent. Dense second-growth stands may have sparse understories with *Gaultheria shallon* and *Polystichum munitum* as the most abundant species.

Classification Comments: PSEMEN/GAUSHA-MAHNER/POLMUN represents an earlier seral stage of this association, with little to no *Tsuga heterophylla*.

Conservation Status Rank: G4G5/S4

Rank Justification: This community has a limited natural range, being restricted to the Puget Lowlands (Washington), Willamette Valley (Oregon), and the Georgia Depression in British Columbia. This is a mid- to late-seral forest community that naturally depended upon moderately frequent to infrequent fires. Its area has been reduced by development and conversion to tree plantations. The vast majority of remaining occurrences are young stands that have been logged in the past. There are few viable occurrences remaining and little protection. Fire suppression is a long-term threat that could result in the future extinction of this community type. Inventory is needed in British Columbia where there may be more occurrences.

Synonyms:

Pseudotsuga menziesii - Tsuga heterophylla / *Gaultheria shallon* / *Polystichum munitum* (Chappell, 2006a)

Pseudotsuga menziesii - Tsuga heterophylla / *Gaultheria shallon* / *Polystichum munitum* (Meidinger et al., 2005) [PNWCOAST_182]

Pseudotsuga menziesii - Tsuga heterophylla / *Gaultheria shallon* / *Polystichum munitum* Forest (Crawford et al., 2009)

Pseudotsuga menziesii - Tsuga heterophylla / *Mahonia nervosa - Polystichum munitum* Forest

Douglas-fir - Western Hemlock / Cascade Barberry - Western Swordfern Forest



Abbrev: PSEMEN-TSUHET/MAHNER-POLMUN

EL Code: CEGL005543

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: Tsuga heterophylla - Pseudotsuga menziesii / Rubus spectabilis Mesic Forest

Range: Occurs in the western Cascades and Olympic Peninsula in Washington (absent from the outer coastal strip), as well as in Oregon and British Columbia.

Plots: MORA (14), NOCA (2), OLYM (25), Other (46)

Environmental Description: Occurs at low elevations (200 to 950 m), on mid to toeslopes, benches, and bottoms with well-drained, mesic soils.

Vegetation Description: The canopy is dominated by *Pseudotsuga menziesii* or codominated by *Pseudotsuga menziesii* and *Tsuga heterophylla*. *Thuja plicata* is usually present, often prominent and occasionally codominant. The well-developed shrub layer has *Mahonia nervosa* prominent to codominant. *Acer circinatum* is sometimes codominant, forming a taller layer. *Gaultheria shallon* is usually present, but always in small amounts. The typically well-developed herb layer is dominated by *Polystichum munitum* usually with low abundance of other species.

Classification Comments: PSEMEN/GAUSHA-MAHNER/POLMUN may sometimes represent an earlier seral stage of this association.

Conservation Status Rank: G4/S4

Rank Justification: This association is widespread in the Puget Lowlands and the Cascade and Olympic Mountains in western Washington. Foothill and montane sites have been less impacted by development and logging.

Synonyms:

Pseudotsuga menziesii - Tsuga heterophylla / *Mahonia nervosa - Polystichum munitum* (Chappell, 1997, 2001, 2006a)

Pseudotsuga menziesii - Tsuga heterophylla / *Mahonia nervosa - Polystichum munitum* (Meidinger et al., 2005) [PNWCOAST_191]

Pseudotsuga menziesii - Tsuga heterophylla / *Mahonia nervosa - Polystichum munitum* Forest (Crawford et al., 2009)

***Pseudotsuga menziesii - Tsuga heterophylla* / *Polystichum munitum - Oxalis oregana* Forest**

Douglas-fir - Western Hemlock / Western Swordfern - Redwood Sorrel Forest



Abbrev: PSEMEN-TSUHET/POLMUN-OXAORE

EL Code: CEGL005568

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Rubus spectabilis* Mesic Forest

Range: In Washington, occurs in the Cascades and Olympic Mountains. Also found in Oregon and California.

Plots: MORA (8), OLYM (11)

Environmental Description: Occurs at low elevations (350 to 750 m) on lower slopes or valley bottoms with moist but well- drained soils.

Vegetation Description: The canopy is typically codominated by *Pseudotsuga menziesii* and *Tsuga heterophylla*. *Tsuga heterophylla* dominates tree regeneration. The shrub layer is rather sparse to moderate. *Acer circinatum* often forms a prominent tall-shrub layer. *Mahonia nervosa* and *Vaccinium parvifolium* are usually present and occasionally prominent. The well-developed herb layer is codominated by *Polystichum munitum* and *Oxalis oregana*.

Classification Comments: Distinguished from other associations in this alliance by prominence of Achlys triphylla, Adenocaulon bicolor, and Oxalis oregana. Relative to other similar associations, this association is distinguished by greater cover *Pseudotsuga menziesii* and *Mahonia nervosa*, and absence of *Struthiopteris* (= *Blechnum*) *spicant* and *Vaccinium ovalifolium* (= *alaskaense*).

Conservation Status Rank: G3G4/S3

Rank Justification: Occurs within a narrow environmental range in western Washington and its extent has been greatly reduced by logging.

Synonyms:

Pseudotsuga menziesii - Tsuga heterophylla / *Polystichum munitum - Oxalis oregana* (Chappell, 2001)

Pseudotsuga menziesii - Tsuga heterophylla / *Polystichum munitum - Oxalis oregana* (Meidinger et al., 2005) [PNWCOAST_196]

Pseudotsuga menziesii - Tsuga heterophylla / *Polystichum munitum - Oxalis oregana* Forest (Crawford et al., 2009)

Tsuga heterophylla / *Polystichum munitum - Blechnum spicant* Forest

Western Hemlock - (Douglas-fir) / Western Swordfern - Deer Fern Forest



Abbrev: TSUHET/POLMUN-BLESPI

EL Code: CEGL005559

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Rubus spectabilis* Mesic Forest

Range: Occurs on the western Olympic Peninsula and at Mount Rainier in Washington. Also found in western Oregon.

Plots: MORA (10), OLYM (6)

Environmental Description: Occurs at low to middle elevations (250 to 1050 m), usually on lower slopes of major river valleys. These moist slopes are frequently unstable—slides may be common in the vicinity.

Vegetation Description: The generally closed canopy is dominated by *Tsuga heterophylla*. In plots sampled in the national parks, *Pseudotsuga menziesii* is often present (57% constancy) and can be prominent (12% average cover). The shrub layer is very sparse—*Vaccinium ovalifolium* (= *alaskaense*), *Vaccinium parvifolium*, *Gaultheria shallon*, and *Mahonia nervosa* can be present at low cover. The herb layer ranges from sparse to fairly well-developed and is codominated by *Polystichum munitum* and *Struthiopteris* (= *Blechnum*) *spicant*. *Gymnocarpium dryopteris* can be prominent. A variety of forbs may occur, but at low cover.

Classification Comments: Plots from Mount Rainier represent an expansion of this association's concept (particularly in the prominence of *Pseudotsuga menziesii*) and may represent a separate association or subtype.

Conservation Status Rank: GNR/S2S3

Rank Justification: This association was previously known only along the Olympic Peninsula and Willapa Hills and is now recognized in the southern Cascades. Occurrences have been fragmented by timber harvests.

Synonyms:
Tsuga heterophylla / *Polystichum munitum - Blechnum spicant* (Meidinger et al., 2005) [PNWCOAST_226]
Tsuga heterophylla / *Polystichum munitum - Blechnum spicant* Forest (Crawford et al., 2009)

***Tsuga heterophylla* - (*Pseudotsuga menziesii*) / *Vaccinium alaskaense* / *Polystichum munitum* Forest**

Western Hemlock - (Douglas-fir) / Alaska Blueberry / Western Swordfern Forest



Abbrev: TSUHET-(PSEMEN)/VACALA/POLMUN

EL Code: CEGL005573

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Rubus spectabilis* Mesic Forest

Range: Occurs in the western Cascades and Olympic Mountains of Washington, as well as western Oregon and coastal Alaska.

Plots: NOCA (1), OLYM (16)

Environmental Description: Sites are mostly lower and toeslopes or benches with well-drained soils at moderately low elevations (200 to 800 m).

Vegetation Description: The canopy is codominated by *Tsuga heterophylla*, *Pseudotsuga menziesii* and/or *Thuja plicata*. *Tsuga heterophylla* dominates tree regeneration and occupies over 10% total cover. *Abies amabilis* is usually present in small amounts as regeneration. The shrub layer is usually present, but rarely dense. *Vaccinium ovalifolium* (= *alaskaense*) is always prominent to codominant. *Vaccinium parvifolium* is usually prominent. *Mahonia nervosa* or *Acer circinatum* sometimes occur, the latter prominently. The herb layer is diverse and well-developed. *Polystichum munitum* is always prominent to codominant. *Struthiopteris* (= *Blechnum*) *spicant* is usually prominent. *Clintonia uniflora*, *Tiarella trifoliata*, and *Cornus unalaschkensis* are usually present.

Classification Comments:

Conservation Status Rank: G3/S3

Rank Justification: Occurs within a narrow environmental range in the mountains of western Washington and has been impacted by logging outside of the national parks.

Synonyms:

Tsuga heterophylla - (*Pseudotsuga menziesii*) / *Vaccinium alaskaense* / *Polystichum munitum* (Meidinger et al., 2005) [PNWCOAST_259]

Tsuga heterophylla - (*Pseudotsuga menziesii*) / *Vaccinium alaskaense* / *Polystichum munitum* Forest (Crawford et al., 2009)

***Tsuga heterophylla* - (*Pseudotsuga menziesii* - *Thuja plicata*) / *Polystichum munitum* - *Athyrium filix-femina* Forest**

Western Hemlock - (Douglas-fir - Western Red-cedar) / Western Swordfern - Common Ladyfern Forest



Abbrev: TSUHET-(PSEMEN-THUPLI)/POLMUN-ATHFIL

EL Code: CEGL005576

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla* - *Pseudotsuga menziesii* / *Rubus spectabilis* Mesic Forest

Range: Occurs in the western Cascades, the Puget Lowlands, and on the Olympic Peninsula, except in the wettest areas of the western Olympic Mountains and on the outer coastal strip. It is also found in western Oregon and British Columbia.

Plots: MORA (8), NOCA (8), OLYM (17), Other (63)

Environmental Description: Occurs at low elevations (300 to 850 m), usually on lower or toeslopes or riverine terraces. Soils are moist and often deep.

Vegetation Description: The canopy is dominated by a variable mixture of *Tsuga heterophylla*, *Pseudotsuga menziesii*, and/or *Thuja plicata*. *Tsuga heterophylla* or *Thuja plicata* always occupy at least 10% total cover and dominate tree regeneration. *Acer macrophyllum* is sometimes prominent. A well-developed tall-shrub layer dominated by *Acer circinatum* is often present. Shorter shrubs are usually sparse but often include *Rubus spectabilis* and *Vaccinium parvifolium*. The herb layer is dominated by *Polystichum munitum*, usually growing taller and more densely than it does in other settings. Indicative herbaceous plants include *Athyrium filix-femina*, *Tiarella trifoliata*, *Struthiopteris* (= *Blechnum*) *spicant*, *Gymnocarpium dryopteris* and *Dryopteris expansa*, one or more of which is sometimes prominent. Other frequent herbs include *Achlys triphylla* and *Clintonia uniflora*.

Classification Comments: This association is distinguished by the relative abundance of wet to moist-site indicator herbs, presence of *Rubus spectabilis*, and high cover of *Polystichum munitum*.

Conservation Status Rank: G3G4/S3

Rank Justification: Occurs within a narrow environmental range in the mountains of western Washington and has been impacted by logging.

Synonyms:

Tsuga heterophylla - *Pseudotsuga menziesii* / *Polystichum munitum* - *Dryopteris expansa* (Chappell, 2006a)

Tsuga heterophylla - (*Pseudotsuga menziesii* - *Thuja plicata*) / *Polystichum munitum* - *Athyrium filix-femina* Forest (Crawford et al., 2009)

Tsuga heterophylla - (*Pseudotsuga menziesii* - *Thuja plicata*) / *Polystichum munitum* - *Athyrium filix-femina* (Meidinger et al., 2005) [PNWCOAST_265]

Tsuga heterophylla / *Polystichum munitum* (Bourgeron & Engelking, 1994)

***Tsuga heterophylla - Pseudotsuga menziesii* / *Vaccinium alaskaense* / *Oxalis oregana* Forest**

Western Hemlock - Douglas-fir / Alaska Blueberry / Redwood Sorrel Forest



Abbrev: TSUHET-PSEMEN/VACALA/OXAORE

EL Code: CEGL005588

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Rubus spectabilis* Mesic Forest

Range: Occurs in the southwestern Olympic Mountains and south along the Pacific Coast to California.

Plots: OLYM (16)

Environmental Description: Occurs at low elevations (250 to 450 m), usually on gentle slopes.

Vegetation Description: The canopy is codominated by *Pseudotsuga menziesii* and *Tsuga heterophylla*, with the latter dominating tree regeneration. *Picea sitchensis* can be present but is never prominent. The well-developed shrub layer is dominated or codominated by *Vaccinium ovalifolium* (= *alaskaense*). *Acer circinatum* and *Vaccinium parvifolium* are usually present to codominant. The well-developed herb layer is dominated by *Oxalis oregana*. *Polystichum munitum* is usually present to prominent. *Cornus unalaschkensis* is usually present.

Classification Comments: Fires are more frequent than in TSUHET/VACALA/OXAORE, but the two associations are transitional. This type is distinguished from other associations with *Oxalis* by the prominence of both *Pseudotsuga menziesii* and *Vaccinium ovalifolium* (= *alaskaense*). The plots from the Olympics have a different set of associated species (e.g. less *Acer circinatum* and more *Struthiopteris* (= *Blechnum*) *spicant* and *Rubus pedatus*) than those from Oregon and the southern Washington Cascades.

Conservation Status Rank: GNR/S3

Rank Justification: Occurs within a narrow geographic range. Many occurrences outside the national parks have been impacted by timber harvests.

Synonyms:

Tsuga heterophylla - Pseudotsuga menziesii / *Vaccinium alaskaense* / *Oxalis oregana* (Meidinger et al., 2005) [PNWCOAST_258]

Tsuga heterophylla - Pseudotsuga menziesii / *Vaccinium alaskaense* / *Oxalis oregana* Forest (Crawford et al., 2009)

Tsuga heterophylla / *Gaultheria shallon* / *Polystichum munitum - Blechnum spicant* Forest

Western Hemlock / Salal / Western Swordfern - Deer Fern Forest



Abbrev: TSUHET/GAUSHA/POLMUN-BLESPI

EL Code: CEGL007301

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Rubus spectabilis* Mesic Forest

Range: Restricted to the western Olympic Peninsula and Willapa Hills

Plots: OLYM (10)

Environmental Description: Occurs at low elevations (20 to 90 m) in topographic settings that vary from flats to steep slopes. Soils are deep, well-drained, and relatively moist.

Vegetation Description: The canopy is dominated by *Tsuga heterophylla*. *Thuja plicata* or *Abies amabilis* often occur in small amounts. *Pseudotsuga menziesii* occurs very infrequently. The well-developed shrub layer is dominated by *Gaultheria shallon*. *Vaccinium parvifolium* is always present and sometimes prominent. *Vaccinium ovalifolium* (= *alaskaense*) and *Rhododendron menziesii* (= *Menziesia ferruginea*) are usually present to prominent. The herb layer is usually well-developed and dominated by *Polystichum munitum*, *Struthiopteris* (= *Blechnum*) *spicant*, and/or *Oxalis oregana*. The former two species are always present. *Prosartes* (= *Disporum*) *smithii* and *Trillium ovatum* are usually present.

Classification Comments: This association is distinguished by > 5% cover of either *Polystichum munitum* or *Oxalis oregana*, in combination with > 1% cover of *Struthiopteris* (= *Blechnum*) *spicant*. This association transitions to TSUHET/VACALA/OXAORE with low cover of *Gaultheria shallon*. PSEMEN-TSUHET/GAUSHA/POLMUN is the only other association in this alliance with prominent/dominant *Gaultheria shallon*—that association lacks *Struthiopteris* (= *Blechnum*) *spicant* and *Rhododendron menziesii* (= *Menziesia ferruginea*).

Conservation Status Rank: GNR/S3

Rank Justification: This association occurs only on the Olympic Peninsula and in the Willapa Hills. Many occurrences have been fragmented by timber harvests.

Synonyms:

Tsuga heterophylla / *Gaultheria shallon* / *Polystichum munitum - Blechnum spicant* (Meidinger et al., 2005) [PNWCOAST_222]

Tsuga heterophylla / *Gaultheria shallon* / *Polystichum munitum - Blechnum spicant* Forest (Crawford et al., 2009)

Tsuga heterophylla / *Polystichum munitum - Oxalis oregana* Forest

Western Hemlock / Western Swordfern - Redwood Sorrel Forest



Abbrev: TSUHET/POLMUN-OXAORE

EL Code: CEGL005586

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Rubus spectabilis* Mesic Forest

Range: Occurs on the western Olympic Peninsula and along the Pacific Coast south to California.

Plots: OLYM (23)

Environmental Description: Occurs at low elevations (10 to 400 m) on valley bottoms, lower slopes, and occasionally midslopes. Soils are deep, well-drained, and moist.

Vegetation Description: The canopy is usually dominated by *Tsuga heterophylla*. *Pseudotsuga menziesii* is occasionally present to codominant. If codominant, *Mahonia nervosa* is absent. The shrub layer is typically sparse to moderately dense. *Vaccinium ovalifolium* (= *alaskaense*), *Vaccinium parvifolium*, and *Rubus spectabilis* are usually present. The latter is sometimes prominent. *Acer circinatum* is occasionally prominent to codominant. The well-developed herb layer is codominated by *Polystichum munitum* and *Oxalis oregana* (or occasionally just *Oxalis oregana*). *Struthiopteris* (= *Blechnum*) *spicant* is almost always present and occasionally prominent. *Tiarella trifoliata* is often present.

Classification Comments: *Achlys triphylla*, *Adenocaulon bicolor*, and *Oxalis oregana* are differential species relative to other associations in this alliance. If *Pseudotsuga menziesii* is codominant, *Mahonia nervosa* is always absent and *Vaccinium ovalifolium* and *Struthiopteris* (= *Blechnum*) *spicant* are present.

Conservation Status Rank: GNR/S3

Rank Justification: This association occurs only on the Olympic Peninsula and the Willapa Hills. Many occurrences have been fragmented by timber harvests.

Synonyms:
Tsuga heterophylla / *Polystichum munitum - Oxalis oregana* (Chappell 1997)
Tsuga heterophylla / *Polystichum munitum - Oxalis oregana* (Topik et al. 1986)
Tsuga heterophylla/*Polystichum munitum-Oxalis oregana* (Meidinger et al., 2005) [PNWCOAST_227]
Tsuga heterophylla/*Polystichum munitum-Oxalis oregana* Forest (Crawford et al., 2009)

Tsuga heterophylla / *Vaccinium alaskaense* / *Oxalis oregana* Forest

Western Hemlock / Alaska Blueberry / Redwood Sorrel Forest



Abbrev: TSUHET/VACALA/OXAORE

EL Code: CEGL005587

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: Tsuga heterophylla - Pseudotsuga menziesii / Rubus spectabilis Mesic Forest

Range: Occurs on the western and south-central Olympic Peninsula and south along the Pacific Coast to California.

Plots: OLYM (12)

Environmental Description: Occurs at low elevations (10 to 300 m) on gentle lower or toeslopes, flats, and benches. Soils are generally deep and well-drained.

Vegetation Description: The canopy and tree regeneration are dominated by *Tsuga heterophylla*. *Picea sitchensis* can be prominent in the overstory. The well-developed shrub layer is dominated by *Vaccinium ovalifolium* (= *alaskaense*). *Vaccinium parvifolium*, *Rubus spectabilis*, *Gaultheria shallon*, and *Rhododendron menziesii* (= *Menziesia ferruginea*) are usually present. The usually well-developed herb layer is dominated by *Oxalis oregana*. *Struthiopteris* (= *Blechnum*) *spicant* is always present to occasionally prominent. *Polystichum munitum* is often prominent. *Tiarella trifoliata* and *Rubus pedatus* are usually present in small amounts.

Classification Comments: TSUHET-PSEMEN/VACALA/OXAORE is similar but has codominant *Pseudotsuga menziesii* (fires are more frequent/recent in that type). TSUHET/GAUSHA/POLMUN-BLESPI is also similar, but has low cover of *Vaccinium ovalifolium* (= *alaskaense*) and *Oxalis oregana*.

Conservation Status Rank: GNR/S3

Rank Justification: Occurs only on the Olympic Peninsula. Although somewhat common in the Olympic Mountains, many occurrences have been fragmented by timber harvests.

Synonyms:
Tsuga heterophylla / *Vaccinium alaskaense* / *Oxalis oregana* (Topik et al., 1986)
Tsuga heterophylla / *Vaccinium alaskaense* / *Oxalis oregana* (Meidinger et al., 2005) [PNWCOAST_232]
Tsuga heterophylla / *Vaccinium alaskaense* / *Oxalis oregana* Forest (Crawford et al., 2009)

Abies lasiocarpa - Pseudotsuga menziesii / *Mahonia nervosa* Forest

Subalpine Fir - Douglas-fir / Cascade Barberry Forest



Abbrev: ABILAS-PSEMEN/MAHNER

EL Code: CEGL008237

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Cornus unalaschkensis* Mesic Forest

Range: Occurs in the north and eastern Olympic Mountains. It may also occur in the central and southern Cascades of Washington and Oregon.

Plots: OLYM (8)

Environmental Description: Occur at mid- to upper-montane elevations (1300 to 1500 m) in the Olympic Mountains. Stands occur on steep (31° average slope) south-facing aspects (183° average), with dry, rocky soils.

Vegetation Description: *Abies lasiocarpa* (on the low end of its elevation range) and *Pseudotsuga menziesii* codominate a tree canopy that varies from semi-open to closed. Tree regeneration is dominated by *Abies lasiocarpa*, though *Abies amabilis* and *Callitropsis* (= *Cupressus*) *nootkatensis* regeneration may occur as well. The shrub layer is typically moderately dense and dominated by the *Mahonia nervosa*, with *Vaccinium membranaceum* and *Rosa gymnocarpa* present. The herb layer is frequently well-developed and includes mesic species such as *Achlys triphylla*, *Chimaphila umbellata*, *Clintonia uniflora*, *Linnaea borealis*, *Streptopus lanceolatus*, *Tiarella trifoliata*, and *Orthilia secunda*.

Classification Comments: PSEMEN/MAHNER/ACHTRI is similar, but has a greater abundance of lower elevation species like *Acer circinatum*, *Hieracium albiflorum*, *Pteridium aquilinum*, *Rubus ursinus*, *Lysimachia latifolia*, and *Vaccinium parvifolium* and little or no *Abies lasiocarpa* ssp. *lasiocarpa*, *Callitropsis* (= *Cupressus*) *nootkatensis*, *Lupinus latifolius*, or *Symphoricarpos albus*.

Conservation Status Rank: GNR/S2Q

Rank Justification: Represented at few sites within protected areas.

Synonyms:
Abies lasiocarpa - Pseudotsuga menziesii / *Mahonia nervosa* Forest (Crawford et al., 2009)

***Pseudotsuga menziesii* - (*Thuja plicata* - *Abies grandis*) / *Vaccinium membranaceum* Forest**

Douglas-fir - (Western Red-cedar - Grand Fir) / Thinleaf Huckleberry Forest



Abbrev: PSEMEN-(THUPLI-ABIGRA)/VACMEM

EL Code: CEGL008270

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla* - *Pseudotsuga menziesii* / *Cornus unalaschkensis* Mesic Forest

Range: Cascade Mountains

Plots: MORA (4), NOCA (16), OLYM (1)

Environmental Description: Occur at mid-montane elevations (600 to 1300 m). Stands occur on gentle to steep (11-39° average slope) south-facing aspects (160° average).

Vegetation Description: This association consists of mid-elevation *Pseudotsuga menziesii* forests of the Northeastern Cascades south to Mount Rainier. *Pseudotsuga menziesii* dominates a semi-open tree canopy near and west of the Cascade Crest. *Thuja plicata* may be prominent. *Abies grandis* may be important on the southeastern end of this association's range (i.e. the Wenatchee Mountains). *Tsuga heterophylla* may be present, but rarely prominent. The shrub layer is typically moderately open and dominated by *Vaccinium membranaceum*. *Acer circinatum* and *Paxistima myrsinites* may be prominent. The herb layer is usually poorly developed, with *Chimaphila umbellata*, *Linnaea borealis*, and *Pteridium aquilinum* occasionally prominent.

Classification Comments: PSEMEN/VACMEM has less moss cover and fewer Cascadian species like *Acer circinatum* and *Mahonia nervosa*. It occurs further east, on higher, drier locales, with more recent fire, and with diagnostic species such as *Calamagrostis rubescens*, *Moehringia macrophylla*, *Picea engelmannii*, and *Eucephalus* spp.

Conservation Status Rank: GNR/S2S3

Rank Justification: This proposed association has a narrow geographical and ecological range.

Synonyms:

Pseudotsuga menziesii - (*Thuja plicata* - *Abies grandis*) / *Vaccinium membranaceum* Forest (Crawford et al., 2009)

Pseudotsuga menziesii - Abies grandis / ***Acer circinatum*** / ***Polystichum munitum*** **Forest**

Douglas-fir - (Grand Fir) / Vine Maple / Western Swordfern Forest

Abbrev: PSEMEN-ABIGRA/ACECIR/POLMUN

EL Code: CEGL005631

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Cornus unalaschkensis* Mesic Forest

Range: Known to occur in the Olympic Mountains, in the southern end of the Puget Lowland in Washington, and in northwestern Oregon.

Plots:

Environmental Description: This lowland and montane foothill forest association is known to occur on gentle to moderately steep, generally northerly aspects in Oregon.

Vegetation Description: The canopy is dominated by *Pseudotsuga menziesii* with *Abies grandis* or *Acer macrophyllum* in the canopy; little or no *Tsuga heterophylla* or *Thuja plicata* is present. A generally dense tall shrub layer of *Acer circinatum* with *Corylus cornuta* appears with a diverse understory of shorter shrubs, *Mahonia nervosa*, *Rosa gymnocarpa*, and herbaceous species. *Polystichum munitum* always occurs and is typically over 5% cover.

Classification Comments: This association was recognized as part of the Coastal Correlation Project and was documented in the NCCN mapping project by a single incomplete plot at Mount Rainier. Further sampling is still required to better characterize and confirm the presence of this association in Washington. Stands with little or no *Acer circinatum* and an understory dominated by *Bromus vulgaris* and *Elymus glaucus* may represent the *Abies grandis* / *Bromus vulgaris - Polystichum munitum* Forest type proposed in Crawford et al. (2009).

Conservation Status Rank: GNR/SNR

Rank Justification: Insufficient information.

Synonyms:

Abies grandis / *Acer circinatum* / *Polystichum munitum* - NWO (McCain & Diaz, 2002)
Pseudotsuga menziesii - (*Abies grandis*) / *Acer circinatum* / *Polystichum munitum* Forest (Crawford et al., 2009)
Pseudotsuga menziesii - *Abies grandis* / *Acer circinatum* / *Polystichum munitum* (Meidinger et al., 2005) [PNWCOAST_149]

***Pseudotsuga menziesii - Tsuga heterophylla* / *Achlys triphylla* Forest**

Douglas-fir - Western Hemlock / Sweet After Death Forest



Abbrev: PSEMEN-TSUHET/ACHTRI

EL Code: CEGL005535

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Cornus unalaschkensis* Mesic Forest

Range: Occurs in the northern and eastern Olympic Mountains and in the western Cascades within the range of *Achlys triphylla*.

Plots: MORA (32), OLYM (24)

Environmental Description: Occurs at low to middle elevations (500 to 1100 m) on mid to toeslopes with well-drained, mesic soils.

Vegetation Description: The canopy is dominated by *Pseudotsuga menziesii* or a mixture of *Pseudotsuga menziesii* and *Tsuga heterophylla*. *Tsuga heterophylla* dominates tree regeneration, but may have low cover in earlier successional stands. *Thuja plicata* can be prominent to nearly codominant. *Abies grandis* can be prominent, and *Abies amabilis* or *Abies procera* can occur in small amounts. When the shrub layer is well-developed, *Acer circinatum* is frequently prominent to dominant. *Mahonia nervosa* is often prominent. *Vaccinium parvifolium* and *Rosa gymnocarpa* are often present. The herb layer is relatively rich in species and high in cover. *Achlys triphylla* is always at least prominent and can be dominant. *Tiarella trifoliata* and *Linnaea borealis* are often present to prominent. *Viola sempervirens*, *Cornus unalaschkensis,* and *Polystichum munitum* are usually present.

Classification Comments: PSEMEN/MAHNER/ACHTRI likely develops into this association with stand age, but PSEMEN-TSUHET/ACHTRI has a more closed canopy and less *Rubus ursinus*, *Pteridium aquilinum*, and *Hieracium albiflorum*.

Conservation Status Rank: G4/S4

Rank Justification: Widespread in the southern Cascades in Washington and in the Olympic Mountains.

Synonyms:

Pseudotsuga menziesii - Tsuga heterophylla / *Achlys triphylla* (Meidinger et al., 2005) [PNWCOAST_179]

Pseudotsuga menziesii - Tsuga heterophylla / *Achlys triphylla* Forest (Crawford et al., 2009)

***Pseudotsuga menziesii - Tsuga heterophylla* / *Gaultheria shallon - Mahonia nervosa* Forest**

Douglas-fir - Western Hemlock / Salal - Cascade Barberry Forest



Abbrev: PSEMEN-TSUHET/GAUSHA-MAHNER

EL Code: CEGL005538

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Cornus unalaschkensis* Mesic Forest

Range: Occurs on the western slopes of the Cascades and on the eastern Olympic Peninsula. It is absent from the outer coastal strip of Washington and infrequent to rare on the western side of the Olympics. Also found in western Oregon and British Columbia.

Plots: MORA (13), NOCA (9), OLYM (27), Other (14)

Environmental Description: Occurs at low to middle elevations (400 to 1100 m) on well-drained soils.

Vegetation Description: The canopy is dominated by *Pseudotsuga menziesii* or a mixture of *Pseudotsuga menziesii* and *Tsuga heterophylla*. *Thuja plicata* is often present and sometimes prominent to codominant. *Tsuga heterophylla* typically dominates tree regeneration and always occupies over 10% total cover. The moderate to dense shrub layer is dominated by *Gaultheria shallon* or codominated by *Gaultheria shallon* and *Mahonia nervosa*. *Mahonia nervosa* always has over 5% cover. *Acer circinatum* is sometimes present to codominant. *Vaccinium parvifolium* is almost always present and often prominent. The herb layer is absent to moderate. *Polystichum munitum* is frequent in small amounts (under 3% cover), and *Linnaea borealis* is usually present to sometimes dominant.

Classification Comments: PSEMEN-TSUHET/GAUSHA-VACPAR is similar, but lacks *Polystichum munitum* and prominent *Mahonia nervosa*.

Conservation Status Rank: G4/S4

Rank Justification: This association is widespread in the lowlands of western Washington and in the Cascade and Olympic Mountains. Low-elevation sites, outside the national parks, are frequently logged or impacted by residential development.

Synonyms:

Pseudotsuga menziesii - Tsuga heterophylla / *Gaultheria shallon - Mahonia nervosa* (Chappell, 2006a)

Pseudotsuga menziesii - Tsuga heterophylla / *Gaultheria shallon - Mahonia nervosa* (Meidinger et al., 2005) [PNWCOAST_185]

Pseudotsuga menziesii - Tsuga heterophylla / *Gaultheria shallon - Mahonia nervosa* Forest (Crawford et al., 2009)

Pseudotsuga menziesii - Tsuga heterophylla / *Gaultheria shallon* / *Xerophyllum tenax* Forest

Douglas-fir - Western Hemlock / Salal / Common Beargrass Forest

Abbrev: PSEMEN-TSUHET/GAUSHA/XERTEN

EL Code: CEGL007333

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Cornus unalaschkensis* Mesic Forest

Range: Occurs on the southeastern Olympic Peninsula, slopes of Mount Rainier and southern Cascades in Washington.

Plots: MORA (9), OLYM (2)

Environmental Description: Occurs on mid to upper slopes with shallow soils—primarily with south to west aspects—or, on the Olympic Peninsula, on flats with very coarse textured glacial soils. Sites are located at low to middle elevations.

Vegetation Description: The canopy is dominated by *Pseudotsuga menziesii* and/or *Tsuga heterophylla*. Both of these species are always present. Thuja plicata is occasionally present to prominent. The well-developed shrub layer is always dominated by *Gaultheria shallon*. *Mahonia* (= *Berberis*) *nervosa* is usually present and often prominent. *Acer circinatum* often forms a prominent taller shrub layer often with *Vaccinium parvifolium*. The herb layer is dominated by *Xerophyllum tenax*, which always occupies over 5% cover. *Linnaea borealis* is frequent.

Classification Comments: This association was recommended for elimination by INR, but it has been documented in repeated regional classifications. It is possible that it was not sampled during NCCN map training data collection. It is distinguished from other forest types with *Xerophyllum tenax* herbaceous dominance by a dense shrub layer of *Gaultheria shallon*.

Conservation Status Rank: G3/S3

Rank Justification: This association is narrowly distributed in the southern Washington Cascades in Washington and the Olympic Mountains.

Synonyms:

Pseudotsuga menziesii - Tsuga heterophylla / *Gaultheria shallon* / *Xerophyllum tenax* (Meidinger et al., 2005) [PNWCOAST_183]

Pseudotsuga menziesii - Tsuga heterophylla / *Gaultheria shallon* / *Xerophyllum tenax* Forest (Crawford et al., 2009)

Tsuga heterophylla / *Gaultheria shallon* / *Xerophyllum tenax* Association (Henderson et al., 1989, 1992)

Tsuga heterophylla / *Gaultheria shallon* Association (Franklin et al., 1988)

Pseudotsuga menziesii - Tsuga heterophylla / *Mahonia nervosa* Forest

Douglas-fir - Western Hemlock / Cascade Barberry Forest



Abbrev: PSEMEN-TSUHET/MAHNER

EL Code: CEGL005541

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Cornus unalaschkensis* Mesic Forest

Range: Occurs in the northern and eastern Olympics and in the Cascades, as well as western Oregon.

Plots: MORA (11), NOCA (52), OLYM (6), Other (22)

Environmental Description: Occurs on dry topographic positions at low to middle elevations (500 to 950 m). Sites have well-drained, often shallow soils and are located on steep mid to upper slopes and ridgetops.

Vegetation Description: The typically closed canopy is dominated by *Pseudotsuga menziesii* or codominated by that species and *Tsuga heterophylla*. *Tsuga heterophylla* typically dominates tree regeneration and always occupies over 10% total cover. This type includes stands with earlier- seral trees, such as *Pinus contorta*. The shrub layer varies from sparse to dense. *Mahonia nervosa* is always present and typically prominent to dominant. *Acer circinatum* is often present to dominant in a well-developed tall shrub layer. *Vaccinium parvifolium* or *Paxistima myrsinites* are usually present. The herb layer is usually poorly developed, with shade-tolerant species such as *Chimaphila umbellata* and *Goodyera oblongifolia* usually present. *Polystichum munitum* and *Linnaea borealis* are frequent, the former always with under 3% cover.

Classification Comments:

Conservation Status Rank: G4/S4

Rank Justification: This association is widespread in the lowlands of Western Washington and in the Cascade and Olympic Mountains. Low-elevation sites that occur outside the national parks are frequently logged and/or impacted by residential development.

Synonyms:

Pseudotsuga menziesii - Tsuga heterophylla / *Mahonia nervosa* (Chappell, 1997, 2006a)
Pseudotsuga menziesii - Tsuga heterophylla / *Mahonia nervosa* (Meidinger et al., 2005) [PNWCOAST_189]
Pseudotsuga menziesii - Tsuga heterophylla / *Mahonia nervosa* Forest (Crawford et al., 2009)

Pseudotsuga menziesii - Tsuga heterophylla / *Rhododendron macrophyllum* Forest

Douglas-fir - Western Hemlock / Pacific Rhododendron Forest



Abbrev: PSEMEN-TSUHET/RHOMAC

EL Code: CEGL005544

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Cornus unalaschkensis* Mesic Forest

Range: Occurs in the eastern Olympic Mountains and adjacent lowlands in Washington. Also found in Oregon.

Plots: OLYM (28), Other (14)

Environmental Description: Occurs at low to moderate elevations (400 to 1050 m) on mid to upper slopes, ridgetops, and benches, especially on south to west aspects. Sites have dry, well-drained soils that are often shallow or very rocky.

Vegetation Description: The canopy is dominated by *Pseudotsuga menziesii* and *Tsuga heterophylla*. Both are always present and the latter dominates tree regeneration. The well-developed shrub layer is dominated or codominated by *Rhododendron macrophyllum*. *Gaultheria shallon* and *Mahonia nervosa* are usually present and either can codominate. *Vaccinium ovatum* is characteristically absent. The herb layer varies from sparse to well-developed; when prominent it is dominated by *Xerophyllum tenax*. *Linnaea borealis* is often present. If *Polystichum munitum* is present, it has less than 3% cover.

Classification Comments: *Pseudotsuga menziesii - Tsuga heterophylla* / *Rhododendron macrophyllum* / *Polystichum munitum* Forest (CEGL005545) is a similar association identified in the Coastal Correlation Project and included in Crawford et al. 2009. It occurs in moister landscape positions, with >3% cover of *Polystichum munitum*. It was not documented during map training data collection in the national parks, but may occur within park boundaries.

Conservation Status Rank: G4/S4

Rank Justification: Many low-elevation sites outside of Olympic National Park have been logged.

Synonyms:

Pseudotsuga menziesii - Tsuga heterophylla / *Rhododendron macrophyllum* (Meidinger et al., 2005) [PNWCOAST_197]

Pseudotsuga menziesii - Tsuga heterophylla / *Rhododendron macrophyllum* Forest (Crawford et al., 2009)

Pseudotsuga menziesii - Tsuga heterophylla / *Vaccinium alaskaense* / *Xerophyllum tenax* Forest

Douglas-fir - Western Hemlock / Alaska Blueberry / Common Beargrass Forest



Abbrev: PSEMEN-TSUHET/VACALA/XERTEN

EL Code: CEGL005547

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Cornus unalaschkensis* Mesic Forest

Range: Occurs in the southeastern Olympics and southern Washington Cascades, as well as in Oregon and coastal Alaska.

Plots: MORA (15), OLYM (5)

Environmental Description: Occurs at middle elevations (900 to 1350 m), on moderate to very steep mid to upper slopes and ridgetops, with shallow rocky soils.

Vegetation Description: The canopy is codominated by *Pseudotsuga menziesii* and *Tsuga heterophylla*. *Thuja plicata* and *Abies amabilis* occur in about half the sampled stands; *Thuja plicata* can be prominent. The shrub layer can be rather sparse to well-developed. *Vaccinium ovalifolium* (= *alaskaense*) may be absent, but usually dominates the shrub layer. *Gaultheria shallon* and *Vaccinium parvifolium* are usually present. *Mahonia nervosa* and *Acer circinatum* typically do not occur. The herb layer is dominated by *Xerophyllum tenax* with over 5% cover. *Linnaea borealis* and *Chimaphila umbellata* are frequent.

Classification Comments: Lower elevation trees such as *Tsuga heterophylla*, *Pseudotsuga menziesii*, and *Thuja plicata* along with the shrubs *Vaccinium parvifolium*, *Gaultheria shallon*, and *Mahonia nervosa* are strong indicators for this type relative to other forest associations with *Xerophyllum tenax* understories.

Conservation Status Rank: G3/S3

Rank Justification: Occurs within a narrow environmental range.

Synonyms:

Pseudotsuga menziesii - Tsuga heterophylla / *Vaccinium alaskaense* / *Xerophyllum tenax* (Meidinger et al., 2005) [PNWCOAST_203]

Pseudotsuga menziesii - Tsuga heterophylla / *Vaccinium alaskaense* / *Xerophyllum tenax* Forest (Crawford et al., 2009)

***Pseudotsuga menziesii* / *Acer circinatum* / *Mahonia nervosa* Forest**

Douglas-fir / Vine Maple / Cascade Barberry Forest



Abbrev: PSEMEN/ACECIR/MAHNER

EL Code: CEGL008272

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Cornus unalaschkensis* Mesic Forest

Range: Occurs frequently in the North Cascades rain shadow, near Ross Lake, and elsewhere in the Cascade Mountains south to Oregon. It may also occur in British Columbia.

Plots: MORA (5), NOCA (36), Other (2)

Environmental Description: Occurs at low- to mid-montane elevations (500 to 900 m). Stands occur on gentle to steep (24° average slope) south-facing aspects (184° average), often in areas recovering from recent fires.

Vegetation Description: *Pseudotsuga menziesii* dominates the canopy. *Tsuga heterophylla* and *Thuja plicata* are often present in small amounts, but rarely prominent. *Betula papyrifera* may be present. *Mahonia nervosa* is typically prominent to dominant beneath *Acer circinatum* (over 10%), with other dry indicator shrubs such as *Corylus cornuta*, *Amelanchier alnifolia*, *Paxistima myrsinites*, *Spiraea lucida*, and *Rosa gymnocarpa*. The herb layer is usually poorly developed with *Lysimachia* (= *Trientalis*) *latifolia*, *Chimaphila umbellata*, *Pteridium aquilinum*, and *Maianthemum racemosum* frequent, but with low cover. *Achlys triphylla* is absent to sparse. Mosses cover much of the ground (particularly *Hylocomium splendens*, *Eurhynchium oreganum*, and *Rhytidiadelphus triquetrus*).

Classification Comments: May represent a persistent, early seral stage of PSEMEN-TSUHET/MAHNER, with little to no *Tsuga heterophylla* and more dry site species (e.g., *Spiraea lucida* (= *betulifolia*), *Rosa gymnocarpa*, and *Mahonia aquifolium*). North Cascades sites with prominent to codominant *Betula papyrifera* may represent stands of BETPAP-(THUPLI)/ACECIR/MAHNER.

Conservation Status Rank: GNR/S3S4

Rank Justification: Occurs within a limited geographic range and may be a persistent seral vegetation type maintained by fire.

Synonyms:
Pseudotsuga menziesii / *Acer circinatum* / *Mahonia nervosa* Forest (Crawford et al., 2009)
Pseudotsuga menziesii / *Acer circinatum* / *Mahonia nervosa* Forest (Meidinger et al., 2005) [PNWCOAST_130]

***Pseudotsuga menziesii* / *Mahonia nervosa* / *Achlys triphylla* Forest**

Douglas-fir / Cascade Barberry / Sweet After Death Forest



Abbrev: PSEMEN/MAHNER/ACHTRI

EL Code: CEGL008273

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Cornus unalaschkensis* Mesic Forest

Range: Occurs in the northern and eastern Olympic Mountains and on the west slopes of the Cascades.

Plots: MORA (9), OLYM (5)

Environmental Description: Occur at mid-montane elevations (650 to 1350 m) on moderately steep (29° average slope), typically southwest-facing aspects (208° average). Evidence of past fire or other stand disturbance (such as windthrow) is usually present.

Vegetation Description: *Pseudotsuga menziesii* dominates the canopy. While Tsuga heterophylla is usually present, it is never prominent (always < 10%). *Taxus brevifolia* is occasionally prominent. The tall shrub layer is usually poorly developed, though some stands have prominent to dominant *Acer glabrum*. *Mahonia nervosa* diagnostically dominates a dense short shrub layer, often with prominent *Linnaea borealis* beneath. In the herb layer, *Chimaphila umbellata*, *Rubus ursinus*, *Vaccinium parvifolium*, *and Rosa gymnocarpa* are frequent but at low cover. *Achlys triphylla* characteristically dominates a somewhat sparse herb layer. *Pteridium aquilinum* is usually present and often prominent.

Classification Comments: This association likely develops into PSEMEN-TSUHET/ACHTRI as the stand ages and *Tsuga heterophylla* joins *Pseudotsuga menziesii* in the overstory. PSEMEN-TSUHET/ACHTRI has a more closed canopy and less *Rubus ursinus*, *Pteridium aquilinum*, and *Hieracium albiflorum*.

Conservation Status Rank: GNR/S3S4Q

Rank Justification: In the Puget lowlands, many occurrences have been harvested for timber. Relatively intact, higher quality stands occur in the foothills, although their full extent is unknown.

Synonyms:

Pseudotsuga menziesii / *Mahonia nervosa* / *Achlys triphylla* Forest (Crawford et al., 2009)

***Tsuga heterophylla* - (*Pseudotsuga menziesii*) / *Vaccinium alaskaense - Mahonia nervosa* - (*Gaultheria shallon*) Forest**

Western Hemlock - (Douglas-fir) / Alaska Blueberry - Cascade Barberry - (Salal) Forest



Abbrev: TSUHET-(PSEMEN)/VACALA-MAHNER-(GAUSHA)

EL Code: CEGL005574

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Cornus unalaschkensis* Mesic Forest

Range: Occurs in the western Cascades and Olympic Mountains of Washington, as well as western Oregon and coastal Alaska.

Plots: MORA (3), NOCA (8), OLYM (23)

Environmental Description: Occurs at low to middle elevations (300 to 1000 m) on moderate to very steep slopes, most often with south or west aspects. Sites typically have well-drained soils.

Vegetation Description: The canopy is dominated or codominated by *Tsuga heterophylla*, with *Pseudotsuga menziesii* usually codominant. *Thuja plicata* is usually prominent. *Tsuga heterophylla* usually dominates tree regeneration. The well-developed shrub layer always has *Vaccinium ovalifolium* (= *alaskaense*) and either *Mahonia nervosa* or *Gaultheria shallon* prominent to codominant. The herb layer is usually poorly developed. *Clintonia uniflora* and *Cornus unalaschkensis* are frequent. *Struthiopteris* (= *Blechnum*) *spicant* has less than 2% cover or is absent.

Classification Comments:

Conservation Status Rank: G3G4/S3S4

Rank Justification: Many occurrences have been impacted by logging.

Synonyms:

Tsuga heterophylla - (*Pseudotsuga menziesii*) / *Vaccinium alaskaense* - *Mahonia nervosa* - (*Gaultheria shallon*) (Meidinger et al., 2005) [PNWCOAST_260]

Tsuga heterophylla - (*Pseudotsuga menziesii*) / *Vaccinium alaskaense* - *Mahonia nervosa* - (*Gaultheria shallon*) Forest (Crawford et al., 2009)

***Tsuga heterophylla* - (*Pseudotsuga menziesii*) / *Vaccinium alaskaense* / *Cornus unalaschkensis* Forest**

Western Hemlock - (Douglas-fir) / Alaska Blueberry / Western Cordilleran Bunchberry Forest



Abbrev: TSUHET-(PSEMEN)/VACALA/CORUNA

EL Code: CEGL005572

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Cornus unalaschkensis* Mesic Forest

Range: Occurs in the western Cascades and southern and western Olympic Mountains in Washington, as well as western Oregon and coastal Alaska.

Plots: MORA (14), NOCA (9), OLYM (22)

Environmental Description: Occurs at low to middle elevations (500 to 1150 m) on mid to toeslopes, valley bottoms, and benches with well-drained, moist soils.

Vegetation Description: The canopy is dominated by *Tsuga heterophylla* or codominated by *Tsuga heterophylla* and *Pseudotsuga menziesii*. *Thuja plicata* is often prominent. *Tsuga heterophylla* dominates tree regeneration and *Abies amabilis* is often present in small amounts. The moderate to dense shrub layer is dominated or codominated by *Vaccinium ovalifolium* (= *alaskaense*). *Vaccinium parvifolium* is usually present and sometimes codominant. *Gaultheria shallon* and *Acer circinatum* are frequent, the latter sometimes prominent. The herb layer is generally poorly developed. *Struthiopteris* (= *Blechnum*) *spicant*, *Polystichum munitum*, and *Cornus unalaschkensis* are usually present in small amounts. These plots tend to have a multi-layered canopy, rather than having just one tree cohort.

Classification Comments: *Vaccinium ovalifolium* (= *alaskaense*), *Cornus unalaschkensis*, and *Abies amabilis* are indicators for this association, relative to other associations in this alliance. If *Abies amabilis* is codominant, the stand likely represents TSUHET-ABIAMA/VACALA/TIATRI. TSUHET-ABIAMA/VACALA/RUBPED is another association differentiated by prominent to codominant *Abies amabilis*.

Conservation Status Rank: G4/S4

Rank Justification: This association occurs in the mountains of western Washington and many occurrences have been impacted by logging.

Synonyms:

Tsuga heterophylla - (*Pseudotsuga menziesii*) / *Vaccinium alaskaense* / *Cornus unalaschkensis* (Meidinger et al., 2005) [PNWCOAST_257]

Tsuga heterophylla - (*Pseudotsuga menziesii*) / *Vaccinium alaskaense* / *Cornus unalaschkensis* Forest (Crawford et al., 2009)

***Tsuga heterophylla - Pseudotsuga menziesii* / *Mahonia nervosa - Chimaphila menziesii* Forest**

Western Hemlock - Douglas-fir / Cascade Barberry - Little Prince's-pine Forest



Abbrev: TSUHET-PSEMEN/MAHNER-CHIMEN

EL Code: CEGL005570

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Cornus unalaschkensis* Mesic Forest

Range: Occurs in the western Cascades and eastern to northern Olympic Mountains in Washington, as well as in western Oregon.

Plots: MORA (19), NOCA (32), OLYM (27), Other (3)

Environmental Description: Occurs at low to middle elevations (500 to 1300 m) on mid to upper slope with well-drained, often shallow soils. Sites are generally drier and cooler than typical *Tsuga heterophylla* sites.

Vegetation Description: The canopy is dominated by *Tsuga heterophylla* and/or *Thuja plicata*, and often codominated *Pseudotsuga menziesii*. All three species are typically present. *Abies amabilis* frequently occurs in small amounts. The understory is sparse and usually contains small amounts of *Mahonia nervosa*. *Chimaphila menziesii*, *Chimaphila umbellata*, or Corallorhiza spp. are generally present in small amounts. *Vaccinium parvifolium* is usually present, while *Vaccinium ovalifolium* (= *alaskaense*) is usually absent

Classification Comments: Crawford et al. 2009 proposed a separate Pseudotsuga menziesii - Tsuga heterophylla / Depauperate undergrowth Forest, but that is considered here as variation in TSUHET-PSEMEN/MAHNER-CHIMEN.

Conservation Status Rank: G3/S3

Rank Justification: Occurs within a narrow environmental range.

Synonyms:

Tsuga heterophylla - Pseudotsuga menziesii / *Mahonia nervosa - Chimaphila menziesii* (Meidinger et al., 2005) [PNWCOAST_254]

Tsuga heterophylla - Pseudotsuga menziesii / *Mahonia nervosa - Chimaphila menziesii* Forest (Crawford et al., 2009)

> *Pseudotsuga menziesii - Tsuga heterophylla* / Depauperate undergrowth Forest (Crawford et al., 2009)

***Betula papyrifera* - (*Thuja plicata*) / *Acer circinatum* / *Mahonia nervosa* Forest**

Paper Birch - (Western Red-cedar) / Vine Maple / Cascade Barberry Forest



Abbrev: BETPAP-(THUPLI)/ACECIR/MAHNER

EL Code: CEGL008246

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Holodiscus discolor* Dry Forest

Range: Occurs in the North Cascades, particularly in the rain shadow around Ross Lake and in major river valleys.

Plots: NOCA (16)

Environmental Description: Occur at low to mid-montane elevations (250 to 800 m). Stands occur on flat to moderate (3-30° slope) typically southwest-facing aspects (227° average), in mesic to dry topographic positions on debris aprons, near rockslides, and along rocky outcroppings. Stands typically display evidence of past disturbance from blowdown events (downed and broken trees) or fire (charcoal and fire scars).

Vegetation Description: A dense, closed forest canopy is dominated by *Betula papyrifera* and young conifers (*Pseudotsuga menziesii* or *Thuja plicata*), or occasionally *Acer macrophyllum*. *Acer circinatum* and *Mahonia nervosa* dominate shrub layers beneath. *Acer glabrum*, *Paxistima myrsinites*, *Prunus emarginata*, *Rosa gymnocarpa* and *Rubus nutkanus* (= *parviflorus*) are often present. The herb layer in these dark forests is sparse, with *Cornus unalaschkensis*, *Lysimachia* (= *Trientalis*) *latifolia*, and/or *Linnaea borealis* present.

Classification Comments: These forests develop after disturbance and are likely seral to *Pseudotsuga menziesii* and *Tsuga heterophylla*-dominated associations in this alliance or in A3378. *Betula papyrifera* is rarely a community dominant, so there are few associations with which to confuse this proposed type.

Conservation Status Rank: GNR/S2S3

Rank Justification: This association occurs within a limited geographic range and environment. Known sites are in protected areas.

Synonyms:
Betula papyrifera - (*Thuja plicata*) / *Acer circinatum* / *Mahonia nervosa* Forest (Crawford et al., 2009)

***Pseudotsuga menziesii* - (*Pinus contorta*) / *Arctostaphylos uva-ursi* / *Racomitrium canescens* Woodland**

Douglas-fir - (Lodgepole Pine) / Bearberry / Silver Moss Woodland



Abbrev: PSEMEN-(PINCON)/ARCUVA/RACCAN

EL Code: CEGL007345

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Holodiscus discolor* Dry Forest

Range: Occurs in the northern and eastern Olympic Mountains, on the slopes of Mount Rainier, and in the western North Cascades. It may occur elsewhere in the Washington Cascades.

Plots: MORA (2), NOCA (21), OLYM (12)

Environmental Description: Occur at low- to mid-montane elevations (500 to 1400 m) on excessively drained or very shallow soils of lahars, lava flows, fractured bedrock balds, steep rocky slopes, and ridgetops. Stands occur on flat to moderate (3-40° average slope) typically southwest-facing aspects (212° average).

Vegetation Description: A typically open forest canopy is dominated by *Pinus contorta* and/or *Pseudotsuga menziesii*. *Pseudotsuga menziesii* is always present. A tall shrub layer is typically absent or rather sparse, but significant patches of *Gaultheria shallon* may occur in pockets of greater soil depth. *Holodiscus discolor*, *Vaccinium membranaceum*, *Rosa gymnocarpa*, and *Paxistima myrsinites* occur frequently but usually only in small amounts. The dwarf-shrub *Arctostaphylos uva-ursi* characteristically forms sprawling mats. Many other species may occur, especially *Hieracium albiflorum*, *Linnaea borealis*, and *Chimaphila umbellata*. *Racomitrium canescens* dominates a well-developed moss layer.

Classification Comments: Two plots at Mount Rainier lahars lack *Racomitrium canescens* and *Arctostaphylos uva-ursi* but have *Arctostaphylos nevadensis* and well-developed moss layers dominated by *Pleurozium schreberi* or *Hylocomium splendens*. PSEMEN-PINCON/ARCNEV is a superficially similar association that also occurs on rocky substrates, but *Arctostaphylos uva-ursi* is replaced by *Arctostaphylos nevadensis*. This type occurs in the East Cascades and has greater abundance of dry associate species such as *Calamagrostis rubescens*, *Hieracium scouleri*, *Ceanothus velutinus*, *Eremogone capillaris* var. *americana*, *Lomatium brandegeei*, and *Pinus ponderosa*. It also lacks *Gaultheria shallon* and *Mahonia nervosa*.

Conservation Status Rank: GNR/S3

Rank Justification: Occurs within a narrow geographic and ecological range.

Synonyms:

Pseudotsuga menziesii - (*Pinus contorta*) / *Arctostaphylos uva-ursi* / *Racomitrium canescens* Woodland (Crawford et al., 2009)

Pseudotsuga menziesii - (*Pinus contorta*) / *Arctostaphylos uva-ursi* / *Racomitrium canescens* (Meidinger et al., 2005) [PNWCOAST_115]

***Pseudotsuga menziesii - Tsuga heterophylla* / *Gaultheria shallon - Holodiscus discolor* Forest**

Douglas-fir - Western Hemlock / Salal - Oceanspray Forest



Abbrev: PSEMEN-TSUHET/GAUSHA-HOLDIS

EL Code: CEGL005537

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Holodiscus discolor* Dry Forest

Range: Occurs most frequently in the Puget Lowlands of Washington (reaching northern Oregon). It also occurs in the northern and eastern foothills of the Olympic Mountains.

Plots: OLYM (6), Other (13)

Environmental Description: Occurs at low to occasionally moderate elevations (500 to 1150 m) on shallow or rocky well-drained soils, mostly on southerly or westerly aspects.

Vegetation Description: The canopy is dominated by *Pseudotsuga menziesii* or a mixture of *Pseudotsuga menziesii* and *Tsuga heterophylla*. *Thuja plicata* is often present and sometimes prominent to codominant. *Tsuga heterophylla* dominates tree regeneration and typically occupies over 10% total cover. The well-developed shrub layer is always dominated by *Gaultheria shallon*. *Holodiscus discolor* is always present and usually has over 2% cover. *Mahonia nervosa* is usually prominent. *Rosa gymnocarpa* and *Symphoricarpos mollis* are usually present. The herb layer is usually sparse. Typical species include *Linnaea borealis*, *Chimaphila umbellata*, *Achlys triphylla*, and *Campanula scouleri*.

Classification Comments:

Conservation Status Rank: G2/S2

Rank Justification: Somewhat restricted in the Puget Lowlands and Olympic Mountains. Low-elevation sites that occur outside the national parks are more likely logged or impacted by residential development.

Synonyms:

Pseudotsuga menziesii - Tsuga heterophylla / *Gaultheria shallon - Holodiscus discolor* (Chappell, 2006a)

Pseudotsuga menziesii - Tsuga heterophylla / *Gaultheria shallon - Holodiscus discolor* (Meidinger et al., 2005) [PNWCOAST_184]

Pseudotsuga menziesii - Tsuga heterophylla / *Gaultheria shallon - Holodiscus discolor* Forest (Crawford et al., 2009)

***Pseudotsuga menziesii - Tsuga heterophylla* / *Gaultheria shallon - Vaccinium parvifolium* Forest**

Douglas-fir - Western Hemlock / Salal - Red Huckleberry Forest



Abbrev: PSEMEN-TSUHET/GAUSHA-VACPAR

EL Code: CEGL005539

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Holodiscus discolor* Dry Forest

Range: Occurs on the western slopes of the Cascades and on the Olympic Peninsula. It is absent from the outer coastal strip and infrequent to rare on the western side of the Olympics. It also occurs in Oregon and British Columbia.

Plots: MORA (11), NOCA (15), OLYM (60)

Environmental Description: Occurs at relatively low to middle elevations (200 to 1050 m), on moderately dry, well-drained soils. These are moderately dry sites.

Vegetation Description: The canopy is usually codominated by *Pseudotsuga menziesii* and *Tsuga heterophylla*, though in any one stand one or the other could be dominant. *Pseudotsuga menziesii* is occasionally absent. *Thuja plicata* is usually prominent to occasionally codominant. Small amounts of *Abies amabilis* can occur, and the broadleaf trees *Alnus rubra* and *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*) can be present, although they are typically not prominent. The well-developed shrub layer is dominated by *Gaultheria shallon*. Typically, no other shrubs are prominent. *Vaccinium parvifolium* is usually present in small amounts, and the dwarf shrubs *Mahonia nervosa*, *Linnaea borealis*, and *Chimaphila umbellata* are often present (also with low cover). The herb layer is absent to sparse with *Goodyera oblongifolia* the only species that occurs frequently. *Struthiopteris* (= *Blechnum*) *spicant* is usually absent or present only in small amounts. A dense moss carpet is frequently present.

Classification Comments: This association is similar to PSEMEN-TSUHET/GAUSHA-MAHNER, but is strongly dominated by *Gaultheria shallon*, with little *Mahonia nervosa*, and with a generally less diverse, sparser understory. TSUHET-PSEMEN/MAHNER-CHIMEN typically has less *Gaultheria shallon* than *Mahonia nervosa*.

Conservation Status Rank: G4/S4

Rank Justification: This association is widespread in the lowlands of Western Washington and in the Cascade and Olympic Mountains. Low-elevation sites that occur outside the national parks are frequently logged and/or impacted by residential development.

Synonyms:

Pseudotsuga menziesii - Tsuga heterophylla / *Gaultheria shallon - Mahonia nervosa* (Chappell, 2006a)

Pseudotsuga menziesii - Tsuga heterophylla / *Gaultheria shallon - Mahonia nervosa* (Meidinger et al., 2005) [PNWCOAST_185]

Pseudotsuga menziesii - Tsuga heterophylla / *Gaultheria shallon - Mahonia nervosa* Forest (Crawford et al., 2009)

Pseudotsuga menziesii / *Acer circinatum* - (*Holodiscus discolor*) Woodland

Douglas-fir / Vine Maple - (Oceanspray) Woodland



Abbrev: PSEMEN/ACECIR-(HOLDIS)

EL Code: CEGL008238

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla* - *Pseudotsuga menziesii* / *Holodiscus discolor* Dry Forest

Range: Occurs at North Cascades, Olympic, and Mount Rainier National Parks. It has been observed throughout the Cascade Mountains in Washington and likely occurs in British Columbia and Oregon, as well

Plots: MORA (2), NOCA (8), OLYM (7)

Environmental Description: Occurs on low to middle elevation talus fields, often on south-facing valley walls (160° average aspect), at elevations ranging from 308-1193 m. Slopes are often steep (up to 44°), but stands also occur on more moderate lower slopes (23° minimum, 33° average). The substrate consists of well-consolidated boulders or occasional scree, often with high nonvascular cover.

Vegetation Description: These are short, open conifer woodlands, dominated by *Pseudotsuga menziesii*, on talus. Tree cover is variable and can occasionally be nearly absent (mean canopy cover is 22%). *Acer macrophyllum* may be prominent. Tall shrubs have sparse to moderate cover, though scattered dense patches may be present. Dominant shrubs include *Acer circinatum* (most common), *Corylus cornuta*, and/or *Salix scouleriana*. *Holodiscus discolor*, *Paxistima myrsinites*, *Acer glabrum*, *Amelanchier alnifolia*, and/or *Rubus leucodermis* are usually present with lower cover. The herb layer is poorly developed, but *Cryptogramma acrostichoides* is usually present. When trees are sparse, the type retains its characteristic open tall shrub layer dominated by *Acer circinatum*. The moss layer is well-developed.

Classification Comments: This association is currently in A3379 due to the low cover of *Tsuga heterophylla*, but it occurs at higher elevations and further from maritime influence than most associations in this alliance. It may belong in A3378. This type is floristically similar to dry *Pseudotsuga menziesii*-dominated forests like PSEMEN/ACECIR/MAHNER. For example, *Acer circinatum*, *Acer glabrum*, *Amelanchier alnifolia*, and *Holodiscus discolor* are all relatively constant components of these talus woodlands. However, physiognomy (open woodland) and substrate (talus, fractured bedrock, and occasionally scree) differentiate this association. High lichen and *Racomitrium* spp. cover and the presence of *Cryptogramma acrostichoides* or *Rubus leucodermis* are also differential characteristics for this type. Closed forest species like *Hylocomium splendens* and *Goodyera oblongifolia* are also absent. ABILAS-PSEMEN/ACECIR is similar in structure, but is characteristically dominated by *Abies lasiocarpa*. *Callitropsis* (= *Cupressus*) *nootkatensis*, *Picea engelmannii*, and *Vaccinium membranaceum* and absence of *Acer glabrum*, *Symphoricarpos albus*, and *Rubus nutkanus* (= *parviflorus*) are also strong diagnostics for ABILAS-PSEMEN/ACECIR.

Conservation Status Rank: GNR/S2S4Q

Rank Justification: This association is represented at a few sites within protected areas.

Synonyms:

> Acer circinatum - (Holodiscus discolor) Lithomorphic Vegetation (Crawford et al., 2009)

Pseudotsuga menziesii / *Gaultheria shallon - Holodiscus discolor* Forest

Douglas-fir / Salal - Oceanspray Forest



Abbrev: PSEMEN/GAUSHA-HOLDIS

EL Code: CEGL005531

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: Tsuga heterophylla - Pseudotsuga menziesii / Holodiscus discolor Dry Forest

Range: Occurs in the eastern and northeastern Olympic Mountains and adjacent Puget Lowlands

Plots: OLYM (11), Other (35)

Environmental Description: Occurs at low to middle elevations in dry climatic areas within the Olympic rain shadow. Aspects are frequently south to west. The association typically occurs on fairly shallow soils derived from glacial outwash and till, other parent materials with high gravel or stone content, or on bedrock.

Vegetation Description: The canopy is dominated by *Pseudotsuga menziesii*, with little or no *Tsuga heterophylla* or *Thuja plicata*. *Arbutus menziesii* can be prominent. The understory is dominated by *Gaultheria shallon*. *Holodiscus discolor* can be abundant and is diagnostic in the Olympic Mountains. *Polystichum munitum* may be present, but always with under 5% cover. Other frequently occurring species include *Festuca occidentalis*, *Rosa gymnocarpa*, *Rubus ursinus*, and *Mahonia nervosa*.

Classification Comments: In the Olympics, PSEMEN/GAUSHA-VACPAR lacks prominent *Holodiscus discolor*.

Conservation Status Rank: GNR/S2

Rank Justification: Most occurrences have been altered by past timber harvest.

Synonyms:
Pseudotsuga menziesii / *Gaultheria shallon - Holodiscus discolor* (Meidinger et al., 2005) [PNWCOAST_121]
Pseudotsuga menziesii / *Gaultheria shallon - Holodiscus discolor* Forest (Crawford et al., 2009)

***Pseudotsuga menziesii* / *Gaultheria shallon - Mahonia nervosa* / *Polystichum munitum* Forest**

Douglas-fir / Salal - Cascade Barberry / Western Swordfern Forest



Photo of representative vegetation association.

Abbrev: PSEMEN/GAUSHA-MAHNER/POLMUN

EL Code: CEGL007365

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Holodiscus discolor* Dry Forest

Range: Occurs through much of lowland western Washington and Oregon

Plots: MORA (1), OLYM (13)

Environmental Description: These low-elevation forests are moderately dry to mesic and appear to be relatively nutrient-rich. Sites are flat to fairly steep, with aspects often south to west, on a variety of slope position (including plateaus/plains). Parent materials are variable, including glacial till, glacial outwash, and various bedrock types (including ultramafic). Soil textures are loam to loamy sand, usually with abundant coarse fragments.

Vegetation Description: The canopy is dominated by *Pseudotsuga menziesii* or occasionally codominated by *Acer macrophyllum*, with little to no *Tsuga heterophylla*, *Thuja plicata,* or *Abies grandis* present. *Gaultheria shallon* or *Mahonia nervosa* dominates or codominates the understory and *Polystichum munitum* is always prominent to dominant in the herb layer. *Holodiscus discolor*, *Acer circinatum*, and/or *Corylus cornuta* can form a prominent to codominant tall shrub layer. *Rubus ursinus* (an increaser with disturbance), and *Symphoricarpos albus* or *Rosa gymnocarpa* are often prominent in the shrub or dwarf-shrub layers. *Achlys triphylla*, *Galium triflorum*, *Lysimachia* (= *Trientalis*) *latifolia*, and *Festuca subulata* are frequently occurring herbs.

Classification Comments: This association represents a persistent early seral stage of PSEMEN-TSUHET/ GAUSHA/POLMUN and PSEMEN-TSUHET/MAHNER-POLMUN. PSEMEN-TSUHET/GAUSHA-MAHNER has prominent to codominant *Tsuga heterophylla* and has fewer dry-site indicators such as *Rosa gymnocarpa*.

Conservation Status Rank: GNR/S4S5

Rank Justification: In the lowlands, this association appears primarily as young, regenerating, post-harvest stands. Many occurrences have been fragmented by development. Relatively intact, higher quality stands occur in the foothills, although their full extent is unknown.

Synonyms:

Pseudotsuga menziesii / *Gaultheria shallon - Mahonia nervosa* / *Polystichum munitum* (Meidinger et al., 2005) [PNWCOAST_122]

Pseudotsuga menziesii / *Gaultheria shallon - Mahonia nervosa* / *Polystichum munitum* Forest (Crawford et al., 2009)

Pseudotsuga menziesii / *Gaultheria shallon* / *Polystichum munitum* (Chappell, 2006a)

Tsuga heterophylla / *Acer circinatum - Gaultheria shallon* / *Polystichum munitum* - NWO Coast (McCain & Diaz, 2002)

Pseudotsuga menziesii / *Gaultheria shallon - Vaccinium parvifolium* Forest

Douglas-fir / Salal - Red Huckleberry Forest



Abbrev: PSEMEN/GAUSHA-VACPAR

EL Code: CEGL005532

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Douglas-fir - Western Hemlock Forest

Alliance: *Tsuga heterophylla - Pseudotsuga menziesii* / *Holodiscus discolor* Dry Forest

Range: Occurs in the eastern and northeastern Olympic Mountains, on the slopes of Mount Rainier, and the North Cascades. Also present as far south as California and north to British Columbia.

Plots: MORA (6), NOCA (3), OLYM (23)

Environmental Description: Occurs at low to middle elevations on dry, often steep sites. It is usually found on south- or west-facing aspects, with shallow or gravelly/stony soils.

Vegetation Description: The canopy is dominated by *Pseudotsuga menziesii*. *Tsuga heterophylla* or *Thuja plicata* may occur in small amounts in the understory (under 5-10% cover), but *Pseudotsuga menziesii* is usually the most abundant regenerating tree. The shrub layer is well-developed and dominated by *Gaultheria shallon*. *Mahonia nervosa* is usually prominent and *Vaccinium parvifolium* is usually present. *Acer circinatum* is prominent in many stands. *Holodiscus discolor* and *Rosa gymnocarpa* are frequent in small amounts. The herb layer is absent or rather poorly developed typically. *Festuca occidentalis* or *Linnaea borealis* are often present in small amounts.

Classification Comments: PSEMEN/GAUSHA-HOLDIS is similar but has higher cover of *Holodiscus discolor* and lacks *Acer circinatum* and *Vaccinium parvifolium*. PSEMEN/GAUSHA-VACPAR may develop from PINCON-PSEMEN/GAUSHA in the absence of fire.

Conservation Status Rank: G3G4/S3

Rank Justification: In the lowlands, many occurrences have been harvested for timber. Relatively intact, higher quality stands occur in the foothills, although their full extent is unknown.

Synonyms:
Pseudotsuga menziesii / *Gaultheria shallon* - *Vaccinium parvifolium* (Meidinger et al., 2005) [PNWCOAST_124]
Pseudotsuga menziesii / *Gaultheria shallon* - *Vaccinium parvifolium* Forest (Crawford et al., 2009)

***Abies amabilis* - (*Pseudotsuga menziesii*) / *Achlys triphylla* - *Tiarella trifoliata* var. *unifoliata* Forest**

Pacific Silver Fir - (Douglas-fir) / Sweet After Death - Oneleaf Foamflower Forest



Abbrev: ABIAMA-(PSEMEN)/ACHTRI-TIATRI

EL Code: CEGL005512

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Silver Fir - Western Hemlock Forest

Alliance: *Abies amabilis - Tsuga heterophylla* / *Achlys triphylla* Forest

Range: Mount Rainier, eastern and northern Olympics, western Oregon

Plots: MORA (25), OLYM (7)

Environmental Description: At middle elevations on sites with deep, well-drained, moist soils.

Vegetation Description: The canopy is dominated by *Abies amabilis*, *Pseudotsuga menziesii*, *Tsuga heterophylla*, and/or *Abies procera*. *Abies amabilis* has over 10% total cover and dominates or codominates tree regeneration. The shrub layer varies from sparse to moderate and frequently has abundant *Acer circinatum* or *Vaccinium membranaceum* (the latter usually no more than 10% cover). The well-developed herb layer always has *Achlys triphylla* present to more often prominent. *Tiarella trifoliata* and/or *Maianthemum stellatum* are usually present and the combination of the two is typically over 5% cover. *Clintonia uniflora* is usually present to prominent. *Linnaea borealis*, *Gymnocarpium dryopteris,* or *Cornus unalaschkensis* are occasionally prominent.

Classification Comments: ABIAMA-PSEMEN/ACHTRI, ABIAMA-TSUHET/(ORTSEC-CHIMEN), and ABIAMA-TSUHET/RUBPED-TIATRI are similar associations.

Conservation Status Rank: G4/S3S4

Rank Justification: Many natural-origin stands occur on protected lands although many are subject to logging and development.

Synonyms:

Abies amabilis - (*Pseudotsuga menziesii*) / *Achlys triphylla* - *Tiarella trifoliata* var. *unifoliata* (Meidinger et al., 2005) [PNWCOAST_007]

Abies amabilis - (*Pseudotsuga menziesii*) / *Achlys triphylla* - *Tiarella trifoliata* var. *unifoliata* Forest (Crawford et al., 2009)

Abies amabilis / *Achlys triphylla* - *Tiarella unifoliata* Association (Henderson et al., 1989)

***Abies amabilis - Pseudotsuga menziesii* / *Achlys triphylla* Forest**

Pacific Silver Fir - Douglas-fir / Sweet After Death Forest



Abbrev: ABIAMA-PSEMEN/ACHTRI

EL Code: CEGL005511

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Silver Fir - Western Hemlock Forest

Alliance: *Abies amabilis - Tsuga heterophylla* / *Achlys triphylla* Forest

Range: Occurs at Mount Rainier and elsewhere in the range of *Achlys triphylla* in the Oregon and Washington Cascades. Also in the eastern and northern Olympics.

Plots: MORA (27), OLYM (11)

Environmental Description: At middle elevations, often with southerly aspects. Sites have deep, well-drained soils and are environmentally moderate.

Vegetation Description: The canopy is dominated by *Pseudotsuga menziesii*, *Tsuga heterophylla*, and/or *Abies amabilis*. *Abies amabilis* has over 10% total cover and dominates or codominates tree regeneration. *Abies procera* is sometimes prominent. The shrub layer varies from sparse to moderate, and when more developed is dominated by *Acer circinatum*. *Mahonia nervosa* and *Vaccinium membranaceum* are often present. The well-developed herb layer is dominated or codominated by *Achlys triphylla*. *Clintonia uniflora*, *Cornus unalaschkensis*, and *Linnaea borealis* are usually present.

Classification Comments:

Conservation Status Rank: GNR/S4

Rank Justification: Many natural-origin stands occur on protected lands. However, many others are subject to logging and development.

Synonyms:
Abies amabilis - Pseudotsuga menziesii / *Achlys triphylla* (Meidinger et al., 2005) [PNWCOAST_006]
Abies amabilis - Pseudotsuga menziesii / *Achlys triphylla* Forest (Crawford et al., 2009)

***Abies amabilis - Tsuga heterophylla* / (*Orthilia secunda - Chimaphila menziesii*) Forest**

Pacific Silver Fir - Western Hemlock / (Sidebells Wintergreen - Little Prince's-pine) Forest



Abbrev: ABIAMA-TSUHET/(ORTSEC-CHIMEN)

EL Code: CEGL008232

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Silver Fir - Western Hemlock Forest

Alliance: *Abies amabilis - Tsuga heterophylla* / *Achlys triphylla* Forest

Range: Throughout the range of *Abies amabilis* forests in the Cascades and Olympics

Plots: MORA (21), NOCA (36), OLYM (19), Other (2)

Environmental Description: Dense, dark, mid-seral forests with persistent closed canopies found at mid-montane elevations (750 to 1400 m). Stands occur on moderate to steep (21° average slope) frequently north or east-facing aspects (83° average).

Vegetation Description: Dominated by *Abies amabilis* and *Tsuga heterophylla*, sometimes with codominant *Pseudotsuga menziesii*. Deep shade, poor soil development, and litter accumulation limit the understory to sparse vascular plants (average = 4% cover). *Vaccinium parvifolium*, *Vaccinium ovalifolium* (= *alaskaense*), *Vaccinium membranaceum*, and *Goodyera oblongifolia* are frequent present in the understory, while other species may have trace cover. *Orthilia secunda* is not differential, but it is the most frequent co-occurring plant in the understory. Moss cover is variable, but can be high.

Classification Comments: PSEMEN-TSUHET/MAHNER-CHIMEN occurs at lower elevations without prominent/dominant *Abies amabilis.* This association may also be confused with and matrix with relatively sparse occurrences of TSUHET-ABIAMA-(PSEMEN)/VACALA (with more *Vaccinium ovalifolium* (= *alaskaense*)), and ABIAMA-TSUHET/RUBPED-TIATRI (with greater herb diversity and wet indicators such as *Tiarella trifoliata*)

Conservation Status Rank: GNR/S3S4Q

Rank Justification: Appears to be widespread and in protected areas.

Synonyms:

Abies amabilis - Tsuga heterophylla / Depauperate undergrowth Forest (Crawford et al., 2009)

Abies amabilis / Depauperate Association (Henderson et al., 1989)

***Abies amabilis - Tsuga heterophylla* / *Rubus pedatus - Tiarella trifoliata* var. *unifoliata* Forest**

Pacific Silver Fir - Western Hemlock / Strawberry-leaf Raspberry - Oneleaf Foamflower Forest



Abbrev: ABIAMA-TSUHET/RUBPED-TIATRI

EL Code: CEGL005515

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Silver Fir - Western Hemlock Forest

Alliance: *Abies amabilis - Tsuga heterophylla* / *Achlys triphylla* Forest

Range: The western Cascades of Washington and Oregon (rarely in the Olympics)

Plots: MORA (42), NOCA (11), OLYM (6), Other (5)

Environmental Description: At middle elevations on mesic to moist sites, with well-drained soils, mostly on lower slopes.

Vegetation Description: The canopy is codominated by *Abies amabilis* and *Tsuga heterophylla*. *Abies procera* and *Thuja plicata* can also be prominent to codominant. *Abies amabilis* dominates tree regeneration and occupies over 10% total cover. Plots from the East Cascades contain *Picea engelmannii* in the canopy. A shrub layer is absent to sparse, frequently with *Vaccinium ovalifolium* (= *alaskaense*) or *Vaccinium parvifolium* (the latter sometimes prominent). The diverse herb layer is characterized by *Rubus pedatus*, *Streptopus lanceolatus*, *Struthiopteris* (= *Blechnum*) *spicant*, and *Tiarella trifoliata*, one or more of which is typically prominent. *Achlys triphylla* is absent or very low in cover.

Classification Comments: Relatively sparse occurrences of this type may be confused with ABIAMA-TSUHET/(ORTSEC-CHIMEN), but that association tends to have lower understory diversity and fewer mesic/wet indicator species.

Conservation Status Rank: G3G4/S3S4

Rank Justification: Many natural-origin stands occur on protected lands. However, many others are subject to logging and development.

Synonyms:

Abies amabilis - Tsuga heterophylla / *Rubus pedatus - Tiarella trifoliata* var. *unifoliata* (Meidinger et al., 2005) [PNWCOAST_012]

Abies amabilis - Tsuga heterophylla / *Rubus pedatus - Tiarella trifoliata* var. *unifoliata* Forest (Crawford et al., 2009)

Abies amabilis / *Polystichum munitum* Forest

Pacific Silver Fir / Western Swordfern Forest



Abbrev: ABIAMA/POLMUN

EL Code: CEGL000006

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Silver Fir - Western Hemlock Forest

Alliance: *Abies amabilis - Tsuga heterophylla* / *Achlys triphylla* Forest

Range: Occurs on the western slopes of the Cascades and in the southern, eastern, and northern Olympic Mountains.

Plots: MORA (4), NOCA (4), OLYM (14)

Environmental Description: Occurs at low to moderate elevations (400 to 1050 m) on relatively moist sites—often lower slopes—that have lower snowpack than average for most *Abies amabilis* types. Soils are moderately well-drained and may be subirrigated.

Vegetation Description: The canopy is dominated primarily by *Tsuga heterophylla* and secondarily by *Abies amabilis*. These two species usually codominate tree regeneration. *Thuja plicata* or *Pseudotsuga menziesii* can be prominent. The shrub layer is sparse to moderately dense, with *Vaccinium ovalifolium* (= *alaskaense*) and *Vaccinium parvifolium* the most abundant species. *Acer circinatum* is sometimes prominent. A typically rich and diverse herb layer is characterized by the prominence to codominance of *Polystichum munitum*. *Struthiopteris* (= *Blechnum*) *spicant* and *Tiarella trifoliata* are usually present to prominent.

Classification Comments: *Polystichum munitum*, *Luzula parviflora*, and (to a lesser degree) *Tiarella trifoliata* are differential relative to other associations in this alliance.

Conservation Status Rank: G4/S3S4

Rank Justification: Occurs in a narrow environmental range in the mountains of western Washington.

Synonyms:

Abies amabilis / *Polystichum munitum* (Henderson et al., 1989)

Tsuga heterophylla - Abies amabilis / *Blechnum spicant - Tiarella trifoliata - Polystichum munitum* Forest (Crawford et al., 2009)

Tsuga heterophylla - (*Abies amabilis*) / *Gaultheria shallon* / *Blechnum spicant* Forest

Western Hemlock - (Pacific Silver Fir) / Salal / Deer Fern Forest



Abbrev: TSUHET-(ABIAMA)/GAUSHA/BLESPI

EL Code: CEGL005549

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Silver Fir - Western Hemlock Forest

Alliance: *Abies amabilis - Tsuga heterophylla* / *Achlys triphylla* Forest

Range: Limited primarily to a strip no more than about 30 km wide adjacent to the Pacific Ocean along the Olympic Peninsula and the western Willapa Hills.

Plots: OLYM (2)

Environmental Description: Occurs at low elevations (50 to 100 m) on well-drained soils and a variety of landforms, including gentle to steep slopes, ridgetops, and rolling plains.

Vegetation Description: The tree canopy is always dominated or codominated by *Tsuga heterophylla*. *Abies amabilis* is sometimes present to codominant. Either of these species can dominate tree regeneration. *Thuja plicata* is occasionally present, but never codominant. *Gaultheria shallon* dominates the well-developed shrub layer. *Vaccinium ovalifolium* (= *alaskaense*), *Vaccinium parvifolium* and *Rhododendron menziesii* (= *Menziesia ferruginea*) are usually present to prominent or occasionally codominant. The herb layer is variable in total cover. *Struthiopteris* (= *Blechnum*) *spicant* is always present and often prominent or dominating the herb layer. *Polystichum munitum* is absent or present only in low amounts.

Classification Comments: Distinguished from TSUHET-THUPLI/GAUSHA/BLESPI by the absence or low cover of *Thuja plicata*.

Conservation Status Rank: GNR/S3

Rank Justification: This regional endemic association is limited primarily to a relatively narrow hypermaritime coastal strip on the western Olympic Peninsula and Vancouver Island. Within portions of this area, the association historically formed the matrix. Industrial logging practices have vastly reduced the area of the association by conversion to tree plantations, especially of Douglas-fir, which is naturally very rare on these sites. Remaining occurrences are mostly small and/or highly fragmented. There are very few occurrences in protected areas, and their viability is questionable.

Synonyms:

Tsuga heterophylla - (*Abies amabilis*) / *Gaultheria shallon* / *Blechnum spicant* (Meidinger et al., 2005) [PNWCOAST_221 - 234]

Tsuga heterophylla - (*Abies amabilis*) / *Gaultheria shallon* / *Blechnum spicant* Forest (Crawford et al., 2009)

***Tsuga heterophylla - Abies amabilis* - (*Thuja plicata*) / *Vaccinium alaskaense* / *Blechnum spicant* Forest**

Western Hemlock - Pacific Silver Fir - (Western Red-cedar) / Alaska Blueberry / Deer Fern Forest



Abbrev: TSUHET-ABIAMA-(THUPLI)/VACALA/BLESPI

EL Code: CEGL007319

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Silver Fir - Western Hemlock Forest

Alliance: Abies amabilis - Tsuga heterophylla / Achlys triphylla Forest

Range: Occurs on the western slopes of the Olympic Mountains and at Mount Rainier and north into British Columbia.

Plots: MORA (2), NOCA (1), OLYM (6)

Environmental Description: Occurs on relatively moist and nutrient-poor sites at low to middle elevations (300 to 1150 m)

Vegetation Description: The canopy is dominated by a somewhat variable mixture of *Tsuga heterophylla*, *Abies amabilis,* and *Thuja plicata*. *Thuja plicata* is sometimes absent. Tree regeneration is dominated by *Abies amabilis* and *Tsuga heterophylla*. The well-developed shrub layer is dominated by *Vaccinium ovalifolium* (= *alaskaense*), with *Vaccinium parvifolium* prominent to codominant and *Rhododendron menziesii* (= *Menziesia ferruginea*) usually prominent. The well-developed herb layer is dominated or codominated by *Struthiopteris* (= *Blechnum*) *spicant*. *Cornus unalaschkensis* is usually present to prominent. *Oxalis oregana* and *Gaultheria shallon* occupy low cover if they are present.

Classification Comments: *Rubus pedatus*, *Clintonia uniflora*, and *Boykinia occidentalis* are differential relative to other associations in this alliance, indicating that it extends to higher elevations than most forests in A3386.

Conservation Status Rank: G4/S1

Rank Justification: Occurs in a narrow environmental and geographic range in western Washington, with few known occurrences.

Synonyms:

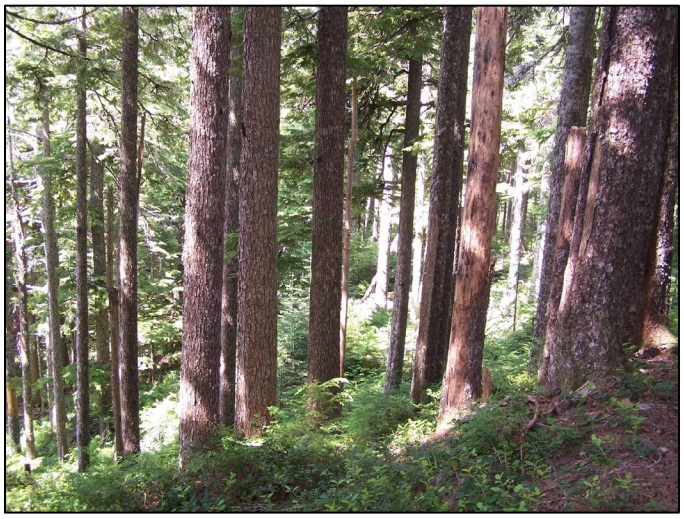
Abies amabilis / *Cornus canadensis* - Olympics (Bigley & Hull, 1995)

Tsuga heterophylla - Abies amabilis - (*Thuja plicata*) / *Vaccinium alaskaense* / *Blechnum spicant* (Meidinger et al., 2005) [PNWCOAST_274]

Tsuga heterophylla - Abies amabilis- (*Thuja plicata*) / *Vaccinium alaskaense* / *Blechnum spicant* Forest (Crawford et al., 2009)

Tsuga heterophylla - Abies amabilis - Pseudotsuga menziesii / *Gaultheria shallon* Forest

Western Hemlock - Pacific Silver Fir - Douglas-fir / Salal Forest



Abbrev: TSUHET-ABIAMA-PSEMEN/GAUSHA

EL Code: CEGL000217

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Silver Fir - Western Hemlock Forest

Alliance: *Abies amabilis - Tsuga heterophylla* / *Achlys triphylla* Forest

Range: Occurs in the western Cascades and Olympic Mountains in Washington, as well as western Oregon and British Columbia

Plots: MORA (8), NOCA (3), OLYM (18)

Environmental Description: Occurs at middle elevations (550 to 1050 m) on well-drained soils. Conditions are relatively dry compared to typical *Abies amabilis* stands.

Vegetation Description: The canopy is typically codominated by *Tsuga heterophylla*, *Abies amabilis*, and *Pseudotsuga menziesii*. In any one stand, one or more of the canopy species may be less abundant. *Abies amabilis* always occupies over 10% total cover and usually codominates tree regeneration with *Tsuga heterophylla*. *Pseudotsuga menziesii* is occasionally absent and *Thuja plicata* is sometimes prominent. The well-developed shrub layer is dominated by *Gaultheria shallon* (always over 5% cover) or *Vaccinium ovalifolium* (= *alaskaense*). *Mahonia nervosa* is usually present and sometimes prominent. The herb layer is usually sparse and *Linnaea borealis* is the only frequently occurring species.

Classification Comments: TSUHET-(ABIAMA)/GAUSHA/BLESPI has a shrub layer dominated by *Gaultheria shallon*, but it is distinguished by *Rhododendron menziesii* (= *Menziesia ferruginea*), *Lysichiton americanus*, and *Struthiopteris* (= *Blechnum*) *spicant*. TSUHET-THUPLI/GAUSHA/BLESPI also has a *Gaultheria* shallon-dominated shrub layer; besides having *Struthiopteris* (= *Blechnum*) *spicant* and *Rhododendron menziesii* (= *Menziesia ferruginea*), it is further differentiated by *Vaccinium ovatum* and *Picea sitchensis*.

Conservation Status Rank: GNR/S4

Rank Justification:

Synonyms:
Abies amabilis / *Berberis nervosa* (Brockway & Topik, 1984; Henderson et al., 1992)
Abies amabilis / *Berberis nervosa* Association (Franklin et al., 1988)
Tsuga heterophylla - Abies amabilis - Pseudotsuga menziesii / *Mahonia nervosa* (Meidinger et al., 2005) [PNWCOAST_246]
Tsuga heterophylla - Abies amabilis - Pseudotsuga menziesii / *Mahonia nervosa* Forest (Crawford et al. 2009)
Pacific Silver Fir / Dwarf Oregon Grape Association (CF S1-51) ABAM/BENE (Brockway et al., 1983)
Pacific silver fir / Oregon grape (ABAM/BENE) (Hemstrom et al., 1982)

***Tsuga heterophylla - Abies amabilis - Pseudotsuga menziesii* / *Mahonia nervosa* Forest**

Western Hemlock - Pacific Silver Fir - Douglas-fir / Cascade Barberry Forest



Abbrev: TSUHET-ABIAMA-PSEMEN/MAHNER

EL Code: CEGL005567

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Silver Fir - Western Hemlock Forest

Alliance: *Abies amabilis - Tsuga heterophylla* / *Achlys triphylla* Forest

Range: Occurs in the western Cascades and Olympic Mountains in Washington, as well as western Oregon and British Columbia.

Plots: MORA (17), NOCA (14), OLYM (5)

Environmental Description: Occurs at middle elevations (600 to 1200 m), typically on moderate to steep slopes with south to west-facing aspects and well-drained soils.

Vegetation Description: The canopy is typically codominated by *Tsuga heterophylla*, *Abies amabilis*, and *Pseudotsuga menziesii*. In any one stand, one or more species may be less abundant. *Abies amabilis* always occupies over 10% total cover and usually codominates tree regeneration with *Tsuga heterophylla*. The shrub layer is usually moderately dense and is dominated by *Mahonia nervosa*. *Vaccinium ovalifolium* (= *alaskaense*) and *Vaccinium parvifolium* are usually present. The herb layer is typically sparse and may be absent. *Cornus unalaschkensis* and *Linnaea borealis* are usually present.

Classification Comments: *Mahonia nervosa*, *Taxus brevifolia*, *Paxistima myrsinites*, *Chimaphila umbellata*, and *Pyrola asarifolia* are all strong differential indicators relative to other associations in this alliance.

Conservation Status Rank: GNR/S4

Rank Justification:

Synonyms:

Tsuga heterophylla - Abies amabilis - Pseudotsuga menziesii / *Gaultheria shallon* (Meidinger et al., 2005) [PNWCOAST_245]

Tsuga heterophylla - Abies amabilis- Pseudotsuga menziesii / *Gaultheria shallon* Forest (Crawford et al., 2009)

Tsuga heterophylla - Abies amabilis / *Oxalis oregana - Blechnum spicant* Forest

Western Hemlock - Pacific Silver Fir / Redwood Sorrel - Deer Fern Forest



Abbrev: TSUHET-ABIAMA/OXAORE-BLESPI

EL Code: CEGL005564

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Silver Fir - Western Hemlock Forest

Alliance: *Abies amabilis - Tsuga heterophylla* / *Achlys triphylla* Forest

Range: Occurs on the western Olympic Peninsula and south to Oregon.

Plots: OLYM (12)

Environmental Description: Occurs at low elevations (400 to 650 m), with relatively deep, well-drained, moist soils.

Vegetation Description: The canopy is dominated by *Tsuga heterophylla* and *Abies amabilis* may codominate. *Abies amabilis* dominates or codominates tree regeneration and occupies over 10% total cover. *Pseudotsuga menziesii* is occasionally present to prominent. The shrub layer varies from sparse to (occasionally) moderately dense. When it is more developed, it is dominated by *Vaccinium ovalifolium* (= *alaskaense*) or *Gaultheria shallon* (although the latter species is absent from all plots sampled in the Washington national parks). *Vaccinium parvifolium* and *Rubus spectabilis* are present or occasionally prominent. The usually well-developed herb layer is dominated or codominated by *Oxalis oregana*. *Polystichum munitum* is usually present and occasionally codominant. *Struthiopteris* (= *Blechnum*) *spicant* is almost always present and occasionally prominent. *Maianthemum dilatatum* or *Tiarella trifoliata* is frequent.

Classification Comments: *Oxalis oregana*, *Cornus unalaschkensis*, and *Gymnocarpium dryopteris* are indicators for this type, relative to other associations within this alliance.

Conservation Status Rank: G3/S3

Rank Justification: Many occurrences of this association have been impacted by logging.

Synonyms:

Tsuga heterophylla - Abies amabilis / *Oxalis oregana - Blechnum spicant* (Meidinger et al., 2005) [PNWCOAST_235]

Tsuga heterophylla - Abies amabilis / *Oxalis oregana - Blechnum spicant* Forest (Crawford et al., 2009)

***Tsuga heterophylla - Abies amabilis* / *Vaccinium alaskaense* / *Tiarella trifoliata* var. *unifoliata* Forest**

Western Hemlock - Pacific Silver Fir / Alaska Blueberry / Oneleaf Foamflower Forest



Abbrev: TSUHET-ABIAMA/VACALA/TIATRI

EL Code: CEGL005566

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Silver Fir - Western Hemlock Forest

Alliance: *Abies amabilis - Tsuga heterophylla* / *Achlys triphylla* Forest

Range: Occurs in the western Cascades and Olympic Mountains of Washington.

Plots: MORA (26), NOCA (4), OLYM (24)

Environmental Description: Occurs at low to middle elevations (350 to 1250 m) in a variety of topographic positions with moist, well-drained to subirrigated soils.

Vegetation Description: The canopy is dominated by *Tsuga heterophylla* and/or *Abies amabilis* (usually both). *Abies amabilis* occupies over 10% total cover (understory and canopy). *Thuja plicata* is occasionally prominent. *Vaccinium ovalifolium* (= *alaskaense*) dominates the well-developed shrub layer. *Rubus spectabilis* is usually present. The diverse herb layer is usually well-developed. *Struthiopteris* (= *Blechnum*) *spicant*, *Tiarella trifoliata*, *Streptopus lanceolatus*, *Athyrium filix-femina*, *Clintonia uniflora*, *Cornus unalaschkensis*, and *Rubus pedatus* are usually present. *Maianthemum dilatatum* sometimes dominates the herb layer.

Classification Comments: This association is distinguished from similar types by > 3% combined cover of *Tiarella trifoliata*, *Streptopus lanceolatus*, and/or *Maianthemum dilatatum*. It is distinguished from TSUHET-(PSEMEN)/ VACALA/CORUNA by the codominance of *Abies amabilis*.

Conservation Status Rank: G4/S4

Rank Justification:

Synonyms:

Tsuga heterophylla - Abies amabilis / *Vaccinium alaskaense* / *Tiarella trifoliata* var. *unifoliata* (Meidinger et al., 2005) [PNWCOAST_240]

Tsuga heterophylla - Abies amabilis / *Vaccinium alaskaense* / *Tiarella trifoliata* var. *unifoliata* Forest (Crawford et al., 2009)

Tsuga heterophylla - Thuja plicata / *Gaultheria shallon* / *Blechnum spicant* Forest

Western Hemlock - Western Red-cedar / Salal / Deer Fern Forest



Abbrev: TSUHET-THUPLI/GAUSHA/BLESPI

EL Code: CEGL005577

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Silver Fir - Western Hemlock Forest

Alliance: *Abies amabilis - Tsuga heterophylla* / *Achlys triphylla* Forest

Range: This association is limited primarily to a strip no more than about 30 km wide adjacent to the Pacific Ocean, though apparently expanding further inland on northern Vancouver Island. In Washington, it occurs on the western coastal plain of the Olympic Peninsula and in the Willapa Hills.

Plots: OLYM (11)

Environmental Description: In Washington, this association occurs on well-drained upland sites with gentle, rolling topography at elevations from 10 to 60 m.

Vegetation Description: The canopy is dominated by *Thuja plicata* and *Tsuga heterophylla*. *Abies amabilis* is sometimes prominent and can infrequently codominate. Tree regeneration is dominated by *Tsuga heterophylla* and/or *Abies amabilis*. *Gaultheria shallon* dominates the well-developed shrub layer. *Vaccinium ovalifolium* (= *alaskaense*), *Vaccinium parvifolium* and *Rhododendron menziesii* (= *Menziesia ferruginea*) are usually present to prominent or occasionally codominant. The herb layer is variable in total cover. *Struthiopteris* (= *Blechnum*) *spicant* is always present and often prominent or dominant in the herb layer. *Polystichum munitum* is absent or present only in low amounts.

Classification Comments:

Conservation Status Rank: G4G5/S1S2

Rank Justification: This regional endemic association is limited primarily to a relatively narrow hypermaritime coastal strip on the western Olympic Peninsula and Vancouver Island. Within portions of this area, the association historically formed the matrix. Industrial logging practices have vastly reduced the area of the association by conversion to tree plantations, especially of Douglas-fir, which is naturally very rare on these sites. Remaining occurrences are mostly small and/or highly fragmented. There are very few occurrences in protected areas, and their viability is questionable.

Synonyms:

Tsuga heterophylla - Thuja plicata - (*Abies amabilis*) / *Gaultheria shallon* / *Blechnum spicant* (Meidinger et al., 2005) [PNWCOAST_276+267+273]

Tsuga heterophylla - Thuja plicata - (*Abies amabilis*) / *Gaultheria shallon* / *Blechnum spicant* Forest (Crawford et al., 2009)

***Abies amabilis* - (*Pseudotsuga menziesii* - *Abies procera*) / *Vaccinium membranaceum* / *Xerophyllum tenax* Forest**

Pacific Silver Fir - (Douglas-fir, Noble Fir) / Thinleaf Huckleberry / Common Beargrass Forest



Abbrev: ABIAMA-(PSEMEN-ABIPRO)/VACMEM/XERTEN

EL Code: CEGL000239

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Silver Fir - Western Hemlock Forest

Alliance: *Abies amabilis - Tsuga heterophylla* / *Vaccinium membranaceum Cold* Forest

Range: Mount Rainier, northern and eastern Olympics

Plots: MORA (41), OLYM (6)

Environmental Description: Middle to moderately high elevations. Sites are dry, usually on mid to upper slopes or ridgetops, with shallow or rocky soils and southerly aspects.

Vegetation Description: The canopy is dominated by *Abies amabilis*, *Abies procera*, *Pseudotsuga menziesii*, *Tsuga heterophylla* and/or *Callitropsis* (= *Cupressus*) *nootkatensis*. *Abies amabilis* or *Callitropsis* (= *Cupressus*) *nootkatensis* dominates tree regeneration. The shrub layer varies from sparse to dense, generally with *Vaccinium membranaceum* dominant. The herb layer is moderately developed, with *Xerophyllum tenax* dominant. *Rubus lasiococcus*, *Orthilia secunda*, *Clintonia uniflora*, and *Viola sempervirens* are often present.

Classification Comments: Stands with *Abies procera* in the canopy and *Tsuga heterophylla* prominent in tree regeneration should be keyed to a *Pseudotsuga menziesii* and/or *Tsuga heterophylla* dominant association. Dominant *Abies amabilis* is the only statistically significant indicator for this association, relative to other forest types with *Xerophyllum tenax* understories.

Conservation Status Rank: G4/S4

Rank Justification: Many natural-origin stands occur on protected lands, however, non-protected stands are subject to logging and development.

Synonyms:

Abies amabilis - (*Pseudotsuga menziesii* - *Abies procera*) / *Vaccinium membranaceum* / *Xerophyllum tenax* (Meidinger et al., 2005) [PNWCOAST_005]

Abies amabilis / *Vaccinium membranaceum* - *Xerophyllum tenax* (Brockway & Topik, 1984; Henderson et al., 1989, 1992; Bourgeron & Engelking, 1994)

Abies amabilis - (*Pseudotsuga menziesii* - *Abies procera*) / *Vaccinium membranaceum* / *Xerophyllum tenax* Forest (Crawford et al., 2009)

Pacific Silver Fir / Big Huckleberry - Beargrass Association (CF S2-51) ABAM/VAME/XETE (Brockway et al., 1983)

Pacific silver fir / big huckleberry / beargrass (ABAM/VAME/XETE) (Hemstrom et al., 1982)

***Abies amabilis* - (*Tsuga heterophylla*) / *Vaccinium membranaceum* - *Vaccinium alaskaense* Forest**

Pacific Silver Fir - (Western Hemlock) / Thinleaf Huckleberry - Alaska Blueberry Forest



Abbrev: ABIAMA-(TSUHET)/VACMEM-VACALA

EL Code: CEGL005517

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Silver Fir - Western Hemlock Forest

Alliance: *Abies amabilis - Tsuga heterophylla / Vaccinium membranaceum Cold* Forest

Range: Occurs in the Washington Cascades and Olympics, as well as British Columbia.

Plots: MORA (17), NOCA (11), OLYM (6)

Environmental Description: At middle elevations on well-drained sites. Absent from the wettest climatic areas such as the western Olympics.

Vegetation Description: *Abies amabilis* codominates the canopy with one or more of the following codominants: *Tsuga heterophylla* (usually) *Callitropsis* (= *Cupressus*) *nootkatensis* (occasionally), *Pseudotsuga menziesii* (occasionally prominent) or *Picea engelmannii* (East Cascades only). The shrub layer is usually well-developed and codominated by *Vaccinium ovalifolium* (= *alaskaense*) and *Vaccinium membranaceum*. *Rhododendron menziesii* (= *Menziesia ferruginea*) is often present. The herb layer is variable, with *Clintonia uniflora*, *Rubus pedatus*, *Rubus lasiococcus*, *Orthilia secunda*, and *Goodyera oblongifolia* the most frequent species.

Classification Comments: ABIAMA-(TSUHET)/VACMEM/ORTSEC is similar but has little or no *Vaccinium ovalifolium* (= *alaskaense*).

Conservation Status Rank: G4G5/S4

Rank Justification: Many natural-origin stands occur on protected lands; however, some non-protected stands are subject to logging and development.

Synonyms:

Abies amabilis - (*Tsuga heterophylla*) / *Vaccinium membranaceum* - *Vaccinium alaskaense* Forest (Crawford et al., 2009)

Abies amabilis - (*Tsuga heterophylla*) / *Vaccinium membranceum* - *Vaccinium alaskaense* (Meidinger et al., 2005) [PNWCOAST_014]

***Abies amabilis* - (*Tsuga heterophylla*) / *Vaccinium membranaceum* / *Orthilia secunda* Forest**

Pacific Silver Fir - (Western Hemlock) / Thinleaf Huckleberry / Sidebells Wintergreen Forest



Abbrev: ABIAMA-(TSUHET)/VACMEM/ORTSEC

EL Code: CEGL005516

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Silver Fir - Western Hemlock Forest

Alliance: *Abies amabilis - Tsuga heterophylla* / *Vaccinium membranaceum Cold* Forest

Plots: MORA (9), NOCA (32), OLYM (8)

Range: Occurs in the Washington and Oregon Cascades, and less commonly in the Olympics

Plots: MORA (51), NOCA (32), OLYM (11), Other (6)

Environmental Description: At middle to moderately high elevations. Sites have well-drained, often shallow or rocky soils, and occur mostly on southerly aspects and mid to upper slopes. Sites east of the Cascade crest are generally more variable in topography and soils.

Vegetation Description: *Abies amabilis*, *Tsuga heterophylla*, and/or *Pseudotsuga menziesii* dominate the canopy, although *Pseudotsuga menziesii* is not always present. *Thuja plicata* is sometimes codominant. *Abies amabilis* usually dominates tree regeneration. The shrub layer is sparse to moderate and characterized by *Vaccinium membranaceum*, which is usually at least prominent. *Acer circinatum*, *Mahonia nervosa*, and *Linnaea borealis* are often prominent. *Vaccinium ovalifolium* (= *alaskaense*) occurs only infrequently and in small amounts. The herb layer is typically sparse but can infrequently have moderate cover. *Orthilia secunda*, *Goodyera oblongifolia*, and *Rubus lasiococcus* frequently occur. When it occurs, *Clintonia uniflora* can be prominent.

Classification Comments: Distinguished from similar types by the absence or minimal cover of *Xerophyllum tenax*, *Valeriana sitchensis*, *Arnica latifolia*, *Vaccinium ovalifolium* (= *alaskaense*), and *Achlys triphylla*. East Cascades stands with *Picea engelmannii* present and located along intermittent streams, or on terraces above perennial watercourses, may represent *Abies amabilis - Picea engelmannii* / *Vaccinium membranaceum* Riparian Forest (CWWA000270)—this is a poorly defined “xeroriparian” type that is further removed from ground and surface water than more typical riparian areas. Xeroriparian communities typically contain many of the same plants as neighboring upland types, but with denser vegetation and larger individual plants associated with more plentiful water. If present in the parks, CWWA000270 is treated in this classification as variation in upland forest associations.

Conservation Status Rank: G4/S4

Rank Justification: Many natural-origin stands occur on protected lands, however, some non-protected stands are subject to logging and development.

Synonyms:

Abies amabilis / *Vaccinium membranaceum* (Henderson et al., 1992)

> *Abies amabilis* - (*Tsuga heterophylla*) / *Vaccinium membranaceum* Forest (Crawford et al., 2009)

> *Abies amabilis* / *Vaccinium membranaceum* / *Rubus lasiococcus* Forest (Crawford et al., 2009)

Abies amabilis - (*Tsuga heterophylla*) / *Vaccinium membranceum* / *Orthilia secunda* (Meidinger et al., 2005) [PNWCOAST_013]

Abies amabilis / *Menziesia ferruginea* Forest

Pacific Silver Fir / Rusty Menziesia Forest



Abbrev: ABIAMA/MENFER

EL Code: CEGL000224

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Silver Fir - Western Hemlock Forest

Alliance: *Abies amabilis - Tsuga heterophylla* / *Vaccinium membranaceum* Cold Forest

Range: Occurs in the Oregon and Washington Cascades and in the Olympics

Plots: MORA (32), NOCA (1), OLYM (5), Other (1)

Environmental Description: Usually on north aspects, in moist and well-drained locations with more snow than average for middle elevations.

Vegetation Description: The canopy is dominated or codominated by *Abies amabilis* with *Tsuga heterophylla* usually prominent to codominant. *Pseudotsuga menziesii* is occasionally prominent. The well-developed shrub layer is codominated by *Rhododendron menziesii* (= *Menziesia ferruginea*) and either *Vaccinium ovalifolium* (= *alaskaense*) or *Vaccinium membranaceum*. The herb layer is variable. *Clintonia uniflora*, *Orthilia secunda*, *Rubus lasiococcus* and *Rubus pedatus* are usually present. *Xerophyllum tenax* or *Erythronium montanum* can be prominent to codominant.

Classification Comments: ABIAMA-(TSUHET)/VACMEM/ORTSEC is similar, but *Rhododendron menziesii* (= *Menziesia ferruginea*) is < 5%.

Conservation Status Rank: G4/S4

Rank Justification: Many natural-origin stands occur on protected lands. However, many others are subject to logging and development.

Synonyms:

Abies amabilis / *Menziesia ferruginea* (Brockway & Topik, 1984; Bourgeron & Engelking, 1994; Lillybridge et al., 1995)
Abies amabilis / *Menziesia ferruginea* (Meidinger et al., 2005) [PNWCOAST_001]
Abies amabilis / *Menziesia ferruginea* Forest (Crawford et al., 2009)
Pacific Silver Fir / Fool's Huckleberry Association (Brockway et al., 1983)
Pacific Silver Fir / Fool's Huckleberry (Hemstrom et al., 1982)

***Tsuga heterophylla - Abies amabilis* - (*Pseudotsuga menziesii*) / *Vaccinium alaskaense* Forest**

Western Hemlock - Pacific Silver Fir - (Douglas-fir) / Alaska Blueberry Forest



Abbrev: TSUHET-ABIAMA-(PSEMEN)/VACALA

EL Code: CEGL005518

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Silver Fir - Western Hemlock Forest

Alliance: *Abies amabilis - Tsuga heterophylla* / *Vaccinium membranaceum* Cold Forest

Range: Occurs in the western Cascades and Olympic Mountains of Washington, as well as western Oregon and British Columbia

Plots: MORA (43), NOCA (27), OLYM (43)

Environmental Description: Occurs at middle elevations (600 to 1250 m) on a variety of topographic settings, but most frequently the middle third of a slope. Soils are well-drained and moderately dry.

Vegetation Description: The canopy is usually codominated by *Tsuga heterophylla*, *Abies amabilis*, and *Pseudotsuga menziesii* (latter often absent). *Abies amabilis* dominates tree regeneration and occupies over 10% total cover. The shrub layer is usually well-developed, but occasionally sparse. *Vaccinium ovalifolium* (= *alaskaense*) dominates the shrub layer and is always present. *Mahonia nervosa* is sometimes prominent to codominant. The herb layer is usually sparse to occasionally moderately developed, with *Clintonia uniflora* and *Cornus unalaschkensis* the only species present in many stands. *Linnaea borealis* or *Xerophyllum tenax* are occasionally prominent to dominant.

Classification Comments: This association is distinguished from similar types by either (1) > 5% cover of *Mahonia nervosa*, *Xerophyllum tenax* or *Linnaea borealis*, (2) codominance of *Pseudotsuga menziesii*, or (3) absence or trace cover of both *Rubus pedatus* and *Struthiopteris* (= *Blechnum*) *spicant*, particularly when total herb cover is < 5%. TSUHET-ABIAMA/VACALA/RUBPED is easily confused, but distinguished by (3). *Vaccinium parvifolium* is differential relative to most other associations in this alliance.

Conservation Status Rank: G4/S4

Rank Justification: This association is widespread in the mountains of western Washington, but many occurrences have been impacted by logging.

Synonyms:

Abies amabilis / *Vaccinium ovalifolium* (Murray, 2000)

Tsuga heterophylla - Abies amabilis - (*Pseudotsuga menziesii*) / *Vaccinium alaskaense* (Meidinger et al., 2005) [PNWCOAST_016]

Tsuga heterophylla - Abies amabilis - (*Pseudotsuga menziesii*) / *Vaccinium alaskaense* Forest (Crawford et al., 2009)

***Tsuga heterophylla - Abies amabilis* / *Vaccinium alaskaense* / *Rubus pedatus* Forest**

Western Hemlock - Pacific Silver Fir / Alaska Blueberry / Strawberry-leaf Raspberry Forest



Abbrev: TSUHET-ABIAMA/VACALA/RUBPED

EL Code: CEGL005565

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Maritime Silver Fir - Western Hemlock Forest

Alliance: *Abies amabilis - Tsuga heterophylla* / *Vaccinium membranaceum* Cold Forest

Range: Occurs on the western slopes of the Cascades and in the Olympic Mountains of Washington, as well as in Oregon and British Columbia.

Plots: MORA (44), NOCA (15), OLYM (25)

Environmental Description: Occurs at at middle elevations (550 to 1300 m) in moist climatic areas, occupying well-drained modal sites. It is generally found on benches/flats and toeslopes.

Vegetation Description: The canopy is usually codominated by *Tsuga heterophylla* and *Abies amabilis*, though any one stand might be dominated by one or the other. *Abies amabilis* is always present with at least 10% total cover, and typically dominates tree regeneration. *Callitropsis* (= *Cupressus*) *nootkatensis*, *Thuja plicata*, or *Pseudotsuga menziesii* are occasionally prominent. A well-developed shrub layer is always dominated by *Vaccinium ovalifolium* (= *alaskaense*). The shrubs *Rhododendron menziesii* (= *Menziesia ferruginea*), *Vaccinium membranaceum* or *Vaccinium parvifolium* occur frequently, but are rarely prominent. An herb layer is always present and characterized by 3% or more combined cover of the following species: *Clintonia uniflora*, *Cornus unalaschkensis*, *Rubus pedatus*, *Rubus lasiococcus*, or *Erythronium montanum* (the latter is local, the others are widespread and frequent). *Struthiopteris* (= *Blechnum*) *spicant* is often present.

Classification Comments: Some plots from the North Cascades and Olympic Mountains have high cover of *Acer circinatum* and may represent transitions to warmer types. TSUHET-ABIAMA-(PSEMEN)/VACALA is similar, but generally lacks *Rubus pedatus* and *Struthiopteris* (= *Blechnum*) *spicant*.

Conservation Status Rank: G4G5/S4S5

Rank Justification: This association is widespread.

Synonyms:

Tsuga heterophylla - Abies amabilis / *Vaccinium alaskaense* / *Rubus pedatus* (Meidinger et al., 2005) [PNWCOAST_239]

Tsuga heterophylla - Abies amabilis / *Vaccinium alaskaense* / *Rubus pedatus* Forest (Crawford et al., 2009)

Picea sitchensis / *Gaultheria shallon* Forest

Sitka Spruce / Salal Forest



Abbrev: PICSIT/GAUSHA

EL Code: CEGL005524

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Western Hemlock - Sitka Spruce - Western Red-cedar Seasonal Rainforest

Alliance: *Tsuga heterophylla - Picea sitchensis* / *Rhytidiadelphus loreus* Forest

Range: Occurs on the coastal plain of the western Olympic Peninsula, as well as the Oregon and British Columbian coasts.

Plots: OLYM (38)

Environmental Description: Occurs on well-drained, generally sloping sites, often on or near coastal bluffs.

Vegetation Description: The canopy is dominated by *Picea sitchensis*. *Tsuga heterophylla* or *Thuja plicata* is often present to occasionally codominant. The dense shrub layer is dominated or codominated by *Gaultheria shallon*. *Rubus spectabilis* is sometimes codominant and *Vaccinium ovatum*, if present, is low in cover. The herb layer varies in density. *Struthiopteris* (= *Blechnum*) *spicant*, *Maianthemum dilatatum*, and *Polystichum munitum* are present in most stands. Small amounts of *Lysichiton americanus* may be present, but only in limited wet inclusions.

Classification Comments: TSUHET-THUPLI/VACOVAL-GAUSHA/LYSAME is usually inundated and has much higher cover of *Lysichiton americanus* (10-30%). *Picea sitchensis - Pseudotsuga menziesii* / *Gaultheria shallon* Forest (CEGL005526) is similar, but has *Pseudotsuga menziesii* in the canopy.

Conservation Status Rank: GNR/S2S3

Rank Justification: Occurs within a limited geographic range; sites may be threatened by timber harvest.

Synonyms:
Picea sitchensis / *Gaultheria shallon* (Meidinger et al., 2005) [PNWCOAST_052]
Picea sitchensis / *Gaultheria shallon* Forest (Crawford et al., 2009)

***Picea sitchensis* / *Maianthemum dilatatum* Forest**

Sitka Spruce / False Lily-of-the-Valley Forest



Abbrev: PICSIT/MAIDIL

EL Code: CEGL005525

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Western Hemlock - Sitka Spruce - Western Red-cedar Seasonal Rainforest

Alliance: *Tsuga heterophylla* - *Picea sitchensis* / *Rhytidiadelphus loreus* Forest

Range: Occurs on the western coastal plain of the Olympic Peninsula and in coastal Alaska.

Plots: OLYM (4)

Environmental Description: Occurs on well-drained upland sites within the coastal salt spray zone. Sites are relatively flat, often at the top of coastal cliffs. This type also occurs on sand and gravel substrates in the lee of young tree thickets and driftwood piles adjacent to beaches.

Vegetation Description: *Picea sitchensis* dominates the forest canopy. *Tsuga heterophylla* and *Thuja plicata* are occasionally present. A shrub layer is typically absent to very sparse. *Maianthemum dilatatum* dominates the well-developed herb layer with *Struthiopteris* (= *Blechnum*) *spicant* and *Polystichum munitum* often present. Mosses can be a prominent ground cover.

Classification Comments:

Conservation Status Rank: GNR/S1?

Rank Justification: This association occurs as small patches within a very limited distribution (within 20 km of the coastline).

Synonyms:
Picea sitchensis/ *Maianthemum dilatatum* (Meidinger et al., 2005) [PNWCOAST_055]
Picea sitchensis / *Maianthemum dilatatum* Community (Kratz, 1975)
Picea sitchensis / *Maianthemum dilatatum* Forest (Crawford et al., 2009)

Picea sitchensis / *Vaccinium ovatum* Forest

Sitka Spruce / California Huckleberry Forest



Abbrev: PICSIT/VACOVAT

EL Code: CEGL007306

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Western Hemlock - Sitka Spruce - Western Red-cedar Seasonal Rainforest

Alliance: *Tsuga heterophylla - Picea sitchensis* / *Rhytidiadelphus loreus* Forest

Range: Occurs on the outer coastal strip of the Olympic Peninsula, Pacific County, Washington, and interdunal areas of the Oregon Coast.

Plots: OLYM (8)

Environmental Description: In Oregon and southwestern Washington, this association occurs on stabilized dunes or tree islands within unstabilized dunes. Stands documented along the coastal strip of Olympic National Park occur on benches/flats, or small basins, and have no association with dunes.

Vegetation Description: The canopy is dominated by *Picea sitchensis*. *Tsuga heterophylla* may also occur. The dense shrub layer is codominated by *Gaultheria shallon* and *Vaccinium ovatum*. The herb layer is usually poorly developed.

Classification Comments:

Conservation Status Rank: GNR/S1?

Rank Justification: Occurs as small patches within a very limited geographic distribution (within 20 km of the coastline).

Synonyms:
Picea sitchensis / *Vaccinium ovatum* (Meidinger et al., 2005) [PNWCOAST_060]
Picea sitchensis / *Vaccinium ovatum* Forest (Crawford et al., 2009)
Picea sitchensis / *Vaccinium ovatum*-PNW (Christy et al., 1998)

***Thuja plicata - Tsuga heterophylla* / *Vaccinium ovatum - Gaultheria shallon* Forest**

Western Red-cedar - Western Hemlock / California Huckleberry - Salal Forest



Abbrev: THUPLI-TSUHET/VACOVAT-GAUSHA

EL Code: CEGL008282

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Western Hemlock - Sitka Spruce - Western Red-cedar Seasonal Rainforest

Alliance: *Tsuga heterophylla - Picea sitchensis* / *Rhytidiadelphus loreus* Forest

Range: Restricted to the outer coastal strip of the western Olympic Peninsula, perhaps extending into Oregon.

Plots: OLYM (69)

Environmental Description: These forests are restricted to flat or gently concave sites (1° average slope) on coastal terraces (10 to 60 m elevation).

Vegetation Description: *Thuja plicata* and *Tsuga heterophylla* dominate the canopy. The very dense, tall-shrub layer (> 2 m) is codominated by *Gaultheria shallon* and *Vaccinium ovatum*. *Vaccinium ovalifolium* (= *alaskaense*), *Vaccinium parvifolium* and *Rhododendron* (= *Menziesia*) *ferruginea* are usually present to prominent (occasionally codominant). *Struthiopteris* (= *Blechnum*) *spicant* is always present and often prominent/dominant. *Lysichiton americanus* is frequent but rarely abundant (< 5% cover). *Polystichum munitum* is absent or present only in low amounts. A diverse moss layer is typically present.

Classification Comments: THUPLI-TSUHET/GAUSHA/LYSAME may intergrade with this association at the ecotone from wetland to upland when it has significant *Vaccinium ovatum* cover.

Conservation Status Rank: GNR/S1S2

Rank Justification: Occurs only along the Pacific Coast of Washington. These forests can be extremely old and many occurrences have been fragmented by timber harvests.

Synonyms:

Thuja plicata - Tsuga heterophylla / *Vaccinium ovatum* Forest (Crawford et al., 2009)

Picea sitchensis - Tsuga heterophylla / *Polystichum munitum - Oxalis oregana* Forest

Sitka Spruce - Western Hemlock / Western Swordfern - Redwood Sorrel Forest



Abbrev: PICSIT-TSUHET/POLMUN-OXAORE

EL Code: CEGL005530

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Western Hemlock - Sitka Spruce - Western Red-cedar Seasonal Rainforest

Alliance: *Tsuga heterophylla - Thuja plicata* / *Blechnum spicant* Rich Mesic Forest

Range: Occurs on the western Olympic Peninsula and south along the Oregon Coast.

Plots: OLYM (61)

Environmental Description: Occurs at low elevations, often on lower slopes, toeslopes or riparian terraces. It is extensive on high terraces of major rivers. Sites are relatively moist, but well-drained soils.

Vegetation Description: *Picea sitchensis* usually dominates the canopy or codominates with *Tsuga heterophylla*. *Acer macrophyllum* or *Alnus rubra* are sometimes prominent to codominant. Tree regeneration is dominated by *Tsuga heterophylla* and/or *Picea sitchensis*. The shrub layer is variable in cover. When well-developed (mainly in major river valleys), it is dominated by the tall shrub *Acer circinatum*. *Rubus spectabilis*, *Vaccinium ovalifolium* (= *alaskaense*), and *Vaccinium parvifolium* are usually present in small amounts, though the former can be prominent. The well-developed herb layer is codominated by *Polystichum munitum* and *Oxalis oregana*. *Athyrium filix-femina*, *Struthiopteris* (= *Blechnum*) *spicant*, and *Tiarella trifoliata* are usually present. *Tiarella trifoliata* or *Achlys triphylla* can be abundant.

Classification Comments: PICSIT-TSUHET/POLMUN is similar, but has little or no *Oxalis oregana*.

Conservation Status Rank: GNR/S3

Rank Justification: Occurs in a restricted range in which most occurrences have been altered by forest harvesting. Recovery is expected within 100 years from time of stand replacement disturbances (though sites often replanted with *Pseudotsuga menziesii*).

Synonyms:

Picea sitchensis - Tsuga heterophylla / *Polystichum munitum - Oxalis oregana* (Meidinger et al., 2005) [PNWCOAST_077]

Picea sitchensis - Tsuga heterophylla / *Polystichum munitum - Oxalis oregana* Forest (Crawford et al., 2009)

Picea sitchensis - Tsuga heterophylla / *Polystichum munitum* Forest

Sitka Spruce - Western Hemlock / Western Swordfern Forest



Abbrev: PICSIT-TSUHET/POLMUN

EL Code: CEGL003787

Macrogroup: Vancouverian Lowland & Montane Forest

Group: North Pacific Western Hemlock - Sitka Spruce - Western Red-cedar Seasonal Rainforest

Alliance: *Tsuga heterophylla - Thuja plicata* / *Blechnum spicant* Rich Mesic Forest

Range: Occurs along British Columbia's mainland outer coast from near the northern tip of Vancouver Island, northward to Portland Canal, and the Queen Charlotte Islands off the central coast. Also occurs at low elevations on the western Olympic Peninsula (mostly within 20 km of the outer coast), western Willapa Hills of Washington, and rarely in the northwestern Cascade Range of Washington (south to King County) and along a narrow outer coastal strip (< 20 km wide) in northern and central Oregon (probably south to Lane County).

Plots: MORA (1), OLYM (20)

Environmental Description: Occurs at elevations from 0 to 650 m, on all slope positions, gentle to steep slopes, and any aspect. At the south end of its range, it tends to occur more commonly on middle slopes. Soils are usually loamy to sandy and derived from fluvial or colluvial materials. Soils may also be morainal or organic. Soil nutrient regimes are usually rich to very rich.

Vegetation Description: The moderately closed canopy is dominated by *Tsuga heterophylla* and *Picea sitchensis* (minimum of 10%), often with low to moderate cover of *Thuja plicata*, *Alnus rubra*, and/or *Acer macrophyllum*. The poorly developed shrub layer has low cover of *Vaccinium parvifolium* and *Rubus spectabilis*. Low to moderate cover of *Rhododendron menziesii* (= *Menziesia ferruginea*), *Vaccinium ovalifolium* (= *alaskaense*), or *Gaultheria shallon* sometimes occurs in the shrub layer. The well-developed forb layer is dominated by a high cover of *Polystichum munitum* with low cover of *Struthiopteris* (= *Blechnum*) *spicant*, *Dryopteris expansa*, *Tiarella trifoliata*, *Athyrium filix-femina*, and sometimes with low cover of *Maianthemum dilatatum*, *Claytonia sibirica*, *Galium triflorum*, *Luzula parviflora*, and *Streptopus amplexifolius*. The variable, moderately developed moss layer has low to moderate cover of *Rhytidiadelphus loreus*, *Eurhynchium oreganum*, *Hylocomium splendens*, and *Plagiothecium undulatum*. Low to moderate cover of *Rhizomnium glabrescens* and *Pellia neesiana* is often present. Moss composition varies with moisture regime, with more feathermosses on drier sites and leafy mosses on moist sites.

Classification Comments: PICSIT-TSUHET/POLMUN-OXAORE is similar, but has greater cover of *Oxalis oregana*.

Conservation Status Rank: G3?/S2S3

Rank Justification: Widespread but uncommon to rare within its range, this forested community is currently subject to forest harvesting on the Queen Charlotte Islands and mainland of British Columbia. This community experiences more frequent disturbance than similar communities do, as it often occurs on steep slopes that experience landslides and avalanche events. Recovery is expected within 100 years from time of disturbance.

Synonyms:
Picea sitchensis - *Tsuga heterophylla* / *Polystichum munitum* (Meidinger et al., 2005) [PNWCOAST_075]
Picea sitchensis - *Tsuga heterophylla* / *Polystichum munitum* Forest (Crawford et al., 2009)

Abies amabilis - Tsuga mertensiana / *Menziesia ferruginea* Forest

Pacific Silver Fir - Mountain Hemlock / Rusty Menziesia Forest



Abbrev: ABIAMA-TSUMER/MENFER

EL Code: CEGL005628

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Tsuga mertensiana - Abies amabilis* Forest & Woodland

Range: Mount Rainier and eastern North Cascades, as well as in OR.

Plots: MORA (7), NOCA (11), Other (1)

Environmental Description: At middle to high elevations, on slopes with northern aspects or benches, with relatively moist soils.

Vegetation Description: The canopy is typically codominated by *Abies amabilis* and *Tsuga mertensiana* (which is always at least prominent). *Abies amabilis* usually dominates tree regeneration. *Tsuga heterophylla* and *Callitropsis* (= *Cupressus*) *nootkatensis* are sometimes present to prominent. The well-developed shrub layer is usually codominated by *Rhododendron menziesii* (= *Menziesia ferruginea*) and either *Vaccinium membranaceum* or *Vaccinium ovalifolium* (= *alaskaense*), or both. *Vaccinium membranaceum* is almost always present and *Sorbus sitchensis* is frequent. The herb layer is variable in density and rather species-poor. Sometimes *Erythronium montanum* is dominant or codominant in a lush herb layer. *Rubus lasiococcus* and *Rubus pedatus* are usually present.

Classification Comments: ABIAMA-TSUMER/VACMEM/RUBLAS, TSUMER-ABIAMA/VACALA/RUBPED, and ABIAMA-TSUMER/STRLAN are similar associations.

Conservation Status Rank: G4/S4

Rank Justification: Many natural-origin stands occur on protected lands. However, many others are subject to logging and development.

Synonyms:
Abies amabilis - Tsuga mertensiana / *Menziesia ferruginea* (Meidinger et al., 2005) [PNWCOAST_017]
Abies amabilis - Tsuga mertensiana / *Menziesia ferruginea* Forest (Crawford et al., 2009)
Abies amabilis / *Menziesia ferruginea* Association (Franklin et al., 1988)
Tsuga mertensiana / *Menziesia ferruginea - Vaccinium alaskaens*e Association (Kovalchik, 2001)
Tsuga mertensiana / *Menziesia ferruginea* Association (Brockway et al., 1983; Diaz et al., 1997)

***Abies amabilis - Tsuga mertensiana* / *Streptopus lanceolatus* var. *curvipes* Forest**

Pacific Silver Fir - Mountain Hemlock / Rosy Twisted-stalk Forest



Abbrev: ABIAMA-TSUMER/STRLAN

EL Code: CEGL005519

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Tsuga mertensiana - Abies amabilis* Forest & Woodland

Range: Occurs in the Olympics and western Washington Cascades, as well as in British Columbia.

Plots: MORA (8), NOCA (7), OLYM (1), Other (5)

Environmental Description: Upper montane forest on generally moist soils.

Vegetation Description: The canopy is usually dominated by *Abies amabilis*, with *Tsuga mertensiana* prominent to codominant. *Callitropsis* (= *Cupressus*) *nootkatensis*, *Abies lasiocarpa*, *Abies procera* and *Pseudotsuga menziesii* may be prominent. The shrub layer varies from absent to well-developed, with dominant *Vaccinium ovalifolium* (= *alaskaense*) or *Vaccinium membranaceum* dominant (all plots sampled in the parks had sparse shrubs). An herb layer is always present, with *Streptopus lanceolatus* and/or *Tiarella trifoliata* diagnostically present. *Rubus pedatus* is frequently present, as well. In the parks, *Tiarella trifoliata* is the most common herb with *Valeriana sitchensis*, *Rubus lasiococcus,* and *Veratrum viride* frequent.

Classification Comments: ABIAMA-TSUMER/VACMEM/RUBLAS is floristically very similar, but lacks *Streptopus lanceolatus* and *Tiarella trifoliata* and always has a shrub layer dominated by *Vaccinium membranaceum*. Stands with *Maianthemum dilatatum* present (typically > 2%) may represent occurrences of *Tsuga mertensiana - Abies amabilis* / *Vaccinium ovalifolium* / *Maianthemum dilatatum* Forest (CEGL002617), which has yet to be documented in the Washington national parks.

Conservation Status Rank: G4/S4

Rank Justification: Many natural-origin stands occur on protected lands, but some unprotected stands are subject to logging and development.

Synonyms:

Abies amabilis - Tsuga mertensiana / *Streptopus lanceolatus* var. *curvipes* (Meidinger et al., 2005) [PNWCOAST_019]

Abies amabilis - Tsuga mertensiana / *Streptopus lanceolatus* var. *curvipes* Forest (Crawford et al., 2009)

***Abies amabilis - Tsuga mertensiana* / *Vaccinium membranaceum* / *Rubus lasiococcus* Forest**

Pacific Silver Fir - Mountain Hemlock / Thinleaf Huckleberry / Rough-fruit Berry Forest



Abbrev: ABIAMA-TSUMER/VACMEM/RUBLAS

EL Code: CEGL005520

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Tsuga mertensiana - Abies amabilis* Forest & Woodland

Range: Occurs in the Washington and (possibly) Oregon Cascades and in the Olympics

Plots: MORA (20), NOCA (29), OLYM (14), Other (6)

Environmental Description: Occurs at high elevations. In the northern portion of the range, aspects tend to be southerly, while in the southern portion, aspects tend to be northerly. Soils are well-drained and relatively dry.

Vegetation Description: The canopy is typically codominated by *Tsuga mertensiana* and *Abies amabilis*. The former has over 10% total cover and the latter usually dominates tree regeneration. *Callitropsis* (= *Cupressus*) *nootkatensis* is commonly present and sometimes prominent to codominant. *Abies lasiocarpa* is occasionally prominent. The shrub layer varies from sparse to dense and is characterized by the presence to dominance of *Vaccinium membranaceum*. Other shrubs, if present, are low in cover. In the Washington Cascades and Olympic Mountains, *Rhododendron* (= *Menziesia*) *ferruginea* is commonly present with low cover. *Vaccinium ovalifolium* (= *alaskaense*) is sometimes present. The herb layer varies from sparse to well-developed. *Rubus lasiococcus* and *Rubus pedatus* are often present. *Erythronium montanum* sometimes dominates a well-developed herb layer.

Classification Comments: This type is not found as small tree islands within a matrix of heather meadows. Tree islands with similar composition to this type should be considered within their heather matrix and are usually TSUMER/PHYEMP-VACDEL or TSUMER-ABILAS/VACDEL-PHYEMP.

Conservation Status Rank: G4G5/S4

Rank Justification: This forest community is endemic to portions of the upper elevations of the eastern Cascades. It is a small- to large-patch community. Trees are often over 150 years old; 250-year-old trees have been sampled in some stands. Sites have deep snowpacks, and forest structure is greatly influenced by ice and winter winds. These are harsh sites and slow to reforest. The community type occurs "on ridges once used as livestock driveways" to access subalpine and alpine meadows. It occurs in wilderness areas and national parks with few known, but some unprotected stands are subject to logging and development. The abundance of this type is estimated from a classification survey and an expert interview.

Synonyms:

Abies amabilis - Tsuga mertensiana / *Vaccinium membranaceum* / *Rubus lasiococcus* Forest (Crawford et al., 2009)

Abies amabilis - Tsuga mertensiana / *Vaccinium membranaceum* / *Rubus lasiococcus* (Meidinger et al., 2005) [PNWCOAST_020]

Abies amabilis / *Rhododendron albiflorum* Forest

Pacific Silver Fir / Cascade Azalea Forest



Abbrev: ABIAMA/RHOALB

EL Code: CEGL000225

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North Pacific Maritime Silver Fir - Western Hemlock Forest

Alliance: *Abies amabilis - Tsuga heterophylla* / *Vaccinium membranaceum Cold* Forest

Range: Occurs in the Olympic Mountains and in the Cascade Mountains of Washington and Oregon.

Plots: MORA (29), NOCA (1), OLYM (5), Other (1)

Environmental Description: Occurs at middle to high elevations, usually on steep north-facing middle to upper slopes with rocky or shallow well-drained soils.

Vegetation Description: *Abies amabilis* typically dominates the canopy. *Tsuga heterophylla* and *Pseudotsuga menziesii* may occasionally codominate. *Tsuga mertensiana* may be present in small amounts (always < 5%), but if so, *Tsuga heterophylla* is also present. The frequently dense shrub layer is dominated or codominated by *Rhododendron albiflorum*. *Vaccinium membranaceum* is usually prominent to codominant. *Vaccinium ovalifolium* (= *alaskaense*) or *Rhododendron menziesii* (= *Menziesia ferruginea*) are occasionally codominant. The herb layer is variable in composition and density. *Rubus lasiococcus* (occasionally prominent) is the only consistent herb. *Valeriana sitchensis*, *Orthilia secunda*, and *Rubus pedatus* are frequent. *Erythronium montanum* is occasionally prominent to codominant.

Classification Comments: These stands are environmentally indistinguishable from TSUMER-ABIAMA/RHOALB (CEGL002632) in plots from the parks. The only distinguishing feature is presence/absence of *Tsuga heterophylla* and degree of *Tsuga mertensiana* cover. With analysis of range-wide data, these two associations could potentially be merged.

Conservation Status Rank: G5/S4

Rank Justification: Many natural-origin stands occur on protected lands. However, many others are subject to logging and development.

Synonyms:

Abies amabilis / *Rhododendron albiflorum* (Brockway & Topik, 1984; Bourgeron & Engelking, 1994)
Abies amabilis / *Rhododendron albiflorum* (Meidinger et al., 2005) [PNWCOAST_002]
Abies amabilis / *Rhododendron albiflorum* Forest (Crawford et al., 2009)
Pacific Silver Fir / Cascade Azalea Association (Brockway et al., 1983)

Tsuga mertensiana - Abies amabilis / *Rhododendron albiflorum* Forest

Mountain Hemlock - Pacific Silver Fir / Cascade Azalea Forest



Abbrev: TSUMER-ABIAMA/RHOALB

EL Code: CEGL002632

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Tsuga mertensiana - Abies amabilis* Forest & Woodland

Range: Occurs in the Cascades and northern and eastern Olympic Mountains in Washington, as well as in Oregon and British Columbia.

Plots: MORA (34), NOCA (34), OLYM (41), Other (14)

Environmental Description: Occurs at high elevations (1300 to 1750 m), on mid to upper slopes or ridgetops on well-drained soils.

Vegetation Description: This association has a closed to semi-closed canopy codominated by *Tsuga mertensiana* and *Abies amabilis* or occasionally *Callitropsis* (= *Cupressus*) *nootkatensis*. *Abies lasiocarpa* is occasionally prominent. *Tsuga heterophylla* is rarely present in small amounts. The usually dense shrub layer is at least codominated by *Rhododendron albiflorum*. *Vaccinium ovalifolium* (= *alaskaense*) and/or *Vaccinium membranaceum* usually codominate and *Rhododendron menziesii* (= *Menziesia ferruginea*) is sometimes prominent to codominant. The herb layer is sparse to moderate and dominated by *Rubus pedatus*, *Rubus lasiococcus*, *Xerophyllum tenax*, or *Erythronium montanum*. Occasionally *Valeriana sitchensis* is prominent.

Classification Comments: *Rhododendron albiflorum* may also occur beneath tree clumps in TSUMER-ABILAS/VACDEL-PHYEMP and TSUMER/PHYEMP-VACDEL communities, but *Phyllodoce empetriformis* and other dwarf-shrubs dominate in the openings of those parkland woodlands.

Conservation Status Rank: G4G5/S4

Rank Justification: Occurs throughout the upper elevations of western Washington mountain ranges.

Synonyms:

Abies amabilis / *Rhododendron albiflorum* Association (Franklin et al., 1988)

Tsuga mertensiana / *Rhododendron albiflorum* - *Vaccinium alaskaense* Association (Henderson et al., 1992) (Henderson et al., 1989, 1992)

Tsuga mertensiana - Abies amabilis / *Rhododendron albiflorum* Forest (Crawford et al., 2009)

Tsuga mertensiana - Abies amabilis / *Rhododendron albiflorum* (Meidinger et al., 2005) [PNWCOAST_293]

***Tsuga mertensiana - Abies amabilis* / *Vaccinium alaskaense* / *Rubus pedatus* Forest**

Mountain Hemlock - Pacific Silver Fir / Alaska Blueberry / Strawberry-leaf Raspberry Forest



Abbrev: TSUMER-ABIAMA/VACALA/RUBPED

EL Code: CEGL005580

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Tsuga mertensiana - Abies amabilis* Forest & Woodland

Range: Occurs in the Cascades and Olympic Mountains in Washington, as well as in Oregon and British Columbia.

Plots: MORA (12), NOCA (3), OLYM (34)

Environmental Description: Occurs at middle to high elevations (950 to 1450 m), on a variety of well-drained, moderately dry to moist sites.

Vegetation Description: The canopy is codominated by *Tsuga mertensiana* and *Abies amabilis*. *Tsuga heterophylla* is often prominent and *Callitropsis* (= *Cupressus*) *nootkatensis* is occasionally prominent to dominant. The typically well-developed shrub layer is at least codominated by *Vaccinium ovalifolium* (= *alaskaense*). *Vaccinium ovalifolium* (= *alaskaense*) or *Vaccinium membranaceum* are usually present and occasionally codominant. The herb layer is variable. *Rubus pedatus* is the most consistent herb and is sometimes prominent. *Erythronium montanum*, *Clintonia uniflora,* and *Xerophyllum tenax* are inconsistent, but occasionally prominent to codominant. *Tiarella trifoliata*, *Streptopus lanceolatus*, and *Maianthemum dilatatum* are absent or present with very low cover.

Classification Comments: Stands with *Maianthemum dilatatum* present (typically > 2%) may represent occurrences of *Tsuga mertensiana - Abies amabilis* / *Vaccinium ovalifolium* / *Maianthemum dilatatum* Forest (CEGL002617), which has yet to be documented in the Washington national parks.

Conservation Status Rank: G4G5/S4

Rank Justification: Occurs throughout the upper elevations of the western Washington mountain ranges.

Synonyms:

Tsuga mertensiana - Abies amabilis / *Vaccinium alaskaense* / *Rubus pedatus* Forest (Crawford et al., 2009)

Tsuga mertensiana - Abies amabilis / *Vaccinium alaskaense* / *Rubus pedatus* (Meidinger et al., 2005) [PNWCOAST_294]

***Tsuga mertensiana - Abies amabilis* / *Vaccinium membranaceum* / *Xerophyllum tenax* Forest**

Mountain Hemlock - Pacific Silver Fir / Thinleaf Huckleberry / Common Beargrass Forest



Abbrev: TSUMER-ABIAMA/VACMEM/XERTEN

EL Code: CEGL000515

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Tsuga mertensiana - Abies amabilis* Forest & Woodland

Range: Occurs in the Olympic Mountains and in the Central Washington Cascades south into Oregon.

Plots: MORA (4), OLYM (6), Other (4)

Environmental Description: Occurs at high elevations (1450 to 1750 m), usually on upper slopes and ridgetops with shallow or rocky well-drained soils.

Vegetation Description: The canopy is typically codominated by *Tsuga mertensiana* and *Abies amabilis*. *Tsuga mertensiana* occupies over 10% total cover. *Pseudotsuga menziesii* or *Abies lasiocarpa* are occasionally prominent. The well-developed shrub layer is dominated by *Vaccinium membranaceum*. The well-developed herb layer is dominated by *Xerophyllum tenax*. *Rubus lasiococcus* or *Erythronium montanum* are usually present.

Classification Comments: Relative to other forest types with *Xerophyllum tenax* understories, this association is indicated by *Tsuga mertensiana*, *Luzula hitchcockii*, *Rhytidiadelphus squarrosus*, *Nothochelone nemorosa*, and *Vaccinium deliciosum*. This association may occur as “stringers” at upper treeline, where it may transition to TSUMER/PHYEMP-VACDEL.

Conservation Status Rank: G5/S4

Rank Justification: Occurs throughout the upper elevations of the western Washington mountain ranges.

Synonyms:

Tsuga mertensiana / *Vaccinium membranaceum - Xerophyllum tenax* Association (Henderson et al., 1989, 1992)

Tsuga mertensiana - Abies amabilis / *Vaccinium membranaceum* / *Xerophyllum tenax* Forest (Crawford et al., 2009)

Tsuga mertensiana - Abies amabilis / *Vaccinium membranaceum* / *Xerophyllum tenax* (Meidinger et al., 2005) [PNWCOAST_296]

Tsuga mertensiana - Abies amabilis / Vaccinium membranaceum / Valeriana sitchensis Woodland

Mountain Hemlock - Pacific Silver Fir / Thinleaf Huckleberry / Sitka Valerian Woodland



Abbrev: TSUMER-ABIAMA/VACMEM/VALSIT

EL Code: CEGL005581

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Tsuga mertensiana - Abies amabilis* Forest *&* Woodland

Range: Occurs in the North Cascades and Olympic Mountains in Washington, as well as in British Columbia.

Plots: NOCA (2), OLYM (3)

Environmental Description: Occurs at high elevations (1450 to 1550 m) on upper slopes and ridgetops with well-drained, rocky, and/or shallow soils.

Vegetation Description: The canopy is usually codominated by *Tsuga mertensiana* and *Abies amabilis* (the latter can be absent). Occasionally, *Abies lasiocarpa* or *Callitropsis* (= *Cupressus*) *nootkatensis* are codominant. The well-developed shrub layer is dominated by *Vaccinium membranaceum*. *Sorbus sitchensis* is usually present. The short shrub *Vaccinium deliciosum* is often prominent. The herb layer is well-developed and dominated by *Valeriana sitchensis*. *Veratrum viride* and *Arnica latifolia* are usually present. *Clintonia uniflora*, *Tiarella trifoliata*, and *Rubus pedatus* are often present in small amounts.

Classification Comments: This association may be difficult to distinguish from a number of other subalpine forest associations in Washington. It is differentiated from TSUMER-ABIAMA/RHOALB by having minor *Rhododendron albiflorum* cover (50% constancy, 2% average cover compared to 100% constancy, 23% average cover). ABIAMA-TSUMER/VACMEM/RUBLAS typically has less *Valeriana sitchensis* (25% constancy, 2% average cover, compared to 100% constancy, 8% average cover in this type). ABIAMA-TSUMER/VACMEM/RUBLAS may also have *Vaccinium ovalifolium* (= *alaskaense*) present (36% constancy, 3% average cover), but further distinctions are hazy and may require additional sampling. Alternatively, this association could be subsumed within ABIAMA-TSUMER/VACMEM/RUBLAS, which is more broadly sampled. INR reassigned mapping plots originally assigned to this type into a number of other subalpine forest associations.

Conservation Status Rank: GNR/S4

Rank Justification: Occurs throughout the upper elevations of western Washington mountain ranges.

Synonyms:

Tsuga mertensiana - Abies amabilis / *Vaccinium membranaceum* / *Valeriana sitchensis* Woodland (Crawford et al., 2009)

Tsuga mertensiana - Abies amabilis / *Vaccinium membranaceum* / *Valeriana sitchensis* Woodland (Meidinger et al., 2005) [PNWCOAST_295]

***Abies lasiocarpa* - (*Abies amabilis*) / *Vaccinium membranaceum* / *Xerophyllum tenax* Forest**

Subalpine Fir - (Pacific Silver Fir) / Thinleaf Huckleberry / Common Beargrass Forest



Abbrev: ABILAS-(ABIAMA)/VACMEM/XERTEN

EL Code: CEGL008234

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Abies amabilis - Tsuga mertensiana - Abies lasiocarpa* Cascadian Forest & Woodland

Range: Occurs in the northern and eastern Olympic Mountains and at Mount Rainier. It may also occur south in the Cascades into Oregon.

Plots: MORA (11), OLYM (11)

Environmental Description: Occurs at mid- to upper-montane elevations (1300 to 1600 m) on moderately angled (18° average slope) frequently south-facing slopes (183°). Sites are usually dry and rocky.

Vegetation Description: *Abies lasiocarpa* is prominent and usually codominant with *Tsuga heterophylla* and/or *Pseudotsuga menziesii* in an open canopy. *Callitropsis* (= *Cupressus*) *nootkatensis* is often prominent. *Abies amabilis* is frequently present, but low in cover. *Abies procera* and *Thuja plicata* are typically absent. The shrub layer is poorly developed, with *Vaccinium membranaceum* most abundant. *Vaccinium deliciosum* is sometimes codominant in a dwarf-shrub layer. A well-developed herb layer is dominated by *Xerophyllum tenax*, often with *Rubus lasiococcus*, *Orthilia secunda*, or *Erythronium montanum*.

Classification Comments: *Erythronium montanum* and *Phyllodoce empetriformis* are the strongest indicators relative to other associations with *Xerophyllum tenax* understories. *Erythronium montanum*, *Callitropsis* (= *Cupressus*) *nootkatensis*, *Linnaea borealis*, and *Pinus monticola* are differential within this alliance. Absence of *Tsuga mertensiana* is the only statistically significant floristic difference between this type and TSUMER-ABIAMA/VACMEM/XERTEN. *Tsuga mertensiana* may be present, but never exceeds 5% cover.

Conservation Status Rank: GNR/S2S4Q

Rank Justification: Apparently represented at many sites in protected areas.

Synonyms:

Abies lasiocarpa - (*Abies amabilis*) / *Vaccinium membranaceum* / *Xerophyllum tenax* Forest (Crawford et al., 2009)

Abies amabilis / *Xerophyllum tenax* Association, *Tsuga mertensiana* Phase (Franklin et al., 1988)

Abies amabilis / *Xerophyllum tenax* Lithosol Association (Franklin, 1966)

***Abies lasiocarpa - Abies amabilis* / *Vaccinium membranaceum* / *Valeriana sitchensis* Forest**

Subalpine Fir - Pacific Silver Fir / Thinleaf Huckleberry / Sitka Valerian Forest



Abbrev: ABILAS-ABIAMA/VACMEM/VALSIT

EL Code: CEGL002612

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Abies amabilis - Tsuga mertensiana - Abies lasiocarpa* Cascadian Forest & Woodland

Range: Occurs in the Cascades and in the northeastern Olympic Mountains.

Plots: MORA (27), NOCA (39), OLYM (10), Other (6)

Environmental Description: At relatively high elevations and usually in relatively dry climatic zones. Sites have well-drained soils and usually southern aspects.

Vegetation Description: *Abies lasiocarpa* dominates or codominates in a forest with a semi-open to closed tree canopy. *Abies amabilis* is usually present as the dominant regenerating tree and occasionally is codominant in the canopy. *Picea engelmannii* is sometimes prominent to codominant. This association may include small patches dominated by *Callitropsis* (= *Cupressus*) *nootkatensis* (Only 5% constancy, but 21% average cover when present in Washington).The shrub layer is typically moderate in density and dominated by *Vaccinium membranaceum*. *Sorbus sitchensis* and *Vaccinium deliciosum* are frequent. Occasionally shrubs are only sparsely represented. The well-developed, diverse, and variable herb layer usually has *Valeriana sitchensis* prominent to codominant. *Rubus lasiococcus*, *Arnica latifolia,* and *Veratrum viride* are usually present to codominant. *Clintonia uniflora*, *Rubus pedatus*, *Tiarella trifoliata*, *Luzula hitchcockii* (= *glabrata* var. *hitchcockii*) and *Erythronium montanum* are less frequent but can be prominent to codominant. *Xerophyllum tenax* is very rarely present at low cover.

Classification Comments: Similar to ABILAS/VALSIT-RUBLAS, but with more *Vaccinium membranaceum* and *Abies amabilis* and a more diverse flora. Crawford et al. (2009) proposed a *Cupressus nootkatensis* / *Valeriana sitchensis* Forest association, while noting that the provisional type could also be included in the association described here. After further sampling and analysis, we have chosen to follow the latter path.

Conservation Status Rank: G4/S4

Rank Justification: Many natural-origin stands occur on protected lands. Some non-protected stands are subject to logging and development.

Synonyms:

Abies lasiocarpa / *Valeriana sitchensis* Community Type (Franklin et al., 1988)

Abies lasiocarpa - (*Abies amabilis*)/*Vaccinium membranaceum* / *Valeriana sitchensis* Forest (Crawford et al., 2009)

Abies lasiocarpa / *Vaccinium membranaceum* / *Valeriana sitchensis* (Bourgeron & Engelking, 1994)

Abies lasiocarpa Type (Fonda & Bliss, 1969)

Abies lasiocarpa - (*Abies amabilis*) / *Vaccinium membranaceum* / *Valeriana sitchensis* (Chappell, 2006a)

> *Cupressus nootkatensis* / *Valeriana sitchensis* Forest (Crawford et al., 2009)

Abies lasiocarpa - Tsuga mertensiana / *Festuca viridula* Woodland

Subalpine Fir - Mountain Hemlock / Greenleaf Fescue Woodland



Abbrev: ABILAS-TSUMER/FESVIR

EL Code: CEGL005639

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Abies amabilis - Tsuga mertensiana - Abies lasiocarpa* Cascadian Forest & Woodland

Range: Occurs on the northeastern slopes of Mount Rainier and in Oregon

Plots: MORA (5)

Environmental Description: High elevations, near treeline.

Vegetation Description: Tree islands or ribbons in subalpine parkland. The tree canopy is dominated by *Abies lasiocarpa* and sometimes codominated by *Tsuga mertensiana* (in Oregon only). *Pinus albicaulis* is frequently present only in small amounts. There are few or no shrubs. The well-developed herb layer is usually codominated by *Festuca viridula*, *Luzula hitchcockii* (= *glabrata* var. *hitchcockii*), and *Lupinus latifolius* (= *arcticus*). *Festuca viridula* has over 10% cover. *Eucephalus ledophyllus* and *Valeriana sitchensis* are usually prominent and *Polemonium pulcherrimum*, *Phlox diffusa*, and *Arnica latifolia* are usually present to prominent.

Classification Comments: Stands with prominent *Pinus albicaulis* represent occurrences of PINALB/FESVIR. Stands with little or no *Festuca viridula* (and generally no shrub layer) may represent occurrences of *Tsuga mertensiana - Abies lasiocarpa* / *Eucephalus ledophyllus - Lupinus arcticus* ssp. *subalpinus* Woodland (CEGL007372), which has yet to be documented in the Washington national parks.

Conservation Status Rank: G4G5/S2S3

Rank Justification: Appears within a restricted range, but with few known. Climate change will affect this vegetation.

Synonyms:

Abies lasiocarpa - (*Tsuga mertensiana*) / *Festuca viridula* Woodland (Crawford et al., 2009)

Abies lasiocarpa - Tsuga mertensiana / *Festuca viridula* Woodland (Meidinger et al., 2005) [PNWCOAST_035]

Tsuga mertensiana - Abies lasiocarpa / *Festuca viridula* Association (Diaz et al., 1997)

Abies lasiocarpa - Tsuga mertensiana / *Vaccinium scoparium* Woodland

Subalpine Fir - Mountain Hemlock / Grouse Whortleberry Woodland



Abbrev: ABILAS-TSUMER/VACSCO

EL Code: CEGL005522

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Abies amabilis - Tsuga mertensiana - Abies lasiocarpa* Cascadian Forest & Woodland

Range: Occurs in the eastern Cascades of Washington and Oregon.

Plots: MORA (1), Other (1)

Environmental Description: Occurs at high elevations on gentle slopes, with a variety of aspects. Sites usually have rocky, well-drained soils.

Vegetation Description: This woodland association is codominated by *Abies lasiocarpa* and *Tsuga mertensiana*. *Pinus contorta* is occasionally prominent to codominant. The dwarf shrub layer is typically well-developed. *Vaccinium scoparium* is prominent to dominant and diagnostic. *Vaccinium deliciosum* is occasionally prominent. Taller shrubs may be absent or moderate in cover. *Vaccinium membranaceum* is often prominent. One or more of the following species may be prominent in the variable herb layer: *Xerophyllum tenax*, *Rubus lasiococcus*, *Arnica latifolia*, and *Luzula hitchcockii* (= *glabrata* var. *hitchcockii*).

Classification Comments: This association is represented by a single plot from map training data collection, but it is more common outside of the parks in the East Cascades.

Conservation Status Rank: GNR/S3S4

Rank Justification: This association occurs within a restricted range, but with few known.

Synonyms:

Abies lasiocarpa - Tsuga mertensiana / *Vaccinium scoparium* Woodland (Crawford et al., 2009)

Abies lasiocarpa - Tsuga mertensiana / *Vaccinium scoparium* Woodland (Meidinger et al., 2005) [PNWCOAST_036]

Abies lasiocarpa / *Vaccinium deliciosum* Woodland

Subalpine Fir / Cascade Bilberry Woodland



Abbrev: ABILAS/VACDEL

EL Code: CEGL005636

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Abies amabilis - Tsuga mertensiana - Abies lasiocarpa* Cascadian Forest & Woodland

Range: Occurs in the Oregon and Washington Cascades and in the Olympic Mountains

Plots: MORA (7), NOCA (31), OLYM (5), Other (6)

Environmental Description: Occurs at high elevations (1550 to 1900 m) at the ecotone between forest and subalpine parkland, or as tree islands in subalpine parkland.

Vegetation Description: The open canopy is always dominated by *Abies lasiocarpa*. *Tsuga mertensiana* is occasionally present but never prominent. *Callitropsis* (= *Cupressus*) *nootkatensis* or *Picea engelmannii* can be prominent. The well-developed dwarf-shrub layer is dominated or codominated by *Vaccinium deliciosum*. *Paxistima myrsinites*, *Phyllodoce empetriformis*, *Vaccinium membranaceum*, or *Vaccinium scoparium* are usually present and occasionally prominent. The herb layer is usually low to moderate in cover, with *Arnica latifolia*, *Luzula hitchcockii* (= *glabrata* var. *hitchcockii*), *Valeriana sitchensis*, *Luetkea pectinata*, *Lupinus latifolius* (= *arcticus*), *Pedicularis racemosa* or *Rubus lasiococcus* usually present.

Classification Comments: TSUMER-ABILAS/VACDEL-PHYEMP is similar, but has codominant *Tsuga mertensiana*. Forb-dominated stands with little or no shrub layer may represent occurrences of *Tsuga mertensiana - Abies lasiocarpa* / *Eucephalus ledophyllus - Lupinus arcticus* ssp. *subalpinus* Woodland (CEGL007372), which has yet to be documented in the Washington national parks.

Conservation Status Rank: GNR/S3S4

Rank Justification: Natural-origin stands occur on protected lands within a restricted ecological range. Climate change will likely affect this vegetation.

Synonyms:
Abies lasiocarpa/*Vaccinium deliciosum* Association (Lillybridge et al., 1995)
Abies lasiocarpa/*Vaccinium deliciosum* Community (Wooten & Morrison, 1995)
Abies lasiocarpa/*Vaccinium deliciosum* Woodland (Meidinger et al., 2005) [PNWCOAST_031]
Abies lasiocarpa/*Vaccinium deliciosum* Woodland (Crawford et al., 2009)

Abies lasiocarpa / *Valeriana sitchensis - Rubus lasiococcus* Forest

Subalpine Fir / Sitka Valerian - Rough-fruit Berry Forest



Abbrev: ABILAS/VALSIT-RUBLAS

EL Code: CEGL000345

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Abies amabilis - Tsuga mertensiana - Abies lasiocarpa* Cascadian Forest & Woodland

Range: This association occurs from the North Cascades south to the Goats Rock, Lewis County, and in the northeastern Olympics.

Plots: MORA (17), NOCA (7), OLYM (30), Other (1)

Environmental Description: Occurs at elevations between 1400 to 1900 m. Sites have well-drained soils and southerly aspects.

Vegetation Description: *Abies lasiocarpa* dominates a partially open canopy of relatively short stature, or tree islands in subalpine parkland settings. Small amounts of *Tsuga mertensiana* or *Abies amabilis* sometimes occur as regeneration. *Callitropsis* (= *Cupressus*) *nootkatensis* or *Picea engelmannii* may be locally abundant. Shrubs are often absent. The lush herbaceous understory is dominated by *Valeriana sitchensis* and sometimes *Rubus lasiococcus* or *Luzula hitchcockii* (= *glabrata* var. *hitchcockii*). Other frequent understory species with lower cover include *Arnica latifolia*, *Veratrum viride*, *Viola orbiculata*, *Lupinus latifolius* (= *arcticus*), *Polemonium pulcherrimum*, *Pedicularis racemosa*, and *Ligusticum grayi*. *Erythronium montanum* may be dominant.

Classification Comments: This association is distinguished from similar types by having >5% cover of *Valeriana sitchensis*, *Luzula hitchcockii* (= *glabrata* var. *hitchcockii*), *Arnica latifolia*, and/or *Rubus lasiococcus*, and little to no *Abies amabilis*, *Tsuga heterophylla*, *Tsuga mertensiana*, *Rhododendron albiflorum* (< 10%), *Vaccinium membranaceum* (< 5%), *Vaccinium scoparium*, or *Phyllodoce empetriformis*. Crawford et al. (2009) suggested that *Abies lasiocarpa* parklands with sparse understories of *Valeriana sitchensis* and/or *Arnica latifolia* may fit a new *Abies lasiocarpa* / *Polemonium pulcherrimum - Pedicularis racemosa* Woodland concept. Plots assigned to that provisional association were too diverse to support the concept. Most of those plots are included here as sparser variation (with many of the same species). Other plots with prominent *Juniperus communis*, *Vaccinium scoparium*, and/or *Paxistima myrsinites*) were better fits for associations in A3729. Crawford et al. (2009) also included separate ABILAS/VERVIR and ABILAS/ERYMON associations, but additional sampling indicates that these represent small patches of variation within the unified concept presented here. East Cascades stands with prominent *Gymnocarpium dryopteris* (> 5%) may represent occurrences of *Abies lasiocarpa* / *Gymnocarpium dryopteris* Riparian Forest (CEGL002611). This is a poorly defined “xeroriparian” type that is further removed from ground and surface water than typical riparian areas. If present in the parks, these types are treated here as moist inclusions within upland forests. Xeroriparian communities have many of the same plants as neighboring upland types, but with denser vegetation and larger individual plants associated with more plentiful water. *Abies lasiocarpa* / *Rubus lasiococcus* Riparian Forest (CWWA000278) is another “xeroriparian” community treated here as variation in ABILAS/VALSIT-RUBLAS.

Conservation Status Rank: G3/S3

Rank Justification: This type occupies a limited range in fairly specific climates (relatively dry for high-elevation western Washington). Most occurrences have likely not declined, remain in good condition, and do not face significant near-term threats. Climate change will likely have impacts.

Synonyms:

Abies lasiocarpa / *Rubus lasiococcus* Association (John et al., 1988; Lillybridge et al., 1995; Kovalchik, 2001)

Abies lasiocarpa / *Valeriana sitchensis - Luzula glabrata* var. *hitchcockii* (Meidinger et al., 2005) [PNWCOAST_033]

Abies lasiocarpa / *Valeriana sitchensis* Association (Henderson et al., 1992; Bourgeron & Engelking, 1994)

Abies lasiocarpa / *Valeriana sitchensis* Forest (Henderson et al., 1979; Crawford et al., 2009)

> *Abies lasiocarpa* / *Veratrum viride* Woodland (Crawford et al., 2009)
> *Abies lasiocarpa* / *Erythronium montanum* Forest (Crawford et al., 2009)

Abies lasiocarpa - (*Callitropsis nootkatensis*) Subalpine Scrub

Subalpine Fir - (Alaska-cedar) Subalpine Scrub



Abbrev: ABILAS-(CALNOO)

EL Code: CEGL008259

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Tsuga mertensiana - Abies amabilis - Callitropsis nootkatensis* Tree Island

Range: Documented in the Olympic Mountains and throughout the Washington Cascades. It likely also occurs in Oregon and British Columbia.

Plots: MORA (4), NOCA (4), OLYM (10), Other (1)

Environmental Description: These scrubby shrublands occur at subalpine to alpine elevations (1700 to >2200 m) on moderate to exceedingly steep (7-53° slope) frequently southwest-facing aspects (203° average aspect) on well-drained soils or fractured bedrock.

Vegetation Description: These shrublands are similar to—but do not fit the structure of—traditional mat-forming krummholz stands of the high Rocky Mountains and elsewhere. Upright trees may be present, but are often "flagged", and the overall physiognomy is characteristically stunted and shrub-form due to the harsh, wind-scoured, rocky sites on which they occur. Trees exceeding 5m average 9% cover, while stunted trees average 45%. Shrubs average only 1% cover, while subshrubs are more common (7% average cover). The herb layer is typically sparse, averaging 13% cover (primarily forbs). Mosses are rarely present in measurable amounts. Stunted *Abies lasiocarpa* and/or *Callitropsis* (= *Cupressus*) *nootkatensis* dominate. *Picea engelmannii* is absent. Understory vegetation is variable. Subalpine occurrences with relatively greater soil development may have species typical of subalpine meadows (*Phyllodoce empetriformis*, *Lupinus latifolius*, *Vaccinium deliciosum*), while harsher alpine sites are shorter and more sparsely vegetated, with *Juniperus communis*, *Phyllodoce glanduliflora*, and *Cassiope mertensiana*.

Classification Comments: Relative to CALNOO-(ACECIR-PAXMYR), this association has greater cover from *Juniperus communis*, *Phyllodoce empetriformis*, *Cassiope mertensiana*, and *Phlox diffusa*. This association is similar floristically to ABILAS-(PINCON)/LUPARC (CEGL000316) (on the dry end) and ABILAS/VALSIT-LUZGLA where there is sufficient soil development and snowpack for a lush herb layer. This association concept includes the *Cupressus nootkatensis* Krummholz type mentioned as a variant in Crawford et al. 2009.

Conservation Status Rank: GNR/S3

Rank Justification: Occurs within a restricted range and ecological amplitude in Washington, with few known. Climate change may affect this vegetation.

Synonyms:

Abies lasiocarpa Krummholz Shrubland (Crawford et al., 2009)

Callitropsis nootkatensis - (*Acer circinatum - Paxistima myrsinites*) Subalpine Scrub

Alaska-cedar - (Vine Maple - Oregon Boxleaf) Subalpine Scrub



Abbrev: CALNOO-(ACECIR-PAXMYR)

EL Code: CEGL008256

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Tsuga mertensiana - Abies amabilis - Callitropsis nootkatensis* Tree Island

Range: Documented in the North Cascades and at Mount Rainier. It may also be present elsewhere in the range of *Callitropsis* (= *Cupressus*) *nootkatensis* (Oregon, British Columbia, and Alaska)

Plots: NOCA (6)

Environmental Description: Occurs at mid-montane to subalpine elevations (1000 to 1500 m) on steep (33° average slope) frequently southeast-facing aspects (130° average). Sites are typically avalanche chutes or high-elevation debris aprons/talus fields consisting of large colluvium.

Vegetation Description: Scrubby *Callitropsis* (= *Cupressus*) *nootkatensis* dominates an extremely open canopy, with most individuals in shrub form. Typically, few other shrubs are present, although *Acer circinatum*, *Alnus viridis*, and *Paxistima myrsinites* may be prominent. *Oplopanax horridus* may occur in small amounts. Moss cover is typically high, but the herb layer is otherwise sparse, with *Lilium columbianum*, *Cryptogramma acrostichoides*, and *Moehringia macrophylla* most frequent.

Classification Comments: This association includes plots originally assigned to a provisional *Cupressus nootkatensis* / *Streptopus lanceolatus* var. *curvipes* Forest in Crawford et al. (2009). Additional sampling broadened and clarified the concept, necessitating the name change. Relative to ABILAS-(CALNOO), this association has greater cover from *Acer circinatum*. CALNOO/OPLHOR occurs in wetter avalanche chutes, usually with a denser accompanying shrub layer and a much richer herb layer (especially *Erythronium montanum*, *Clintonia uniflora*, *Rubus spectabilis*, *Spiraea splendens*, *Maianthemum stellatum*, and *Tiarella trifoliata*). That type also has much less *Acer circinatum*, *Paxistima myrsinites*, and *Taxus brevifolia*.

Conservation Status Rank: GNR/SNR

Rank Justification: This association has not been ranked. *Callitropsis* (= *Cupressus*) *nootkatensis* is vulnerable to changes in winter snowpack driven by climate change.

Synonyms:

> *Cupressus nootkatensis* / *Streptopus lanceolatus* var. *curvip*es Forest (Crawford et al., 2009)

***Tsuga mertensiana - Abies lasiocarpa* / *Vaccinium deliciosum - Phyllodoce empetriformis* Woodland**

Mountain Hemlock - Subalpine Fir / Cascade Bilberry - Pink Mountain-heath Woodland



Abbrev: TSUMER-ABILAS/VACDEL-PHYEMP

EL Code: CEGL005583

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Tsuga mertensiana - Abies amabilis - Callitropsis nootkatensis* Tree Island

Range: Occurs in the Washington Cascades and Olympic Mountains and may also occur in British Columbia.

Plots: MORA (15), NOCA (20), OLYM (31), Other (13)

Environmental Description: Occurs in subalpine parklands from (1300 to 1850 m). This association is absent from the driest climatic areas of the Olympics and Cascades, such as the northeast Olympics and northeastern Mount Rainier.

Vegetation Description: This association typically occurs as a mosaic of tree clumps, small patches of forest or woodland, and dwarf-shrub openings. The tree canopy is usually dominated by *Abies lasiocarpa*, with *Tsuga mertensiana* ranging from merely present to codominant. *Abies amabilis* is often present. *Callitropsis* (= *Cupressus*) *nootkatensis* can be present to prominent, typically as a tall shrub. *Vaccinium membranaceum* and *Rhododendron albiflorum* often occur directly under trees. The well-developed dwarf-shrub layer is codominated by *Vaccinium deliciosum* and/or *Phyllodoce empetriformis*. The herb layer can include *Luzula hitchcockii* (= *glabrata* var. *hitchcockii*), *Lupinus latifolius* (= *arcticus*), *Arnica latifolia*, and *Valeriana sitchensis*.

Classification Comments: TSUMER/PHYEMP-VACDEL is similar, but typically has prominent to codominant *Abies amabilis*. PHYEMP-VACDEL is a dwarf-shrubland association that shares many of the same understory species. Forb-dominated stands with little or no shrub layer may represent occurrences of *Tsuga mertensiana - Abies lasiocarpa* / *Eucephalus ledophyllus - Lupinus arcticus* ssp. *subalpinus* Woodland (CEGL007372), which has yet to be documented in the Washington national parks.

Conservation Status Rank: GNR/S3S4

Rank Justification: Occurs throughout the high elevations of western Washington mountain ranges.

Synonyms:

Tsuga mertensiana - Abies lasiocarpa / *Vaccinium deliciosum - Phyllodoce empetriformis* Woodland (Crawford et al., 2009)

Tsuga mertensiana - Abies lasiocarpa / *Vaccinium deliciosum - Phyllodoce empetriformis* Woodland (Meidinger et al., 2005) [PNWCOAST_301]

Tsuga mertensiana / *Phyllodoce empetriformis* - *Vaccinium deliciosum* Woodland

Mountain Hemlock / Pink Mountain-heath - Cascade Bilberry Woodland



Abbrev: TSUMER/PHYEMP-VACDEL

EL Code: CEGL005579

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Tsuga mertensiana* - *Abies amabilis* - *Callitropsis nootkatensis* Tree Island

Range: Occurs in the western Cascades and Olympic Mountains in Washington, as well as western Oregon and British Columbia.

Plots: MORA (2), NOCA (72), OLYM (46), Other (1)

Environmental Description: Occurs at high elevations (1100 to 1750 m), but absent from dry climatic areas including the northeastern Olympics and northeastern Mount Rainier.

Vegetation Description: This association typically occurs as a mosaic of tree clumps or small patches of forest or woodland with dwarf-shrub openings. It may also occur as a contiguous upper montane woodland just below subalpine parklands. *Tsuga mertensiana* dominates the canopy and *Abies amabilis* is usually present to prominent. *Abies lasiocarpa* is usually absent or relatively minor compared to other trees. *Vaccinium ovalifolium* (= *alaskaense*), *Rhododendron albiflorum* or *Vaccinium membranaceum* are usually present and often have substantial cover around the bases of trees. Dwarf-shrubs dominate the understory vegetation. *Phyllodoce empetriformis* and *Vaccinium deliciosum* dominate and *Cassiope mertensiana* and *Luetkea pectinata* may be prominent.

Classification Comments: TSUMER-ABILAS/VACDEL-PHYEMP has less Abies amabilis and has prominent to codominant Abies lasiocarpa. PHYEMP-VACDEL shares understory species, but that is a dwarf-shrubland association. Xerophyllum tenax is characteristically absent from this association.

Conservation Status Rank: G4/S3S4

Rank Justification: Occurs within a narrow environmental range with few known, though climate change will likely affect this vegetation.

Synonyms:

Tsuga mertensiana / *Phyllodoce empetriformis* - *Vaccinium deliciosum* Woodland (Crawford et al., 2009)

Tsuga mertensiana / *Phyllodoce empetriformis* - *Vaccinium deliciosum* Woodland (Meidinger et al., 2005) [PNWCOAST_286]

Tsuga mertensiana Krummholz

Mountain Hemlock Krummholz



Abbrev: TSUMER

EL Code: CEGL005578

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Tsuga mertensiana - Abies amabilis - Callitropsis nootkatensis* Tree Island

Range: Occurs in the Olympic Mountains and Cascades, except in the rain shadow areas of the northeastern Olympics and northeastern parts of Mount Rainier. The range extends into British Columbia.

Plots: MORA (1), NOCA (1), OLYM (8)

Environmental Description: Near upper treeline in the upper subalpine parkland and the lower alpine zones.

Vegetation Description: These are conifer shrublands occurring as small patches of wind-blasted shrub-form (krummholz) trees dominated by *Tsuga mertensiana*. Upright trees may be present, but are often “flagged”, and the overall physiognomy is characteristically stunted and shrub-form due to the harsh, wind-scoured, rocky sites on which they occur. Other high elevation tree species may occur in lesser amounts. Associated shrubs, dwarf-shrubs, and herbs are somewhat variable. *Vaccinium deliciosum*, *Vaccinium membranaceum*, *Phyllodoce empetriformis*, and *Cassiope mertensiana* are frequent.

Classification Comments:

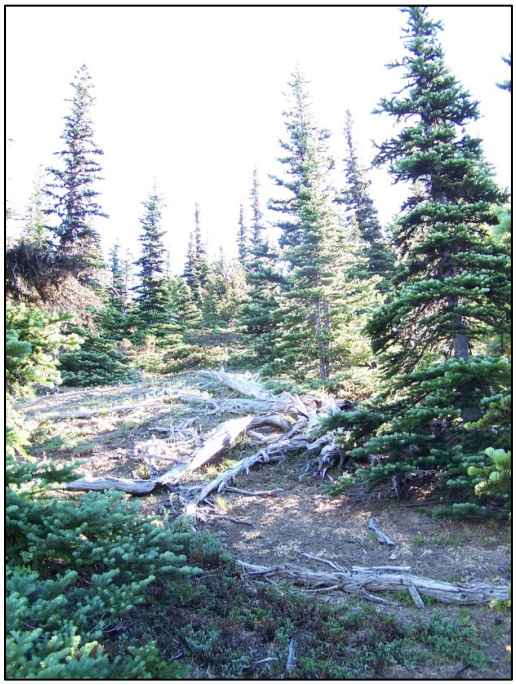
Conservation Status Rank: GNR/S3S4

Rank Justification: Occurs within a restricted geographic range and ecological amplitude in Washington, with few known. Climate change may affect this vegetation.

Synonyms:
Tsuga mertensiana Krummholz Shrubland (Crawford et al., 2009)
Tsuga mertensiana Krummholz Shrubland (Meidinger et al., 2005) [PNWCOAST_280]

***Abies lasiocarpa* - (*Pinus contorta*) / *Juniperus communis* - *Lomatium martindalei* Woodland**

Subalpine Fir - (Lodgepole Pine) / Common Juniper - Cascade Desert-parsley Woodland



Abbrev: ABILAS-(PINCON)/JUNCOM-LOMMAR

EL Code: CEGL005638

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Abies lasiocarpa - Picea engelmannii* / *Rubus lasiococcus* Cascadian Forest

Range: Restricted to the northeastern Olympic Mountains.

Plots: OLYM (8)

Environmental Description: High elevation (1550 to 2000 m) ridgetops or southwest-facing slopes, with shallow, well-drained soils.

Vegetation Description: The canopy is dominated by *Pinus contorta* and/or *Abies lasiocarpa*. *Abies lasiocarpa* usually dominates tree regeneration and typically has over 10% total cover. *Pseudotsuga menziesii* is sometimes present to prominent. A dwarf-shrub layer dominated by *Juniperus communis* is characteristic. Other shrubs and dwarf-shrubs are sparse or absent. The rather sparse herb layer usually has *Lomatium martindalei*, *Phlox diffusa*, *Achillea millefolium*, *Penstemon procerus*, *Carex rossii*, *Festuca roemeri*, and *Orthilia secunda*. *Lupinus latifolius* (= *arcticus*) is occasionally prominent but always less abundant than *Juniperus communis*.

Classification Comments: This type is similar to ABILAS-PICENG/JUNCOM (CEGL000919, not part of this classification), but has Cascadian indicators such as *Lomatium martindalei* and F*estuca roemeri*.

Conservation Status Rank: G2G3/S2S3

Rank Justification: Apparently represented at few sites in protected areas. Threats are few, although climate change will likely affect this vegetation.

Synonyms:

Abies lasiocarpa - (*Pinus contorta*) / *Juniperus communis* - *Lomatium martindalei* Woodland (Meidinger et al., 2005) [PNWCOAST_034]

Abies lasiocarpa - (*Pinus contorta*) / *Juniperus communis* - *Lomatium martindalei* Woodland (Crawford et al., 2009)

Abies lasiocarpa - (*Pinus contorta*) / *Lupinus arcticus* ssp. *subalpinus* Woodland

Subalpine Fir - (Lodgepole Pine) / Subalpine Lupine Woodland



Abbrev: ABILAS-(PINCON)/LUPARC

EL Code: CEGL000316

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Abies lasiocarpa - Picea engelmannii* / *Rubus lasiococcus* Cascadian Forest

Range: Restricted to a very small area in the northeastern Olympic Mountains of Washington.

Plots: OLYM (9)

Environmental Description: Occurs on dry upper slopes and ridgetops on southwestern aspects from 1500 to 2000 m elevation within the driest portion of the Olympic rain shadow.

Vegetation Description: The upper canopy of these woodlands and open forests is relatively short and dominated by *Abies lasiocarpa*. *Pinus contorta* can be dominant or codominant. Shrubs are usually absent, although the dwarf-shrub *Juniperus communis* is occasionally prominent. The herb layer is dominated by *Lupinus latifolius* (= *arcticus*), which has an average cover of 15%, and occasionally codominated by *Arnica cordifolia*. Other frequent understory species that occur with low cover are *Paxistima myrsinites*, *Lomatium martindalei*, *Orthilia secunda*, *Hieracium albiflorum*, and *Valeriana sitchensis*.

Classification Comments: This association is distinguished from similar types by having >3% cover of *Lupinus latifolius* (= *arcticus*) and little to no *Abies amabilis*, *Tsuga heterophylla*, *Tsuga mertensiana*, *Rhododendron albiflorum* (< 10%), *Vaccinium membranaceum* (< 5%), *Valeriana sitchensis* and *Luzula hitchcockii* (= *glabrata* var. *hitchcockii*) (< 3%). Open stands with shrub layers dominated by *Vaccinium ovalifolium* (= *alaskaense*) or *Sorbus sitchensis* may represent occurrences of the *Abies lasiocarpa* / *Vaccinium ovalifolium* (*alaskaense*) / *Lupinus* (*arcticus*, *latifolius*) Woodland type proposed in Crawford et al. (2009).

Conservation Status Rank: G2/S2

Rank Justification: This type has a very limited geographic and environmental range. Most occurrences have likely not declined, remain in good condition, and do not face significant near-term threats, though climate change will likely have impacts on composition.

Synonyms:

Abies lasiocarpa - (*Pinus contorta*) / *Lupinus* (*arcticus*, *latifolius*) Woodland (Crawford et al., 2009)

Abies lasiocarpa - (*Pinus contorta*) / *Lupinus arcticus* ssp. *subalpinus* Woodland (Meidinger et al., 2005) [PNWCOAST_029]

Abies lasiocarpa / *Lupinus latifolius* (Bourgeron & Engelking, 1994)

Abies lasiocarpa / *Lupinus latifolius* Association (Henderson et al., 1989)

Abies lasiocarpa / *Phyllodoce empetriformis* Woodland

Subalpine Fir / Pink Mountain-heath Woodland



Abbrev: ABILAS/PHYEMP

EL Code: CEGL000920

Macrogroup: Vancouverian Subalpine-High Montane Forest

Group: North-Central Pacific Mountain Hemlock - Silver Fir Woodland

Alliance: *Abies lasiocarpa - Picea engelmannii* / *Rubus lasiococcus* Cascadian Forest

Range: Occurs on isolated high peaks in the Okanogan Highlands in Washington and adjacent British Columbia and may also occur in the eastern North Cascades.

Plots: n/a

Environmental Description: Occurs on cold, dry, montane sites between 2000 and 2150 m elevation. Sites are typically upper slopes, with north aspects.

Vegetation Description: The tree canopy is codominated by *Abies lasiocarpa* and *Picea engelmannii* and *Pinus albicaulis* or *Pinus contorta* may be present. The shrub layer is patchy, but dense, and codominated by *Phyllodoce empetriformis* and *Vaccinium scoparium*. Herbaceous species are rare to absent, though lichens are common.

Classification Comments: Crawford et al. (2009) proposed changing this association's name to *Abies lasiocarpa - Picea engelmannii* / *Phyllodoce empetriformis* Woodland. This association remains absent from data sets from Washington's national parks, though it remains a possibility on the eastern margins of NOCA. 3 plots from MORA that were originally assigned to this association during map training data collection, but these were later reassigned to ABILAS-(CALNOO) (due to krummholz stature) or ABILAS-(CALNOO)/VACSCO/VALSIT (due to higher herbaceous cover).

Conservation Status Rank: G4Q/S3S4

Rank Justification: This association occurs within a restricted range, but with few known. Climate change will likely affect this type.

Synonyms:
Abies lasiocarpa - Picea engelmannii / *Phyllodoce empetriformis* (Chappell, 2006a)
Abies lasiocarpa / *Phyllodoce empetriformis* (Clausnitzer & Zamora, 1987)
Abies lasiocarpa / *Phyllodoce empetriformis* Plant Association (Williams & Lillybridge, 1983)
Abies lasiocarpa - Picea engelmannii / *Phyllodoce empetriformis* Woodland (Crawford et al., 2009)

***Pseudotsuga menziesii - Abies grandis* / *Mahonia nervosa - Gaultheria shallon* / *Polystichum munitum* Forest**

Douglas-fir - Grand Fir / Cascade Barberry - Salal / Western Swordfern Forest



Abbrev: PSEMEN-ABIGRA/MAHNER-GAUSHA/POLMUN

EL Code: CEGL005634

Macrogroup: Southern Vancouverian Dry Foothill Forest & Woodland

Group: Southern Vancouverian Dry Douglas-fir - Madrone Woodland

Alliance: *Pseudotsuga menziesii - Abies grandis - Arbutus menziesii* Forest & Woodland

Range: This association is found in the foothills surrounding the Willamette Valley in Oregon and can infrequently occur as far north as the Olympic Mountains.

Plots: OLYM (1)

Environmental Description: The plot representing this association in the Olympics was located on a southwest-facing terrace at 300 m (980 feet) elevation on a dry topographic position.

Vegetation Description: This type has a canopy *Pseudotsuga menziesii* and *Abies grandis* with *Tsuga heterophylla* present. Typically, *Abies grandis* and *Acer macrophyllum* dominate below the main canopy. *Acer circinatum* and *Mahonia nervosa* dominate the shrub layer. *Achlys californica*, *Achlys triphylla*, and *Polystichum munitum* are prominent indicators in the herb layer. As described in Oregon, this association often has *Gaultheria shallon* and *Corylus cornuta* in the shrub layer. Ground mosses are prominent.

Classification Comments:

Conservation Status Rank: GNR/SU

Rank Justification: There is insufficient information to rank this association in Washington.

Synonyms:

Abies grandis / *Mahonia nervosa* - *Gaultheria shallon* - PNW (McCain & Diaz, 2002)

Pseudotsuga menziesii - *Abies grandis* / *Mahonia nervosa* - *Gaultheria shallon* / *Polystichum munitum* (Meidinger et al., 2005) [PNWCOAST_155]

Pseudotsuga menziesii - *Abies grandis* / *Mahonia nervosa* - *Gaultheria shallon* / *Polystichum munitum* Forest (Crawford et al., 2009)

***Pseudotsuga menziesii* / *Holodiscus discolor - Rosa gymnocarpa* / *Festuca occidentalis* Forest**

Douglas-fir / Oceanspray - Dwarf Rose / Western Fescue Forest



Abbrev: PSEMEN/HOLDIS-ROSGYM/FESOCC

EL Code: CEGL000456

Macrogroup: Southern Vancouverian Dry Foothill Forest & Woodland

Group: Southern Vancouverian Dry Douglas-fir - Madrone Woodland

Alliance: *Pseudotsuga menziesii - Abies grandis - Arbutus menziesii* Forest & Woodland

Range: Restricted to the northern Puget Lowlands of Washington and the northeastern Olympic Mountains.

Plots: MORA (1), NOCA (2), OLYM (25), Other (26)

Environmental Description: Occurs on warm, dry sites in the Olympic rain shadow precipitation < ~100 cm/year. Temperatures are nearly continental in their seasonal variation. Winter snowpacks are light and transient and there is a pronounced summer drought. Stands occur on southwestern to southeastern aspects, on steep slopes or ridgetops, with convex topography. Elevations range from 350 to 1300 m. Soils are derived from stony colluvium and are shallow and well-drained. Textures are sandy loams, loamy sands, or sand, with abundant rocks, cobbles, and/or gravel.

Vegetation Description: These forests or woodlands are dominated by *Pseudotsuga menziesii* and shrubs typically dominate the understory. *Abies grandis* and *Tsuga heterophylla* can occur, but at low cover. *Holodiscus discolor* usually dominates the tall shrub layer, with *Mahonia nervosa* dominant beneath. *Rosa gymnocarpa* is always present (6% average cover). The herb layer is open and usually dominated by grasses, particularly *Festuca occidentalis*, *Bromus vulgaris*, and/or *Melica subulata*. Frequent herbs include *Lysimachia* (= *Trientalis*) *latifolia*, *Galium aparine*, *Moehringia microphylla*, and *Polystichum munitum* (always < 5%). *Achlys triphylla*, *Adenocaulon bicolor*, *Goodyera oblongifolia*, *Linnaea borealis*, *Chimaphila umbellata*, *Osmorhiza berteroi*, *Amelanchier alnifolia*, and *Hieracium albiflorum* may also occur.

Classification Comments: PSEMEN/HOLDIS/CALRUB may appear to be similar, but it is characterized by Rocky Mountain species such as *Pinus ponderosa*, *Calamagrostis rubescens*, and *Spiraea lucida* (= *betulifolia*). This association is distinguished from similar ones by >1% cover of *Rosa gymnocarpa* or *Festuca occidentalis*, combined with<10% cover of *Symphoricarpos albus*, *Gaultheria shallon*, *Tsuga heterophylla*, *Thuja plicata*, and *Abies grandis*, <20% cover of *Arbutus menziesii*, and <5% cover of *Polystichum munitum*.

Conservation Status Rank: G2G3/S2

Rank Justification: Occurs in a restricted geographic and r environmental range. Few lowland occurrences have evaded timber harvest. Foothill stands are more abundant and less disturbed.

Synonyms:

Pseudotsuga menziesii / *Holodiscus discolor - Rosa gymnocarpa* (Henderson et al., 1989)

Pseudotsuga menziesii / *Rosa gymnocarpa - Holodiscus discolor* (Chappell, 2006a)

Pseudotsuga menziesii / *Holodiscus discolor - Rosa gymnocarpa* / *Festuca occidentalis* (Meidinger et al., 2005) [PNWCOAST_127]

Pseudotsuga menziesii / *Holodiscus discolor - Rosa gymnocarpa* / *Festuca occidentalis* Forest (Crawford et al., 2009)

Pseudotsuga menziesii / *Rosa gymnocarpa - Holodiscus discolor* (Bourgeron & Engelking, 1994)

Picea engelmannii / Equisetum arvense Swamp Forest

Engelmann Spruce / Field Horsetail Swamp Forest

Abbrev: PICENG/EQUARV

EL Code: CEGL005927

Macrogroup: Rocky Mountain-Great Basin Montane Riparian & Swamp Forest

Group: Rocky Mountain-Great Basin Swamp Forest

Alliance: *Picea engelmannii* Swamp Forest, p. B-5

Range: This association occurs in the East Cascades and Central Rocky Mountains

Plots: Other (16)

Environmental Description: This association occurs in depressional and seepage swamps, as well as along low-gradient, meandering streams. Elevations range from 750 to 1500 m. Soils vary from mineral (e.g. loam with deep A horizons) to organic.

Vegetation Description: The forest or woodland canopy is usually dominated by *Picea engelmannii*, often with *Abies lasiocarpa*. The shrub layer is poorly developed, with occasional patches of *Alnus incana*, *Ribes lacustre*, or a wide variety of other wetland shrubs. *Equisetum arvense* is the dominant (> 10% cover) understory species, often with few other forbs present. *Carex disperma* and/or *Calamagrostis canadensis* sometimes codominate. *Maianthemum stellatum*, *Streptopus amplexifolius*, *Galium triflorum*, and/or *Cornus unalaschkensis* are usually present.

Classification Comments: This type was not documented during map training data collection, but it is still quite likely to occur in eastern NOCA.

Conservation Status Rank: G4/S3

Rank Justification: Occurs at numerous sites in Washington, but is poorly represented in protected areas. Direct and indirect hydrologic changes, such as road construction, can negatively affect these communities.

Synonyms:
Abies lasiocarpa - Picea engelmannii / *Equisetum arvense* (Kittel et al., 1999)
Abies lasiocarpa - Picea engelmannii / *Equisetum arvense* Forest (Carsey et al., 2003)
Picea engelmannii / *Equisetum arvense - Streptopus* (Kovalchik, 1987)
Picea engelmannii / *Equisetum arvense* (Crowe & Clausnitzer, 1997)
Picea engelmannii / *Equisetum arvense* Association (Kovalchik, 1993; Crowe et al., 2004)
Picea engelmannii / *Equisetum arvense* Community (Huckaby & Moir, 1998)
Picea engelmannii / *Equisetum arvense* Forest (Hop et al., 2007; Crawford et al., 2009)
Picea engelmannii / *Equisetum* Association (Williams et al., 1995)
Picea engelmannii / *Equisetum* Plant Association (Williams & Lillybridge, 1983)
Picea pungens - Picea engelmannii / *Equisetum arvense* Plant Association (Johnston, 1987)

Thuja plicata - Tsuga heterophylla / *Oplopanax horridus* Rocky Mountain Swamp Forest

Western Red-cedar - Western Hemlock / Devil's-club Rocky Mountain Swamp Forest



Abbrev: THUPLI-TSUHET/OPLHOR

EL Code: CEGL000479

Macrogroup: Rocky Mountain-Great Basin Montane Riparian & Swamp Forest

Group: Rocky Mountain-Great Basin Swamp Forest

Alliance: *Thuja plicata - Tsuga heterophylla* Rocky Mountain Swamp Forest, p. B-6

Range: Occurs in the East Cascades, eastern Okanogan Highlands, southeastern Thompson Plateau, and the Central Rocky Mountains of Washington, Idaho, and Montana. It also appears to occur in British Columbia.

Plots: NOCA (5), Other (41)

Environmental Description: Typically found in small, linear patches on toeslope seepages, wet streambank terraces, and lower benches with high water tables and cold air drainage. Occurs within moist, mild climatic regimes at low to middle elevations (650 to 1150 m in the North Cascades). This is a saturated to seasonally flooded wetland forest community usually found in a mosaic with other wetland or riparian Th*uja plicata* or *Tsuga heterophylla* types.

Vegetation Description: *Thuja plicata* and/or *Tsuga heterophylla* dominate a nearly closed-canopy forest, often with *Picea engelmannii* or *Abies grandis*. *Abies lasiocarpa*, *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*), and *Pseudotsuga menziesii* are occasionally present in the overstory, but typically with very low cover. Tall *Oplopanax horridus* occurs at varying densities; at least 5% *Oplopanax horridus* cover is diagnostic. *Acer glabrum*, *Alnus viridis*, *Rubus nutkanus* (= *parviflorus*) and *Taxus brevifolia* occur infrequently. Herb diversity is typically high and primarily composed of forbs. *Polystichum munitum* is characteristically absent. *Athyrium filix-femina* and *Gymnocarpium dryopteris* can be prominent, though *Prosartes* (= *Disporum*) *hookeri* and *Clintonia uniflora* are most common in the North Cascades. *Tiarella trifoliata*, *Actaea rubra*, *Asarum caudatum*, *Streptopus amplexifolius*, *Maianthemum stellatum*, *Viola orbiculata,* and *Osmorhiza berteroi* are often present.

Classification Comments: TSUHET-(PSEMEN)/OPLHOR/POLMUN has "maritime" species such as *Alnus rubra*, *Polystichum munitum*, *Achlys triphylla*, *Acer circinatum*, and *Vaccinium parvifolium* present and lacks eastside species such as *Picea engelmannii*, *Acer glabrum*, and *Osmorhiza berteroi*.

Conservation Status Rank: G3/S2S3

Rank Justification: This is a relatively common wetland forest type in the interior Pacific Northwest that occupies very few acres at any given location. Total estimated acreage is less than 10,000 acres (4032 ha), and perhaps much less than this. This association supports large, valuable trees and occurs on productive sites. Many of these sites have been logged thus altering community structure and site hydrology (Crawford & Reid, 2004).

Synonyms:
Thuja plicata - Tsuga heterophylla / *Oplopanax horridum* (Daubenmire, 1952)
Thuja plicata / *Oplopanax horridum* Association (Kovalchik, 1993)
Thuja plicata / *Oplopanax horridum* Habitat Type (Pfister et al., 1977; Hansen et al., 1995)
Thuja plicata / *Oplopanax horridus* Habitat Type (Cooper et al., 2006)

Populus tremuloides / *Symphoricarpos albus* Riparian Forest

Quaking Aspen / Common Snowberry Riparian Forest



Abbrev: POPTRE/SYMALB

EL Code: CEGL000609

Macrogroup: Rocky Mountain-Great Basin Montane Riparian & Swamp Forest

Group: Rocky Mountain-Great Basin Montane Riparian Forest

Alliance: *Populus tremuloides* Riparian Forest Alliance, p. B-7

Range: Known from western Montana, western Wyoming, and north-central Washington, including the North Cascades

Plots: NOCA (1)

Environmental Description: Occurs in small patches in moist settings, such as riparian terraces, or near marshes or wet meadows. The single NCCN plot occurs at 350 m elevation on a nearly flat, northeast-facing slope.

Vegetation Description: This is a moist, low-lying aspen forest, distinguished by an abundant layer of *Symphoricarpos albus*. The overstory canopy is dominated by *Populus tremuloides*. Conifers when present are low in abundance and may include *Pinus contorta*, *Larix occidentalis*, *Pinus ponderosa*, or *Pseudotsuga menziesii*. Tall shrubs may be present but do not form a distinct layer, with *Amelanchier alnifolia* and sapling *Populus tremuloides*. The short-shrub layer is distinct, with *Symphoricarpos albus* the dominant. Other low-stature shrubs include *Rosa woodsii* and *Mahonia* spp. The herb layer is diverse with many grasses and forbs. Graminoids include *Achnatherum nelsonii*, *Elymus trachycaulus*, *Phleum pratense*, and *Poa pratensis*. Forbs include *Actaea rubra*, *Helianthella uniflora*, *Lupinus sericeus*, and *Symphyotrichum spathulatum*. The single plot documented from the North Cascades has prominent *Acer macrophyllum* and *Abies grandis* in the overstory and a distinct tall shrub/understory tree layer dominated by *Cornus nuttallii*. *Rubus nutkana* (= *parviflora*) is prominent, with *Acer circinatum* also present, and *Symphoricarpos albus* contributing only 3% cover. In addition to *Actaea rubra*, *Trillium ovatum*, *Pteridium aquilinum*, *Athyrium filix-femina*, *Viola glabella*, and *Clintonia uniflora* are present in the herb layer.

Classification Comments: POPTRE-PAXMYR is also dominated by *Populus tremuloides*, but it is a shrubland association that occurs on talus. This association was moved from an upland division to this riparian alliance during WNHP's alliance review.

Conservation Status Rank: G3?/S2

Rank Justification:

Synonyms:
Populus tremuloides / *Symphoricarpos albus* Temporarily Flooded Forest (Crawford, 2003)
Populus tremuloides / *Symphoricarpos albus* (Kovalchik & Clausnitzer, 2004)
Populus tremuloides / *Symphoricarpos albus* Association (Crowe et al., 2004)
Populus tremuloides / *Symphoricarpos albus* Plant Association (Williams & Lillybridge, 1983)
Populus tremuloides / *Cornus nuttallii* Forest (Crawford et al., 2009)

Populus balsamifera ssp. *trichocarpa* / *Cornus sericea* Riparian Forest

Black Cottonwood / Red-osier Dogwood Riparian Forest



Abbrev: POPBAL/CORSER

EL Code: CEGL000672

Macrogroup: Rocky Mountain-Great Basin Montane Riparian & Swamp Forest

Group: Northern Rocky Mountain Lowland-Foothill Riparian Forest

Alliance: *Populus balsamifera* ssp. *trichocarpa* Northern Rocky Mountain Riparian Forest, p. B-9

Range: Occurs from the East Cascades of Washington south to northern California and eastward to Idaho, Montana, and Wyoming. It also occurs north along the Front Range of Montana into southern Alberta.

Plots: NOCA (13)

Environmental Description: Occurs from 350 to 1050 m elevation in Washington, on alluvial terraces of major rivers and streams, point bars, side bars, mid-channel bars, delta bars, and an occasional lake or pond margin, It may also creep onto toeslopes and lower subirrigated slopes of hilly or mountainous terrain. Stands occasionally occur on upper positions of moderate to steep toeslopes and colluvial fans at the base of avalanche chutes or erosional gullies, where they are subject to avalanche or flash flood disturbance. Many of these sites are flooded in the spring and dry deeply by summer's end; capillary action keeps upper portions of the soil profile moist. Soils are deep loams, often over gravels.

Vegetation Description: The canopy is dominated by *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*). Several conifer species can be present with low cover (2-10%) in the upper canopy or as young saplings and are never consistently present. Conifers include *Tsuga heterophylla*, *Abies lasiocarpa*, *Pseudotsuga menziesii*, and *Picea engelmannii*. *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*) dominates a well-developed tall-shrub layer. Other shrubs may include *Symphoricarpos albus*, *Ribes* spp., *Rosa* spp., *Salix* spp., and /or *Amelanchier alnifolia*. *Maianthemum stellatum* and *Elymus glaucus* are frequent herbaceous associates in Washington and *Calamagrostis canadensis*, *Glyceria striata*, *Galium* spp., and/or *Equisetum* spp. may also be present.

Classification Comments: All NOCA stands of *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*) and a shrub layer dominated by *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*) represent occurrences of this association. *Populus balsamifera* ssp. *trichocarpa* / *Alnus incana* Forest (CEGL000667) is a similar association that has not been documented in the national parks. POPBAL-ALNRUB/RUBSPE is a similar association that occurs in western Washington. The shrub layer in that association is dominated by *Rubus spectabilis*, rather than *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*).

Conservation Status Rank: G3G4/S2S3

Rank Justification: Dams and diversions have altered annual flooding and scouring events, thereby decreasing depositional floodplain features required for the establishment of *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*). A thorough crosswalk of this type across its range of distribution is needed; there may be local variations in composition and ecology that would bear recognition of separate associations. Threats to this type include floodplain harvesting of cottonwood and over-browsing from livestock and wildlife, which both find *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*) extremely palatable to the point of extirpating it from local floodplain landscapes. The more serious over-browsing consequences are reduced diversity, the introduction of weedy species, and the increase in unpalatable native taxa such as *Symphoricarpos occidentalis*, *Ribes* spp., and *Urtica dioica* (Cooper & Kittel, 2004).

Synonyms:

Populus balsamifera ssp. *trichocarpa* / *Cornus sericea* Forest (Crawford et al., 2009)
Populus balsamifera ssp. *trichocarpa* / *Cornus sericea* Temporarily Flooded Forest (Crawford, 2003)
Populus trichocarpa / *Cornus stolonifera* Community Type (Hansen et al., 1995; Hall & Hansen, 1997)
Populus trichocarpa / *Cornus stolonifera* Forest (Evans, 1989; Kovalchik, 1993)
Black Cottonwood - Engelmann Spruce / Mountain Alder - Red-Osier Dogwood Community Type (Kovalchik, 1987)

Alnus rubra / Alluvial Bar Riparian Forest

Red Alder Alluvial Bar Riparian Forest



Abbrev: ALNRUB ALLUVIAL

EL Code: CWWA000300

Macrogroup: Rocky Mountain-Great Basin Montane Riparian & Swamp Forest

Group: Northern Rocky Mountain Lowland & Foothill Riparian Forest

Alliance: *Alnus rhombifolia* - *Alnus rubra* Interior Swamp & Riparian Forest, p. B-10

Range: In Washington, this association primarily occurs in mountainous areas east of the Cascade Crest, but it may also occur in western Washington.

Plots: Other (5)

Environmental Description: These are early-seral communities on low- to moderate-gradient rivers and streams of wide canyons and U-shaped valleys at low (below lower treeline) to mid-montane elevations. Stands usually form on cobble-rich alluvial bars, with varying amounts of gravel and boulders intermixed, overlain by thin sandy deposits. Sites are point bars, sidebars, and mid-channel bars that are flood-scoured nearly every year, with minimal deposition of sand occurring in microsites with low fluvial energy.

Vegetation Description: *Alnus rubra* dominates an extremely open tree layer, or more commonly dominates an open to moderately developed shrub layer, with or without *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*). Scattered shrubs such as *Symphoricarpos albus*, *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*), *Salix sitchensis*, or *Philadelphus lewisii* may be present. Herbs are characteristically sparse and variable, with *Anaphalis margaritacea*, *Phacelia hastata*, and weedy grasses common.

Classification Comments: SAL(MEL,SIT) is similar but is characteristically dominated by *Salix sitchensis* or *S. melanopsis*. This association is an early seral stage of deciduous floodplain forests and may develop into any number of other associations given periods without regular flooding.

Conservation Status Rank: GNR/SNR

Rank Justification: This association has not been ranked.

Synonyms:

Alnus rubra / Alluvial bar (Crowe & Clausnitzer, 1997)

Abies amabilis - Tsuga heterophylla / *Oplopanax horridus* Swamp Forest

Pacific Silver Fir - Western Hemlock / Devil's-club Swamp Forest



Abbrev: ABIAMA-TSUHET/OPLHOR

EL Code: CEGL000004

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Montane Riparian & Seepage Swamp Forest

Alliance: *Tsuga* (*mertensiana*, *heterophylla*) - *Abies amabilis* Riparian & Swamp Forest, p. B-11

Range: Occurs in the Cascades and Olympic Mountains of Oregon, Washington, and British Columbia

Plots: MORA (12), NOCA (21), OLYM (9), Other (15)

Environmental Description: Occurs at mid-montane elevations on poorly drained, shallowly subirrigated soils, usually with an underlying impermeable layer. Stands are often associated with springs, seeps, or small streams.

Vegetation Description: The canopy is characteristically dominated by *Abies amabilis* and/or *Tsuga heterophylla*, with *Thuja plicata* frequently codominant. *Abies amabilis* usually dominates tree regeneration and always has at least 10% total cover. *Pseudotsuga menziesii* is occasionally prominent to codominant. *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*) is codominant with *Abies amabilis* in one NOCA plot. *Oplopanax horridus* has at least 5% cover and dominates or codominates the shrub layer. *Vaccinium ovalifolium* (= *alaskaense*), *Rubus spectabilis*, and other shrubs may be prominent to codominant. The diverse herb layer varies in composition, but almost always has considerable *Tiarella trifoliata*, *Gymnocarpium dryopteris* and/or *Athyrium filix-femina*. Other frequent herbs are *Viola glabella*, *Clintonia uniflora*, *Trillium ovatum*, and *Streptopus lanceolatus*.

Classification Comments: ABIAMA-TSUMER/OPLHOR (CEGL000507) is a similar association that occurs at higher elevations, with codominant *Tsuga mertensiana*. It was not documented in NCCN map training plots and may be more common in British Columbia.

Conservation Status Rank: G5/S5

Rank Justification: Many natural-origin stands occur on protected lands with few known from logging and development.

Synonyms:
Abies amabilis / *Oplopanax horridum* - *Vaccinium alaskaense* (Henderson et al., 1992)
Abies amabilis / *Oplopanax horridum* (Brockway & Topik, 1984; Henderson et al., 1989)
Abies amabilis / *Oplopanax horridum* Association (Franklin et al., 1988)
Abies amabilis - *Tsuga heterophylla* / *Oplopanax horridus* (Meidinger et al., 2005) [PNWCOAST_011]
Abies amabilis - *Tsuga heterophylla* / *Oplopanax horridus* Forest (Crawford et al., 2009)
Pacific Silver Fir / Devil's Club Association (Brockway et al., 1983)
Pacific Silver Fir / Devil's-club (Hemstrom et al., 1982)

Abies amabilis / *Rubus spectabilis* - *Vaccinium alaskaense* Riparian Forest

Pacific Silver Fir / Salmonberry - Alaska Blueberry Riparian Forest



Abbrev: ABIAMA/RUBSPE-VACALA

EL Code: CWWA000200

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Montane Riparian & Seepage Swamp Forest

Alliance: *Tsuga* (*mertensiana*, *heterophylla*) - *Abies amabilis* Riparian & Swamp Forest, p. B-11

Range: Occurs in the Olympic Mountains and the West and North Cascades.

Plots: MORA (1), NOCA (5), OLYM (6), Other (3)

Environmental Description: Found at lower montane elevations, often on high river terraces that are almost never flooded, but have seasonally elevated water tables.

Vegetation Description: The canopy is dominated by *Tsuga heterophylla* and *Abies amabilis*. Tree regeneration is mainly *Tsuga heterophylla*. A dense shrub layer is dominated by *Rubus spectabilis*, with *Vaccinium ovalifolium* (= *alaskaense*) and *Rubus nutkanus* (= *parviflorus*) present in small amounts. The herb layer is well-developed, with many species. *Tolmiea menziesii*, *Viola glabella*, *Polystichum munitum*, *Tiarella trifoliata*, and *Gymnocarpium dryopteris* are frequently abundant.

Classification Comments: PSEMEN-TSUHET-(ALNRUB)/RUBSPE is similar, but has little to no *Abies amabilis*. ABIAMA-TSUHET/OPLHOR differs in having prominent *Oplopanax horridus*. Although this association often has *Oplopanax horridus* present (33% constancy), it never exceeds 5% cover, and *Rubus spectabilis* is always dominant. A similar *Abies lasiocarpa* / *Rubus spectabilis* Forest [Provisional] was included in Crawford et al. 2009, but additional data collection did not support that type.

Conservation Status Rank: GNR/S2S4

Rank Justification: There is a wide range of uncertainty about the conservation status of this association.

Synonyms:

Abies amabilis / *Rubus spectabilis* - *Vaccinium alaskaense* Riparian Forest (Crawford et al., 2009)

Callitropsis nootkatensis / *Oplopanax horridus* Swamp Forest

Alaska-cedar / Devil's-club Swamp Forest

Abbrev: CALNOO/OPLHOR

EL Code: CEGL000349

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Montane Riparian & Seepage Swamp Forest

Alliance: *Tsuga* (*mertensiana*, *heterophylla*) - *Abies amabilis* Riparian & Swamp Forest, p. B-11

Range: Occurs in the western Cascades and Olympic Mountains in Washington, as well as western Oregon and British Columbia.

Plots: OLYM (6)

Environmental Description: Documented from middle elevations (1050-1500 m), usually as avalanche-impacted scrub forest with subirrigated moist to wet soils.

Vegetation Description: These stands typically have an open canopy of short-statured trees dominated by *Callitropsis* (= *Cupressus*) *nootkatensis*, which is often no taller than co-occurring shrubs. *Abies lasiocarpa* and *Abies amabilis* are often present. The generally dense shrub layer is usually dominated by *Alnus viridis* and/or, less commonly, *Oplopanax horridus* (17% constancy in plots from OLYM). *Vaccinium membranaceum*, *Rubus spectabilis*, and *Spiraea splendens* can be prominent. The herb layer ranges from moderately sparse to moderately dense; *Erythronium montanum*, *Valeriana sitchensis*, *Veratrum viride*, *Viola glabella*, *Maianthemum stellatum*, and *Tiarella trifoliata* and many other forbs are common.

Classification Comments: CALNOO-(ACECIR-PAXMYR) typically has relatively sparse shrub and herb layers. *Acer circinatum* and *Paxistima myrsinites* are common in that type, while *Erythronium montanum*, *Rubus spectabilis*, *Spiraea splendens*, *Maianthemum stellatum*, and *Tiarella trifoliata* are not. ALNVIR-RUBSPE-(OPLHOR) is somewhat similar, but *Callitropsis* (= *Cupressus*) *nootkatensis* is never more than present.

Conservation Status Rank: G3/S3?

Rank Justification: Occurs within a narrow range of environments that are restricted to the mountains of the coastal Pacific Northwest. *Callitropsis nootkatensis*-dominated associations may be particularly imperiled to declining snowpacks caused by climate change.

Synonyms:
Chamaecyparis nootkatensis / *Oplopanax horridus* (Dyrness et al., 1974)
Cupressus nootkatensis / *Oplopanax horridus* - (*Alnus viridis* ssp. *sinuata*) Woodland (Crawford et al., 2009)

Tsuga mertensiana - Abies amabilis / *Caltha leptosepala* ssp. *howellii* Woodland

Mountain Hemlock - Pacific Silver Fir / Howell's Marsh-marigold Woodland

Abbrev: TSUMER-ABIAMA/CALLEP

EL Code: CEGL000501

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Montane Riparian & Seepage Swamp Forest

Alliance: *Tsuga* (*mertensiana*, *heterophylla*) - *Abies amabilis* Riparian & Swamp Forest, p. B-11

Range: This association is regionally endemic to the northwestern Cascade Range of Washington and the Coastal Mountains of British Columbia.

Plots: OLYM (1)

Environmental Description: Occurs at elevations of 800-1550 m, on very moist to wet, poorly drained, concave sites, with springs or seeps, typically occurring in linear stringers. Soils are saturated year-round and the snowpack is very deep (about 4 m).

Vegetation Description: This is a needle-leaved evergreen conifer forest or woodland, with relatively short trees. *Tsuga mertensiana* and *Abies amabilis* are the most abundant trees, averaging 32-37% cover each; *Callitropsis* (= *Cupressus*) *nootkatensis* is also sometimes prominent. The understory typically has a semi-open layer of deciduous broad-leaved shrubs about 0.5-1.5 m tall, mostly *Vaccinium ovalifolium* and, to a lesser degree, *Vaccinium membranaceum*, *Rhododendron menziesii* (= *Menziesia ferruginea*), or *Rubus spectabilis*. The shrubs typically clump near the bases of trees. A relatively lush forb-dominated herb layer always has abundant *Caltha biflora* (= *leptosepala* ssp. *howellii*). Several other herbaceous species can be important, especially *Rubus pedatus*, *Streptopus lanceolatus* (= *Streptopus roseus*), *Athyrium filix-femina*, *Veratrum viride*, *Lysichiton americanus*, and *Valeriana sitchensis*.

Classification Comments: This association is distinguished from similar associations by at least 10% cover of *Caltha biflora* (= *leptosepala* ssp. *howellii*) and little to no *Oplopanax horridus* or *Nephrophyllidium crista-galli*. *Sphagnum* spp. are documented as abundant in British Columbia and probably also in Washington.

Conservation Status Rank: G3/S3

Rank Justification: This wetland association has many very small occurrences. It is a regional endemic to coastal mountains of northern Washington and British Columbia. It is very limited to a specific physical environment, i.e., saturated soils in a particular maritime climatic zone at high elevations. It is also very susceptible to changes in composition with anthropogenic disturbance, but the extent of such disturbance has been relatively limited and there do not appear to be major threats at this time.

Synonyms:

Tsuga mertensiana / *Caltha biflora* (Henderson et al., 1992)
Tsuga mertensiana - Abies amabilis / *Caltha leptosepala* Woodland (Crawford et al., 2009)
Tsuga mertensiana - Abies amabilis / *Caltha leptosepala spp*. *howellii* Woodland (Meidinger et al., 2005) [PNWCOAST_291]

Picea sitchensis - (*Alnus rubra*) / *Rubus spectabilis* / *Polystichum munitum* Riparian Forest

Sitka Spruce - (Red Alder) / Salmonberry / Western Swordfern Riparian Forest



Abbrev: PICSIT-(ALNRUB)/RUBSPE/POLMUN

EL Code: CEGL007297

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Maritime Swamp Forest

Alliance: *Picea sitchensis - Tsuga heterophylla - Alnus rubra* Riparian Forest, p. B-13

Range: Occurs at low elevations along the coasts of Oregon, Washington, and southern British Columbia.

Plots: OLYM (8), Other (1)

Environmental Description: Usually found on slopes facing the Pacific Ocean or, less frequently, within 2 km of the ocean. Soils are somewhat poorly drained and/or subirrigated.

Vegetation Description: The canopy is dominated or codominated by *Picea sitchensis* and/or *Alnus rubra*. *Picea sitchensis* is always at least prominent, though it may be to an understory layer below a canopy of *Alnus rubra*. *Tsuga heterophylla* is sometimes present to prominent. The dense shrub layer is dominated by *Rubus spectabilis*. *Sambucus racemosa* is frequent and can be prominent. The well-developed herb layer is typically dominated by *Polystichum munitum*. *Athyrium filix-femina* is sometimes prominent. *Maianthemum dilatatum* is prominent in certain stands.

Classification Comments: ALNRUB/POLMUN is similar, but lacks prominent *Picea sitchensis* or other conifers. PICSIT/MAIDIL does not have significant *Rubus spectabilis* or other shrubs.

Conservation Status Rank: GNR/S3

Rank Justification: This association is restricted to narrow habitats, in a limited geographic range, with few known.

Synonyms:

Picea sitchensis - (*Alnus rubra*) / *Rubus spectabilis* / *Polystichum munitum* (Meidinger et al. 2005) [PNWCOAST_317]

Picea sitchensis - (*Alnus rubra*) / *Rubus spectabilis* / *Polystichum munitum* Forest (Crawford et al., 2009)

Acer macrophyllum / *Oxalis oregana* Riparian Forest

Bigleaf Maple / Redwood Sorrel Riparian Forest



Abbrev: ACEMAC/OXAORE

EL Code: CWWA000205

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Lowland Riparian Forest Group

Alliance: *Populus balsamifera* ssp. *trichocarpa* - *Alnus rubra* - *Fraxinus latifolia* Riparian Forest, p. B-14

Range: Documented from the coastal plain and foothills of the western Olympic Peninsula.

Plots: OLYM (17), Other (5)

Environmental Description: Occurs on flat or low-angle, moist sites at elevations below 500 m. Primarily found on riparian terraces, but also found on alluvial fans or toeslopes.

Vegetation Description: This broadleaf forest is dominated by *Acer macrophyllum*, with conifers present (most frequently *Picea sitchensis*). *Alnus rubra* may be present, but has less cover than *Acer macrophyllum*. A tall shrub layer dominated by *Acer circinatum* is usually present. *Rubus spectabilis* is often present. The lush, species-rich herbaceous understory is dominated by *Oxalis oregana*, with *Polystichum munitum* frequently codominant. *Tolmiea menziesii*, *Claytonia sibirica*, *Circaea alpina*, and *Galium aparine* are often present to prominent.

Classification Comments: POPBAL-PICSIT-(ACEMAC)/OXAORE is similar, but with minor *Acer macrophyllum*. The stands with abundant *Acer circinatum* and *Oxalis oregana* included in this type were formerly considered part of the *Acer macrophyllum* / *Acer circinatum* association (CEGL000560). That USNVC association is likely redundant.

Conservation Status Rank: GNR/S2S3

Rank Justification: Occurs on few sites within a limited geographic extent on the western Olympic Peninsula. Exotic species are present (and likely to spread) in most stands.

Synonyms:

Acer macrophyllum / *Oxalis oregana* Forest (Crawford et al., 2009)

***Acer macrophyllum* / *Polystichum munitum* - *Tolmiea menziesii* Riparian Forest**

Bigleaf Maple / Western Swordfern - Piggyback Plant Riparian Forest



Abbrev: ACEMAC/POLMUN-TOLMEN

EL Code: CWWA000206

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Lowland Riparian Forest

Alliance: *Populus balsamifera* ssp. *trichocarpa* - *Alnus rubra* - *Fraxinus latifolia* Riparian Forest, p. B-14

Range: Occurs on the Olympic Peninsula and in the Cascade foothills of Washington. May also occur in British Columbia and Oregon.

Plots: MORA (1), OLYM (13)

Environmental Description: Occurs on riparian terraces at low elevations, typically below 600 m.

Vegetation Description: *Acer macrophyllum* dominates the partially to completely closed canopy, sometimes with prominent *Alnus rubra*. *Abies grandis* and *Pseudotsuga menziesii* may be present, but are always less abundant than deciduous trees. The understory is primarily herbaceous and is characteristically dominated by *Polystichum munitum*. *Circaea alpina*, *Tolmiea menziesii*, *Carex leptopoda* (= *deweyana* var. *leptopoda*), *Claytonia sibirica*, *Stachys cooleyae* (= *chamissonis* var. *cooleyae*), *Bromus vulgaris*, *Viola glabella*, and *Hydrophyllum tenuipes* are usually present; *Circaea alpina*, *Tolmiea menziesii*, *Claytonia sibirica* and *Stachys cooleyae* (= *chamissonis* var. *cooleyae*) are frequently prominent. *Symphoricarpos albus* and *Rubus ursinus* are the most commonly occurring shrubs, but are typically not prominent. Patches of *Rubus spectabilis* and *Rosa gymnocarpa* occur less commonly. [Description from Crawford et al. (2009)]

Classification Comments: Flooding may decrease abundance of *Polystichum munitum* and increase *Elymus glaucus* cover; such sites may be intermediate to ALNRUB/ELYGLA. ACEMAC/RUBSPE has much greater abundance of *Rubus spectabilis* and/or *Ribes bracteosum*. ACEMAC-PSEMEN/ACECIR/POLMUN appears on disturbed sites such as debris slides and previously logged upland sites. *Acer macrophyllum* - *Alnus rubra* / *Polystichum munitum* - *Tellima grandiflora* Forest (CEGL003334) is another upland association that occurs in landslide zones.

Conservation Status Rank: GNR/S3S4

Rank Justification: Occurs within a narrow geographic and ecological range. This is a natural disturbance-induced community that may be altered by logging.

Synonyms:

Acer macrophyllum / *Polystichum munitum* - *Tolmiea menziesii* Forest (Crawford et al., 2009)

Acer macrophyllum / *Rubus spectabilis* Riparian Forest

Bigleaf Maple / Salmonberry Riparian Forest



Abbrev: ACEMAC/RUBSPE

EL Code: CEGL000561

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Lowland Riparian Forest

Alliance: *Populus balsamifera* ssp. *trichocarpa* - *Alnus rubra* - *Fraxinus latifolia* Riparian Forest, p. B-14

Range: Occurs in the foothills of the Olympic Mountains and Cascades Range of Washington and Oregon.

Plots: NOCA (9), OLYM (9)

Environmental Description: Occurs at low elevations, mostly on riparian floodplains, terraces, or moist seeps. May also occur on moist upland sites as a seral stage.

Vegetation Description: These closed broadleaf forests are dominated by *Acer macrophyllum*, with occasional *Alnus rubra*. *Picea sitchensis*, *Tsuga heterophylla*, and *Thuja plicata* may be present to prominent, but never exceed broadleaf cover in aggregate. *Rubus spectabilis* and/or *Ribes bracteosum* dominates the shrub understory with few other shrub species present. However, *Acer circinatum* sometimes forms an upper tall-shrub layer. *Polystichum munitum* and *Tolmiea menziesii* may be prominent to dominant in the herb layer. *Claytonia sibirica*, *Circaea alpina*, *Carex leptopoda* (= *deweyana* var. *leptopoda*), and *Melica subulata* are other frequent herbs.

Classification Comments: ACEMAC/POLMUN-TOLMEN is similar, but has low cover of *Rubus spectabilis* and other shrubs.

Conservation Status Rank: G4/S4

Rank Justification: This association occurs within a narrow geographic and ecological range. It is currently recognized as a natural vegetation type that may be altered by logging.

Synonyms:
Acer macrophyllum / *Rubus spectabilis* (Chappell, 2006a)
Acer macrophyllum / *Rubus spectabilis* Community Type (Douglas, 1971)
Acer macrophyllum / *Rubus spectabilis* Forest Association (Rocchio et al., 2012)
Acer macrophyllum / *Rubus spectabilis* Forest (Crawford et al., 2009)

Alnus rubra / *Acer circinatum* / *Claytonia sibirica* Riparian Forest

Red Alder / Vine Maple / Siberian Springbeauty Riparian Forest



Abbrev: ALNRUB/ACECIR/CLASIB

EL Code: CEGL003298

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Lowland Riparian Forest

Alliance: *Populus balsamifera* ssp. *trichocarpa* - *Alnus rubra* - *Fraxinus latifolia* Riparian Forest, p. B-14

Range: Occurs in western Washington and Oregon.

Plots: MORA (4), NOCA (3), OLYM (5), Other (7)

Environmental Description: Found at lower elevations (up to lower montane) on riparian floodplains, streambanks, and terraces. Soils are somewhat well-drained.

Vegetation Description: *Alnus rubra* is often the only tree species in the canopy. *Acer circinatum* and *Ribes lacustre* dominate the shrub layer, and *Oplopanax horridus* is typically present. *Claytonia sibirica* dominates the well-developed herb layer, and is often accompanied by small amounts of *Polystichum munitum*, *Athyrium filix-femina*, *Tolmiea menziesii*, *Struthiopteris* (= *Blechnum*) *spicant*, and *Maianthemum stellatum*.

Classification Comments: ALNRUB/OXAORE is a somewhat similar association with an herb layer dominated by *Oxalis oregana*. ALNRUB/OPLHOR-RUBSPE is differentiated by the presence of *Ribes bracteosum* and typically has much higher cover of *Oplopanax horridus* and *Rubus spectabilis*.

Conservation Status Rank: G4G5/S4

Rank Justification: This association is relatively widespread geographically, though restricted to riparian and valley-bottom habitats.

Synonyms:
Alnus rubra / *Acer circinatum* / *Claytonia sibirica* Forest (Titus et al., 1996)
Alnus rubra / *Acer circinatum* Association (Diaz & Mellen, 1996)
Alnus rubra / *Acer circinatum* / *Claytonia sibirica* Forest (Crawford et al., 2009)
Alnus rubra / *Acer circinatum* / *Polystichum munitum* Community Type (Mycek, 1994)

Alnus rubra / *Elymus glaucus* Riparian Forest

Red Alder / Blue Wildrye Riparian Forest



Abbrev: ALNRUB/ELYGLA

EL Code: CEGL003398

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Lowland Riparian Forest

Alliance: *Populus balsamifera* ssp. *trichocarpa* - *Alnus rubra* - *Fraxinus latifolia* Riparian Forest, p. B-14

Range: Occurs in western Washington and Oregon.

Plots: NOCA (3), OLYM (6), Other (3)

Environmental Description: Occurs at low elevations, on riparian floodplains and flat lower terraces. Soils are well-drained and coarse. Cobbles may be common on the soil surface.

Vegetation Description: The canopy is dominated by *Alnus rubra*. Within its range, *Picea sitchensis* is typically in the canopy or sub-canopy. *Acer macrophyllum* and *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*) are usually not present, but are occasionally prominent. The understory is dominated by grasses (usually *Elymus glaucus* or *E. hirsutus* on undisturbed sites, or by *Poa trivialis*, *P. pratensis*, or *B. sitchensis* on sites impacted by ungulate herbivory). *Oxalis oregana*, *Claytonia sibirica*, and *Circaea alpina* are often prominent. *Polystichum munitum* is usually present but is generally not prominent. *Mycelis muralis* and *Stachys cooleyae* (= *chamissonis* var. *cooleyae*) frequently occur with low cover. The shrub layer is not well-developed, although *Rubus ursinus* and *Salix scouleriana* may be prominent. *Rubus spectabilis* is usually present in small amounts. *Acer circinatum* occasionally occurs in trace amounts.

Classification Comments: Sites with dominant *Acer circinatum* may represent ALNRUB/ACECIR/CLASIB or ALNRUB/OXAORE. Sites with prominent *Acer macrophyllum* may be transitional to ACEMAC/POLMUN-TOLMEN.

Conservation Status Rank: G4/S3S4

Rank Justification: This association occurs in a restricted range and environment, but is found within protected areas. Invasives species (particularly grasses) are a significant threat to this low-elevation community.

Synonyms:
Alnus rubra / *Elymus glaucus* association (Diaz & Mellen, 1996)
Alnus rubra / *Elymus glaucus* Forest (Crawford et al., 2009)
Alnus rubra / *Rubus ursinus* / *Elymus glaucus* Forest (Chappell, 1999)

Alnus rubra / *Oplopanax horridus* - *Rubus spectabilis* Riparian Forest

Red Alder / Devil's-club - Salmonberry Riparian Forest



Abbrev: ALNRUB/OPLHOR-RUBSPE

EL Code: CEGL003399

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Lowland Riparian Forest

Alliance: *Populus balsamifera* ssp. *trichocarpa* - *Alnus rubra* - *Fraxinus latifolia* Riparian Forest, p. B-14

Range: Occurs in western Washington and Oregon.

Plots: MORA (2), NOCA (1), Other (9)

Environmental Description: Occurs at lower elevations on riparian floodplains, terraces, and toeslopes. Sites are somewhat poorly drained and usually subirrigated.

Vegetation Description: The canopy is dominated by *Alnus rubra*. The understory is dominated or codominated by *Oplopanax horridus* (always > 10% cover.) *Rubus spectabilis* and/or *Ribes bracteosum* often codominate in the shrub layer. A diverse and often well-developed herb layer is typical. *Athyrium filix-femina*, *Gymnocarpium dryopteris*, *Oxalis oregana*, and *Tolmiea menziesii* are among the many herbaceous species that are frequently abundant in the understory.

Classification Comments: ALNRUB/OPLHOR-ATHFIL is a similar association of the East Cascades with little or no *Rubus spectabilis*.

Conservation Status Rank: G4G5/S4

Rank Justification: This association occurs within a restricted range and a narrow range of environmental conditions, but with few known. Many occurrences are in protected areas.

Synonyms:
Alnus rubra / *Oplopanax horridus* - *Rubus spectabilis* Association (Diaz & Mellen, 1996)
Alnus rubra / *Oplopanax horridus* - *Rubus spectabilis* Forest (Crawford et al., 2009)
Alnus rubra / *Rubus spectabilis* Community Type (Franklin et al., 1988)

Alnus rubra / *Oxalis* (*oregana*, *trilliifolia*) Riparian Forest

Red Alder / (Redwood Sorrel, Threeleaf Woodsorrel) Riparian Forest



Abbrev: ALNRUB/OXAORE

EL Code: CEGL003400

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Lowland Riparian Forest

Alliance: *Populus balsamifera* ssp. *trichocarpa* - *Alnus rubra* - *Fraxinus latifolia* Riparian Forest, p. B-14

Range: Occurs in the southern Cascade foothills of Washington—including Mount Rainier—and on the western Olympic Peninsula.

Plots: MORA (1), OLYM (11), Other (11)

Environmental Description: Found on relatively well-drained soils at lower elevations, on riparian terraces, streambanks, or floodplains.

Vegetation Description: The canopy is dominated by *Alnus rubra*. *Picea sitchensis* and *Tsuga heterophylla* are frequent in the overstory, but with lower cover than *Alnus rubra*. *Acer circinatum* usually dominates a well-developed tall shrub layer, but tall shrubs may also be absent. *Rubus spectabilis* is usually present, but not prominent. The dense herb layer is codominated by *Oxalis oregana* (or *O. trillifolia*), and *Polystichum munitum*. *Claytonia sibirica*, *Circaea alpina*, *Tolmiea menziesii*, *Tiarella trifoliata*, and/or *Athyrium filix-femina* are frequently prominent. Graminoids such as *Elymus glaucus*, *E. hirsutus*, and *Carex leptopoda* (= *deweyana* var. *leptopoda*) may be prominent, but if so, are always less abundant than *Oxalis*.

Classification Comments: ALNRUB/ACECIR/CLASIB is similar, but does not have dominant *Oxalis oregana*.

Conservation Status Rank: G4/ S3S4

Rank Justification: This association occurs within a narrow geographic and ecological range.

Synonyms:
Alnus rubra / *Oxalis* spp. Association (Diaz & Mellen, 1996)
Alnus rubra / *Oxalis* (*oregana*, *trilliifolia*) Forest (Crawford et al., 2009)

Alnus rubra / *Rubus parviflorus* Riparian Forest

Red Alder / Thimbleberry Riparian Forest

Abbrev: ALNRUB/RUBPAR

EL Code: CEGL003402

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Lowland Riparian Forest

Alliance: *Populus balsamifera* ssp. *trichocarpa* - *Alnus rubra* - *Fraxinus latifolia* Riparian Forest, p. B-14

Range: Documented in the West Cascades, but may also occur elsewhere in lowland western Washington.

Plots: Other (1)

Environmental Description: Occurs at low to montane elevations (up to ~800 m) on riparian floodplains, terraces, streambanks, and toeslopes. This association initiates following high flow events..

Vegetation Description: The canopy is dominated by *Alnus rubra*. Early successional stands may be dominated by shrub-height *Alnus rubra*. *Rubus nutkanus* (= *parviflorus*) dominates the understory with characteristically little or no *Rubus spectabilis*. *Stachys cooleyae* (= *chamissonis* var. *cooleyae*) is most constant and prominent of the numerous herbaceous species which may occur in this association.

Classification Comments: This association was not documented during map training data collection, but may cocur at MORA and/or NOCA.

Conservation Status Rank: G4/S3

Rank Justification: This association occurs within a limited geographic and environmental range, with few known occurrences and few known threats. It may be vulnerable to changes in flood regime.

Synonyms:
Alnus rubra / *Rubus parviflorus* Association (Diaz & Mellen, 1996)
Alnus rubra / *Rubus parviflorus* Forest (Henderson, 1970; Titus et al., 1996; Crawford et al., 2009)

Alnus rubra / *Rubus spectabilis* Riparian Forest

Red Alder / Salmonberry Riparian Forest



Abbrev: ALNRUB/RUBSPE

EL Code: CEGL000639

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Lowland Riparian Forest

Alliance: *Populus balsamifera* ssp. *trichocarpa* - *Alnus rubra* - *Fraxinus latifolia* Riparian Forest, p. B-14

Range: Occurs throughout the northern Puget Trough lowlands of Washington and into the foothills of the Cascades and Olympic Mountains. It is also reported from California and Oregon and likely occurs in British Columbia.

Plots: MORA (2), NOCA (20), OLYM (18), Other (35)

Environmental Description: Occurs at low to middle elevations, usually on streambanks, moist toeslopes, and transitional edges of depressional wetlands. Sites may be seasonally flooded. Soils range from alluvium to veneers of muck and peat and are usually saturated year-round (Kunze, 1994a).

Vegetation Description: *Alnus rubra* forms a nearly closed canopy. *Rubus spectabilis* dominates a well-developed shrub layer and can be the only species in the understory. *Ribes bracteosum* sometimes codominates. *Acer circinatum* may be abundant. The herb layer is frequently well-developed and diverse, with *Athyrium filix-femina*, *Circaea alpina*, *Claytonia sibirica*, *Tiarella trifoliata*, *Tolmiea menziesii*, *Polystichum munitum*, *Carex leptopoda* (= *deweyana*), and *Oxalis oregana* common.

Classification Comments: Disturbance induced upland stands with dominant *Polystichum munitum* are included in ALNRUB/POLMUN. POPBAL-ALNRUB/RUBSPE is similar, but with codominant *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*). That type is more exclusive to riparian floodplains. ALNRUB/RUBSPE/CAROBN-LYSAME is a superficially similar swamp association. It has muckier soils and an herb layer characteristically dominated by *Carex obnupta* and/*or Lysichiton americanus*. *Rubus spectabilis* may be present, but not dominant, in ALNRUB/OXAORE stands. *Alnus rubra* / *Rubus parviflorus* Riparian Forest (CEGL003402) is a similar association included in Crawford et al. 2009. It is a poorly documented type with dominant *Rubus nutkanus* (= *parviflorus*) and little or no *Rubus spectabilis*, but it was not supported by NCCN map training plots.

Conservation Status Rank: G4G5/S4S5

Rank Justification: This association has many occurrences within its limited range, but few are undisturbed.

Synonyms:
Alnus rubra / *Rubus spectabilis* / *Oxalis* spp. Community (Diaz & Mellen, 1996)
Alnus rubra / *Rubus spectabilis* / *Tolmiea menziesii* Community (Diaz & Mellen, 1996)
Alnus rubra / *Rubus spectabilis* (Murray, 2000)
Alnus rubra / *Rubus spectabilis* Forest (Crawford et al., 2009; Copass & Ramm-Granberg, 2016)
Alnus rubra / *Rubus spectabilis* Forest Association (Rocchio et al., 2012)
Alnus rubra / *Rubus spectabilis* Community Type (Kunze, 1994b)
Alnus rubra - *Populus trichocarpa* / *Rubus spectabilis* Community (Agee, 1987)

Alnus rubra / *Stachys chamissonis* - *Tolmiea menziesii* Riparian Forest

Red Alder / Cooley's Hedge-nettle - Piggyback Plant Riparian Forest



Abbrev: ALNRUB/STACHA-TOLMEN

EL Code: CEGL003403

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Lowland Riparian Forest

Alliance: *Populus balsamifera* ssp. *trichocarpa* - *Alnus rubra* - *Fraxinus latifolia* Riparian Forest, p. B-14

Range: Occurs throughout western Washington and Oregon, from the lowlands to lower montane elevations in the Olympic Mountains and Cascades.

Plots: MORA (1), NOCA (2), OLYM (8), Other (19)

Environmental Description: Found at lower elevations on moist, well-drained riparian floodplains, streambanks, and lower terraces. Sites show evidence of periodic flooding, with mineral soil deposits and flood debris.

Vegetation Description: The canopy is dominated by *Alnus rubra*. The understory is dominated by a diverse array of forbs such as *Tolmiea menziesii*, *Stachys cooleyae* (= *chamissonis* var. *cooleyae*), *Tiarella trifoliata*, and/or *Claytonia sibirica*. *Athyrium filix-femina* is usually present, but rarely more than prominent. *Urtica dioica* can be very abundant. Shrubs such as *Acer circinatum*, *Oplopanax horridus*, or *Rubus spectabilis* are frequent, but typically sparse.

Classification Comments: ALNRUB/ELYGLA is similar, but with a grass-dominated understory, typically with prominent *Elymus glaucus*. *Alnus rubra* / *Petasites frigidus* Riparian Forest (CEGL003401) is a similar type that was included in Crawford et al. (2009), but that community is restricted to eastern Washington and Oregon, particularly the Blue Mountains.

Conservation Status Rank: G4/S3S4

Rank Justification: This association occurs within a limited range and environment, with few known.

Synonyms:
Alnus rubra / *Stachys chamissonis* var. *cooleyae* - *Tolmiea menziesii* Forest (Crawford et al., 2009)
Alnus rubra / *Petasites frigidus* Forest (Crawford et al., 2009)

Populus balsamifera ssp. *trichocarpa* - *Alnus rubra* / *Rubus spectabilis* Riparian Forest

Black Cottonwood - Red Alder / Salmonberry Riparian Forest



Abbrev: POPBAL-ALNRUB/RUBSPE

EL Code: CEGL003407

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Lowland Riparian Forest

Alliance: *Populus balsamifera* ssp. *trichocarpa* - *Alnus rubra* - *Fraxinus latifolia* Riparian Forest, p. B-14

Range: Occurs in scattered locations in western Oregon, Washington, and southern British Columbia.

Plots: MORA (1), NOCA (6), OLYM (3), Other (2)

Environmental Description: Occurs on well-developed floodplains of lowland rivers. Sites likely experience periodic (but not annual) flooding. Soils are well-drained alluvium.

Vegetation Description: A mostly closed deciduous tree canopy is dominated by *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*) up to about 50 m tall. *Alnus rubra* occurs in the subcanopy with variable cover. *Acer macrophyllum* is absent or has low cover. Conifers, especially *Abies grandis* and *Thuja plicata*, are usually present and may be prominent or even codominant in the subcanopy. The understory is dominated by *Rubus spectabilis*, which can be quite dense. Several other shrubs may be present in lesser amounts, including *Oplopanax horridus*, *Sambucus racemosa*, *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*), *Acer circinatum*, *Ribes bracteosum*, and *Rubus nutkanus* (= *parviflorus*). The herb layer is variable in cover and composition, but often includes *Tolmiea menziesii*, *Stachys cooleyae* (= *chamissonis* var. *cooleyae*), *Athyrium filix-femina*, *Circaea alpina*, *Claytonia sibirica*, *Urtica dioica*, *Maianthemum stellatum*, and/or *Polystichum munitum*.

Classification Comments: Dominance of *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*) and *Rubus spectabilis* is differential, along with greater abundance of *Alnus rubra* than *Acer macrophyllum*. *Aquilegia formosa*, when present, is strongly differential relative to other associations dominated by *Populus trichocarpa*. POPBAL/CORSER is a similar association that is more common east of the Cascade Crest. It generally lacks mesic, westside-indicator tree species such as *Abies amabilis* and *Tsuga heterophylla*.

Conservation Status Rank: G2G3/S2?

Rank Justification: There are relatively few occurrences remaining of this association, of which only a small percentage are highly viable. This association has probably declined significantly in extent and number of occurrences from historic conditions because of conversion to agriculture and development, and invasion of exotic species. Its condition is declining and it is highly threatened by dams and other hydrologic alterations, invasion of exotic species, and development in adjacent habitats. The regeneration of this association over time is dependent on riverine flooding and channel migration of major rivers (Chappell, 2002a).

Synonyms:

Populus balsamifera ssp. *trichocarpa* - *Alnus rubra* - *Rubus spectabilis* (MacKenzie & Moran, 2004)

Populus balsamifera ssp. *trichocarpa* - *Picea sitchensis* - (*Acer macrophyllum*) / *Oxalis oregana* Riparian Forest

Black Cottonwood - Sitka Spruce - (Bigleaf Maple) / Redwood Sorrel Riparian Forest



Abbrev: POPBAL-PICSIT-(ACEMAC)/OXAORE

EL Code: CEGL003418

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Lowland Riparian Forest

Alliance: *Populus balsamifera* ssp. *trichocarpa* - *Alnus rubra* - *Fraxinus latifolia* Riparian Forest, p. B-14

Range: May occur only on the western Olympic Peninsula. It is possible in southwest Washington or northwest Oregon.

Plots: OLYM (12)

Environmental Description: Occurs at low elevations along major rivers on middle to high fluvial terraces, typically where seasonal flooding is infrequent.

Vegetation Description: The mixed-forest canopy is typically codominated by *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*), *Picea sitchensis*, and often *Acer macrophyllum* or *Alnus rubra*. *Populus trichocarpa* is usually the tallest tree and may be emergent above the rest of the canopy. *Picea sitchensis* and/or *Acer macrophyllum* typically dominate a mid or subcanopy layer. Conifer dominance increases in the absence of flooding and deposition. *Tsuga heterophylla* presence may indicate later development stages. The understory is variably dense, often including substantial *Rubus spectabilis* or *Acer circinatum*. *Polystichum munitum* and *Oxalis oregana* are present and often codominant in the herb layer. *Poa trivialis* may indicate heavy ungulate use.

Classification Comments: POPBAL/CORSER/CAROBN has a well-developed herb layer dominated by *Carex obnupta*. Stands along the Skagit River codominated by *Populus trichocarpa* and *Acer macrophyllum* with understories of *Acer circinatum* and *Polystichum munitum* may represent a logging-induced ruderal association.

Conservation Status Rank: G2G3/S2

Rank Justification: There are very few to few occurrences of this association and a limited areal extent. It appears to be limited to a small geographic range, the western Olympic Peninsula, where it is highly dependent on riverine flooding and channel migration and, possibly, on freedom from excessive ungulate browsing. Most occurrences do not appear viable in the long term and are probably declining in extent because of minimal regeneration of cottonwood stands (the latter is hypothesized to be related to heavy elk browsing in the area). Exotic species are present in most stands to varying degrees and are probably spreading over time (Chappell, 2002b).

Synonyms:

Picea sitchensis - *Acer macrophyllum* - *Populus trichocarpa* community (Fonda, 1974)

Populus balsamifera ssp. *trichocarpa* - *Picea sitchensis* - (*Acer macrophyllum*) / *Oxalis oregana* Forest (Crawford et al., 2009)

Populus balsamifera ssp. *trichocarpa* - *Picea sitchensis* - *Acer macrophyllum* / *Rubus spectabilis* Forest (Chappell, 1999)

Populus balsamifera ssp. *trichocarpa* / *Cornus sericea* / *Carex obnupta* Riparian Forest

Black Cottonwood / Red-osier Dogwood / Slough Sedge Riparian Forest



Abbrev: POPBAL/CORSER/CAROBN

EL Code: CEGL002844

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Lowland Riparian Forest

Alliance: *Populus balsamifera* ssp. *trichocarpa* - *Alnus rubra* - *Fraxinus latifolia* Riparian Forest, p. B-14

Range: Occurs in the Georgia Basin of coastal British Columbia, the outer Washington coast, and in the Puget Trough.

Plots: OLYM (3)

Environmental Description: This small-patch type occurs on flat sites, from sea level to 150 m, with strongly fluctuating water tables. The water table is at or above the soil surface in winter months, then gradually lowers to well below the surface by late summer. Soils range from subhygric to subhydric and are usually rich (to moderate) in nutrients. Soils are variably textured with variable amounts of clay, silt, and sand—they are typically classified as humic gleysols or gleysols (Iverson, 2005).

Vegetation Description: *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*) and *Alnus rubra* dominate or codominate the canopy. *Thuja plicata* is occasionally prominent and *Picea sitchensis* is common, but with low cover. *Carex obnupta* is dominant to prominent. *Symphoricarpos albus* is often prominent. Other herbs include *Elymus glaucus* (which may be codominant), *Carex leptopoda* (= *deweyana* var. *leptopoda*), *Stachys cooleyae* (= *chamissonis* var. *cooleyae*), and *Polystichum munitum*. These plots typically lack a well-developed shrub layer, while exotic grasses may have contribute significant cover.

Classification Comments: This type is distinguished from POPBAL/CORSER by the presence of *Carex obnupta*. POPBAL/CORSER is also primarily restricted to the east side of the Cascade Crest. This description expands the concept of CEGL002844 (PNWCOAST_113) by including occurrences from the western Olympic Peninsula with stands from the Georgia Basin and Puget Lowlands. It also includes riparian-associated wetlands with depressional wetlands currently described in the USNVC, along with an expansion of the climatic envelope and associated species. *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*) and *Oemleria cerasiformis* are common in the Puget Lowland/British Columbia occurrences.

Conservation Status Rank: GNR/SNR

Rank Justification: This association has not been ranked.

Synonyms:

Populus balsamifera spp. trichocarpa / *Cornus sericea* / *Carex obnupta* Forest Association (Rocchio et al., 2012)
Populus balsamifera spp. trichocarpa / *Cornus sericea* / *Carex obnupta* (Meidinger et al., 2005) [PNWCOAST_113]
CDF mm /14 (Green & Klinka, 1994)
Populus balsamifera ssp. *trichocarpa - Alnus rubra* / *Carex obnupta* Forest (Crawford et al., 2009)

Acer macrophyllum / *Maianthemum stellatum* Riparian Forest

Bigleaf Maple / Starry False Lily-of-the-Valley Riparian Forest



Abbrev: ACEMAC/MAISTE

EL Code: CWWA000440

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Lowland Riparian Forest

Alliance: *Alnus rubra - Acer macrophyllum - Alnus viridis* Lower Montane Riparian & Swamp Forest, p. B-16

Range: Documented in the North Cascades of Washington, but may occur elsewhere in the Cascades from Oregon to British Columbia.

Plots: NOCA (3)

Environmental Description: Occurs on moist debris aprons and rocky toeslopes.

Vegetation Description: *Acer macrophyllum* dominates the closed broadleaf forest canopy. The shrub layer is sparse, though *Rubus nutkanus* (= *parviflorus*), *Oplopanax horridus* and *Sambucus racemosa* are often present. *Maianthemum stellatum*, *Prosartes* (= *Disporum*) *hookeri* and *Poa* spp. dominate the herbaceous understory.

Classification Comments: This association is similar to ACEMAC/RUBPAR/MAIRAC, but occurs in topographically moister sites west of the Cascade Crest, with a sparse shrub layer.

Conservation Status Rank: GNR/S2S4Q

Rank Justification: This association is poorly documented, but known occurrences are in protected areas.

Synonyms:
Acer macrophyllum / *Maianthemum stellatum* Forest (Crawford et al., 2009)

Alnus rubra / *Alnus viridis* ssp. *sinuata* Riparian Forest

Red Alder / Sitka Alder Riparian Forest

Abbrev: ALNRUB/ALNVIR

EL Code: CWWA000301

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Lowland Riparian Forest

Alliance: *Populus balsamifera* ssp. *trichocarpa* - *Alnus rubra* - *Fraxinus latifolia* Riparian Forest, p. B-16

Range: Documented in the West and East Cascades of Washington.

Plots: MORA (1), Other (6)

Environmental Description: Occurs at lower montane elevations (650 to1100 m) on gentle, often north-facing slopes. It is found near rivers, avalanche and debris chute runout zones, or other frequently disturbed sites. Surficial sandy soil indicative of flooding may be present, as well as flood-transported woody debris. These features suggest relatively frequent flooding and/or early successional status.

Vegetation Description: These are typically dense, young *Alnus rubra* forests, though large-diameter *Pseudotsuga menziesii* snags or remnant trees are usually present. *Tsuga heterophylla*, *Thuja plicata*, or *Abies amabilis* are usually present with low cover. *Alnus viridis* ssp. *sinuata* dominates a patchy to well-dveloped shrub layer. *Rubus spectabilis* is sometimes prominent. *Acer circinatum*, *Oplopanax horridus*, *Salix scouleriana*, *Sambucus racemosa*, and *Ribes lacustre* may also occur with relatively low cover. *Anaphalis margaritacea* and *Viola glabella* are most frequent in a typically sparse herb layer. *Angelica arguta*, *Athyrium fililx-femina*, and *Chamaenerion* (= *Chamerion*) *angustifolium* may also be present.

Classification Comments: This association is differentiated from other *Alnus rubra*-dominated associations by the dominance of *Alnus viridis* in the understory.

Conservation Status Rank: GNR/S3S4Q

Rank Justification: Occurs on naturally disturbed sites with stands documented in protected areas. This association may be sensitive to changes in disturbance regime.

Synonyms:
Alnus rubra / *Alnus viridis* ssp. *sinuata* Forest (Crawford et al., 2009)
Alnus rubra / *Alnus sinuata* (Kovalchik & Clausnitzer, 2004)

Alnus rubra / *Athyrium filix-femina* - *Lysichiton americanus* Swamp Forest

Red Alder / Common Ladyfern - American Skunk-cabbage Swamp Forest



Abbrev: ALNRUB/ATHFIL-LYSAME

EL Code: CEGL003388

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Maritime Swamp Forest

Alliance: *Alnus rubra* - *Fraxinus latifolia* / *Lysichiton americanus* Swamp Woodland, p. B-18

Range: Occurs in western Washington and Oregon.

Plots: MORA (2), NOCA (4), OLYM (1), Other (21)

Environmental Description: Typically found on flat sites with poorly drained wetland soils. Often associated with lakes, ponds, or depressional wetlands—sites without active riverine flooding.

Vegetation Description: The tree canopy is dominated by *Alnus rubra*. The understory is characterized by > 5% cover of *Lysichiton americanus* and the presence of *Athyrium filix-femina*. *Carex obnupta* is characteristically absent or present with very low cover. *Rubus spectabilis* may be prominent to dominant, particularly at sites with a history of disturbance.

Classification Comments: ALNRUB/RUBSPE/CAROBN-LYSAME may occur in similar settings. It is differentiated by consistent *Carex obnupta* cover and little or no *Athyrium filix-femina*.

Conservation Status Rank: G3G4/S3

Rank Justification: This association occurs within a narrow geographic and ecological range.

Synonyms:
Alnus rubra / (*Athyrium filix-femina* - *Lysichiton americanum*) (Murray, 2000)
Alnus rubra / *Athyrium filix-femina* - *Lysichiton americanus* (McCain & Christy, 2005)
Alnus rubra / *Athyrium filix-femina* - *Lysichiton americanus* Association (Christy, 2004a)
Alnus rubra / *Lysichitum americanum* Community Type (Kunze, 1994b)
Alnus rubra / Athyrium filix-femina - Lysichiton americanus Forest (Crawford et al., 2009)

Alnus rubra / *Glyceria striata* Riparian Woodland

Red Alder / Fowl Mannagrass Riparian Woodland

Abbrev: ALNRUB/GLYSTR

EL Code: CWWA000207

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Maritime Swamp Forest

Alliance: *Alnus rubra - Fraxinus latifolia* / *Lysichiton americanus* Swamp Woodland, p. B-18

Range: Documented in the Olympic Mountains, West Cascades, North Cascades, and Puget Trough of western Washington.

Plots: OLYM (1), Other (9)

Environmental Description: Occurs in depressional and (less frequently) seepage swamps from 100 to 1100 m elevation.

Vegetation Description: This broadleaf swamp forest is dominated by *Alnus rubra*. *Tsuga heterophylla* may be prominent, particularly in the understory. A sparse shrub layer of *Rubus spectabilis* occurs over a dense, diverse herb layer dominated by *Glyceria striata* or *G. elata*. *Lysichiton americanus*, *Veronica americana*, *Scirpus microcarpus*, *Angelica arguta*, *Athyrium filix-femina*, *Tiarella trifoliata*, *Tolmiea menziesii*, and/or *Viola glabella* are frequently present to prominent.

Classification Comments: This association is differentiated from other *Alnus rubra*-dominated types by the dominance of *Glyceria elata* or *G. striata*.

Conservation Status Rank: GNR/S2S4Q

Rank Justification: Occurs within a limited geographic and environmental range, with few known threats.

Synonyms:
Alnus rubra / *Glyceria elata* (Murray, 2000)
Alnus rubra / *Glyceria striata* Forest (Crawford et al., 2009)

Alnus rubra / *Rubus spectabilis* / *Carex obnupta - Lysichiton americanus* Swamp Forest

Red Alder / Salmonberry / Slough Sedge - American Skunk-cabbage Swamp Forest



Abbrev: ALNRUB/RUBSPE/CAROBN-LYSAME

EL Code: CEGL003389

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Maritime Swamp Forest

Alliance: *Alnus rubra - Fraxinus latifolia* / *Lysichiton americanus* Swamp Woodland, p. B-18

Range: Occurs in western Washington, particularly on the outer coast of the Olympic Peninsula. It is also common from northern California to British Columbia (Christy, 2004a).

Plots: OLYM (3), Other (5)

Environmental Description: Occurs in low- to mid-elevation depressional forested swamps, silted-in beaver ponds, peatland laggs, or low-gradient riparian floodplains (Christy, 2004b).

Vegetation Description: The tree canopy is dominated by *Alnus rubra*. The understory is characterized by > 5% cover of *Lysichiton americanus* or *Carex obnupta*, with little or no *Athyrium filix-femina*. *Rubus spectabilis* is always present and often dominates a well-developed shrub layer.

Classification Comments: ALNRUB/RUBSPE is more frequent in riparian settings and has little or no *Carex obnupta* or *Lysichiton americanus*. ALNRUB/ATHFIL-LYSAME has little or no *Carex obnupta* and frequently has codominant *Athyrium filix-femina*.

Conservation Status Rank: G3G4/S3

Rank Justification: This association occurs within a limited environmental and geographic range.

Synonyms:
Alnus rubra / *Carex obnupta - Lysichiton americanus* Association (Christy, 2004a)
Alnus rubra / *Rubus spectabilis* / *Carex obnupta - Lysichiton americanus* Woodland (Crawford et al., 2009)
Alnus rubra / *Rubus spectabilis* / *Carex obnupta - Lysichiton americanum* (Christy et al., 1998)

Alnus rubra / *Rubus spectabilis* / *Chrysosplenium glechomifolium* Riparian Forest

Red Alder / Salmonberry / Pacific Golden Saxifrage Riparian Forest

Abbrev: ALNRUB/RUBSPE/CHRGLE

EL Code: CWWA000208

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Maritime Swamp Forest

Alliance: *Alnus rubra* - *Fraxinus latifolia* / *Lysichiton americanus* Swamp Woodland, p. B-18

Range: Occurs on the western Olympic Peninsula.

Plots: Other (11)

Environmental Description: Occurs on riparian terraces, toeslopes, or landslide deposits with poorly drained soils, at low elevations (sea level to 150 m) in the wettest climatic areas of western Washington. Soils are usually fine-grained.

Vegetation Description: The forest canopy is dominated by *Alnus rubra* and is occasionally codominated by *Picea sitchensis*. The understory is characterized by over 10% cover of *Chrysosplenium glechomifolium*. *Rubus spectabilis* is always present and often forms a well-developed tall shrub layer. *Lysichiton americanus* is often present in small amounts.

Classification Comments: This association was not documented during map training data collection, but it is represented by 11 plots from the Olympic Experimental State Forest.

Conservation Status Rank: GNR/S3S4

Rank Justification: Occurs within a limited geographic and environmental range, with few known threats.

Synonyms:
Alnus rubra / *Rubus spectabilis* / *Chrysosplenium glechomifolium* Forest (Crawford et al., 2009)
Alnus rubra / *Rubus spectabilis* / *Chrysosplenium glechomifolium* Forest Community (Chappell, 1999)

Picea sitchensis - Tsuga heterophylla - (*Alnus rubra*) / *Oplopanax horridus* / *Polystichum munitum* Swamp Forest

Sitka Spruce - Western Hemlock - (Red Alder) / Devil's-club / Westerm Swordfern Swamp Forest

Abbrev: PICSIT-TSUHET-(ALNRUB)/OPLHOR/POLMUN

EL Code: CEGL005529

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Maritime Swamp Forest

Alliance: *Tsuga heterophylla - Picea sitchensis* / *Lysichiton americanus* Swamp Forest, p. B-19

Range: Occurs on the western Olympic Peninsula.

Plots: Other (5)

Environmental Description: Occurs on toeslopes or upper riparian terraces, usually along smaller streams. Soils are somewhat poorly drained and are likely seasonally to permanently subirrigated.

Vegetation Description: The canopy is codominated by *Picea sitchensis* and *Tsuga heterophylla*. *Alnus rubra* is usually present and sometimes codominant. The well-developed shrub layer is dominated or codominated by *Oplopanax horridus*. *Rubus spectabilis*, *Acer circinatum*, and *Ribes bracteosum* are usually present and often prominent to codominant. The rich herb layer is usually codominated by *Polystichum munitum* and *Oxalis oregana*. Many other herbs are common, the most abundant being *Tiarella trifoliata*.

Classification Comments: This association was not documented during map training data collection, but it is represented by 5 plots from the Olympic Experimental State Forest. Crawford et al. (2009) included a *Picea sitchensis* / *Scirpus microcarpus* Riparian Woodland association (CWWA000434), based on a single legacy plot. That association was not observed during map training data collection, but could possibly occur along unsampled stretches of river in the Olympic Mountains.

Conservation Status Rank: GNR/S2S3

Rank Justification: This riparian community occurs within a limited geographic and ecological range.

Synonyms:

Picea sitchensis - Tsuga heterophylla - (*Alnus rubra*)/*Oplopanax horridus*/*Polystichum munitum* (Meidinger et al. 2005) [PNWCOAST_073]

Picea sitchensis - Tsuga heterophylla - (*Alnus rubra*) / *Oplopanax horridus* / *Polystichum munitum* Forest (Crawford et al., 2009)

***Picea sitchensis* / *Rubus spectabilis* / *Carex obnupta - Lysichiton americanus* Swamp Forest**

Sitka Spruce / Salmonberry / Slough Sedge - American Skunk-cabbage Swamp Forest



Abbrev: PICSIT/RUBSPE/CAROBN-LYSAME

EL Code: CEGL000400

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Maritime Swamp Forest

Alliance: *Tsuga heterophylla - Picea sitchensis* / *Lysichiton americanus* Swamp Forest, p. B-19

Range: This community is known from the Pacific Northwest coast from extreme northern California into British Columbia.

Plots: OLYM (6), Other (28)

Environmental Description: These low-elevation coastal wetlands primarily occur on floodplains adjacent to perennial streams and rivers, but may also be found in depressions between stabilized dunes. Soils are perennially wet, usually with high organic content (Kagan & Christy, 1997).

Vegetation Description: The forest or woodland canopy is always dominated or codominated by *Picea sitchensis*. *Alnus rubra* is often codominant and *Tsuga heterophylla* may be prominent. The shrub layer ranges from sparse to moderately dense and *Rubus spectabilis* is nearly always present (95% constancy). *Gaultheria shallon* is frequently prominent (64% constancy, 16% average cover). The well-developed herb layer is dominated by *Carex obnupta* and/or *Lysichiton americanus*. *Carex obnupta* is always at least present and usually codominant. *Athyrium filix-femina* is usually prominent.

Classification Comments:

Conservation Status Rank: G2G3/S2

Rank Justification: This community is known from the coast of northern California, Oregon, Washington, and southern British Columbia, where stands are restricted to perennially saturated, mucky peat soils above tidal influence. The few known occurrences of old-growth remnants of this community, coupled with pervasive losses on private lands, ongoing harvest of second-growth stands, the lack of protection for most remnant sites, and the poor condition of most known remnants requires a high rank (Kagan & Christy, 1997).

Synonyms:

Picea sitchensis - Alnus rubra / *Lysichitum americanum* Community Type (Kunze, 1994b)
Picea sitchensis / *Carex obnupta - Lysichiton americanus* Association (Christy, 2004)
Picea sitchensis / *Carex obnupta - Lysichiton americanus* (Chappell, 1999; McCain & Christy, 2005)
Picea sitchensis / *Carex obnupta - Lysichiton americanus* Forest (Kunze, 1994)
Picea sitchensis / *Lysichiton americanus* association (Stumpf et al., 2017)
Picea sitchensis / *Rubus spectabilis* / *Carex obnupta - Lysichiton americanus* (Meidinger et al., 2005) [PNWCOAST_059]
Picea sitchensis / *Rubus spectabilis* / *Carex obnupta - Lysichiton americanus* Forest (Crawford et al., 2009)
Picea sitchensis - Alnus rubra / *Carex obnupta - Lysichiton americanum* (Christy et al., 1998)

Tsuga heterophylla - (*Thuja plicata - Alnus rubra*) / *Lysichiton americanus - Athyrium filix-femina* Swamp Forest

Western Hemlock - (Western Red-cedar - Red Alder) / American Skunk-cabbage - Common Ladyfern Forest



Abbrev: TSUHET-(THUPLI-ALNRUB)/LYSAME-ATHFIL

EL Code: CEGL007322

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Maritime Swamp Forest

Alliance: *Tsuga heterophylla - Picea sitchensis* / *Lysichiton americanus* Swamp Forest, p. B-19

Range: Occurs in the lowlands throughout western Washington, though uncommon on the outer Olympic coastal plain.

Plots: MORA (2), NOCA (2), OLYM (1), Other (13)

Environmental Description: Occurs on poorly drained soils that are seasonally flooded or saturated throughout the growing season. Soils are usually organic (muck or woody peat), but may also be mineral.

Vegetation Description: The semi-open to dense forest canopy is dominated by *Tsuga heterophylla*, *Thuja plicata*, and/or *Alnus rubra*. Either *Tsuga heterophylla* or *Thuja plicata* are always at least codominant. *Picea sitchensis*, *Pseudotsuga menziesii,* or *Abies amabilis* are sometimes present with less cover. Tree regeneration is generally dominated by *Tsuga heterophylla*. The shrub layer varies from sparse to well-developed. *Rubus spectabilis* is usually the most abundant species. *Acer circinatum* is sometimes prominent. The herb layer is well-developed and dominated or codominated by *Lysichiton americanus*. *Athyrium filix-femina* is usually present to prominent.

Classification Comments: This association is differentiated from other forested wetlands with *Lysichiton americanus* herb layers by low cover of *Gaultheria shallon* and *Picea sitchensis*, little or no *Sphagnum* spp., and differential herbs such as *Athyrium filix-femina*, *Tiarella trifoliata*, *Streptopus amplexifolius*, and *Claytonia sibirica*. When present, *Abies grandis* is also differential.

Conservation Status Rank: GNR/S2S3

Rank Justification: These wetlands are sensitive to changes in hydrology or water quality and to logging disturbance.

Synonyms:

Tsuga heterophylla - (*Thuja plicata - Alnus rubra*) / *Lysichiton americanus - Athyrium filix-femina* Forest Association (Rocchio et al., 2012)

Tsuga heterophylla - (*Thuja plicata - Alnus rubra*) / *Lysichiton americanus-Athyrium filix-femina* (Meidinger et al., 2005) [PNWCOAST_238+270+275]

> *Tsuga heterophylla* - (*Thuja plicata - Alnus rubra*) / *Lysichiton americanus - Athyrium filix-femina* Forest (Crawford et al., 2009)

> *Tsuga heterophylla-Abies amabilis* / *Vaccinium alaskaense* / *Lysichiton americanus* Forest (Crawford et al., 2009)

Tsuga heterophylla - (*Pseudotsuga menziesii*) / *Oplopanax horridus* / *Polystichum munitum* Forest

Western Hemlock - (Douglas-fir) / Devil's-club / Western Swordfern Forest



Abbrev: TSUHET-(PSEMEN)/OPLHOR/POLMUN

EL Code: CEGL000497

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Maritime Swamp Forest

Alliance: *Tsuga heterophylla - Picea sitchensis* / *Lysichiton americanus* Swamp Forest, p. B-19

Range: Occurs in the western Cascades and on the Olympic Peninsula of Washington, as well as in Oregon and British Columbia

Plots: MORA (13), NOCA (16), OLYM (2), Other (7)

Environmental Description: Occurs at low elevations (500 to 900 m) on lower slopes, terraces, and depressions, often associated with springs, seeps, or streams. Soils are subirrigated and poorly drained due to a shallow impermeable layer that perches moving groundwater.

Vegetation Description: The canopy is a variable mixture of *Tsuga heterophylla*, *Pseudotsuga menziesii*, *Thuja plicata*, and/or *Alnus rubra*. *Tsuga heterophylla* or *Thuja plicata* always occupy at least 10% total cover and dominate tree regeneration. *Oplopanax horridus* (over 10% cover) codominates or dominates the shrub layer. *Acer circinatum* and *Rubus spectabilis* are frequent and sometimes codominant. The well-developed, diverse herb layer almost always has *Polystichum munitum* present to codominant. Other frequent to codominant herbs include *Oxalis oregana*, *Athyrium filix-femina*, and *Tiarella trifoliata*

Classification Comments: This is considered an upland association in the CNVC.

Conservation Status Rank: G4/S4

Rank Justification: This association is widespread within a narrow environmental range.

Synonyms:

Thuja plicata - Tsuga heterophylla / *Oplopanax horridus* / *Polystichum munitum* (Chappell, 2006a)
Tsuga heterophylla / *Oplopanax horridum - Athyrium filix-femina* (Henderson et al., 1992)
Tsuga heterophylla / *Oplopanax horridum* / *Polystichum munitum* (Topik et al., 1986)
Tsuga heterophylla / *Oplopanax horridum* (Henderson et al., 1989)
Tsuga heterophylla / *Oplopanax horridum* Association (Franklin et al., 1988; Chappell, 1997)
Tsuga heterophylla - (*Pseudotsuga menziesii*) / *Oplopanax horridus* / *Polystichum munitum* (Meidinger et al., 2005) [PNWCOAST_264]
Tsuga heterophylla - Pseudotsuga menziesii - (*Thuja plicata*) / *Oplopanax horridus* / *Polystichum munitum* Forest (Crawford et al., 2009)
Tsuga heterophylla - (*Thuja plicata*) / *Oplopanax horridus* / *Polystichum munitum* Forest (Chappell, 2001)

***Tsuga heterophylla - Thuja plicata* / *Vaccinium ovalifolium - Gaultheria shallon* / *Lysichiton americanus* Swamp Forest**

Western Hemlock - Western Red-cedar / Oval-leaf Blueberry - Salal / American Skunk-cabbage Swamp Forest



Abbrev: TSUHET-THUPLI/VACOVAL-GAUSHA/LYSAME

EL Code: CEGL003226

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Maritime Swamp Forest

Alliance: *Tsuga heterophylla - Picea sitchensis* / *Lysichiton americanus* Swamp Forest, p. B-19

Range: Occurs on the western coastal plain of the Olympic Peninsula and at low elevations in the West Cascades.

Plots: MORA (2), OLYM (8), Other (40)

Environmental Description: Occurs on poorly drained organic soils (primarily muck with a mixture of woody debris and peat). Topography is flat or gently sloping. Microtopography is typified by raised areas of large woody debris and lower areas that are wetter and seasonally flooded to saturated. Elevations range from sea level to 650 m.

Vegetation Description: The canopy is dominated by *Thuja plicata* and *Tsuga heterophylla*, with *Tsuga heterophylla* usually dominating the understory. *Abies amabilis* and *Picea sitchensis* often occur (with < 25% cover). *Gaultheria shallon* dominates or codominates the shrub layer and is usually rooted in woody debris. *Vaccinium ovalifolium* (= *alaskaense*) is usually prominent to codominant. Other frequently occurring shrubs are *Vaccinium parvifolium* and *Rhododendron menziesii* (= *Menziesia ferruginea*). *Vaccinium ovatum* may be locally abundant (particularly on the outer coast), but is usually absent. The herb layer is characterized by at least 5% cover of *Lysichiton americanus* (growing in the wettest microsites). *Carex obnupta* is sometimes codominant (38% constancy, 17% mean cover). *Struthiopteris* (= *Blechnum*) *spicant* is typically prominent to codominant. *Cornus unalaschkensis* and *Rubus pedatus* are usually present.

Classification Comments: This association is differentiated from other forested wetlands with *Lysichiton americanus* herb layers by dominant *Gaultheria shallon*, little or no *Sphagnum* spp., and presence of *Picea sitchensis*.

Conservation Status Rank: GNR/S2

Rank Justification: Occurs in small patches associated with a very specific environment. It is moderately threatened by logging and associated impacts and is fragile due to its saturated, organic soils. Such soils are susceptible to physical disturbance and difficult to restore once impacted. These communities are also sensitive to hydrologic alterations.

Synonyms:

Tsuga heterophylla - Thuja plicata / *Gaultheria shallon* / *Lysichiton americanus* Forest (Crawford et al., 2009)

***Pseudoroegneria spicata* - (*Calamagrostis rubescens*) / (*Racomitrium canescens*) Grassland**

Bluebunch Wheatgrass - (Pinegrass) / (Silver Moss) Grassland



Abbrev: PSESPI-(CALRUB)/(RACCAN)

EL Code: CEGL008278

Macrogroup: Central Rocky Mountain Montane-Foothill Grassland & Shrubland

Group: Central Rocky Mountain Lower Montane, Foothill & Valley Grassland

Alliance: *Festuca idahoensis - Pseudoroegneria spicata - Poa secunda* Dry Grassland

Range: Documented in the rain shadow areas near Ross Lake in the eastern North Cascades and may occur in the Okanogan Mountains as well. It likely occurs in interior British Columbia

Plots: NOCA (7)

Environmental Description: Occur on balds and rocky slopes at lower montane elevations (550 to 700 m, well above lower treeline) on moderate to steep (20-44°), frequently southwest-facing aspects (202° mean). This association occurs on the far high end of the elevation range for G273.

Vegetation Description: *Pseudoroegneria spicata* dominates the herb layer and mosses (particularly *Racomitrium canescens*) usually cover most of the exposed rock. *Toxicoscordion venenosum*, *Calamagrostis rubescens*, and *Koeleria macrantha* may be prominent. *Lomatium nudicaule* is usually present. Scattered shrubs (*Philadelphus lewisii*, *Amelanchier alnifolia*, *Arctostaphylos uva-ursi*) are frequently present. *Selaginella wallacei* has been reported as a prominent component of this community, but was not documented in map training plots.

Classification Comments: Crawford et al. 2009 proposed a *Pseudoroegneria spicata*/*Selaginella wallacei* Herbaceous Vegetation association, with *Bromus marginatus* and *Selaginella wallacei* noted as prominent. The type proposed here is equivalent, although neither *Bromus marginatus* nor *Selaginella wallacei* were documented in any mapping plots. *Pseudoroegneria spicata* Grassland (CEGL001660) is similar, but PSESPI-(CALRUB)/(RACCAN) occurs in a forest landscape setting, lacks shrub-steppe species (Artemisia spp., Chrysothamnus spp.), and is further distinguished by the presence/prominence of *Calamagrostis rubescens* and *Racomitrium* spp.

Conservation Status Rank: GNR/SNR

Rank Justification:

Synonyms:

Pseudoroegneria spicata / *Selaginella wallacei* Herbaceous Vegetation (Crawford et al., 2009)

Populus tremuloides - Paxistima myrsinites Talus Shrubland

Quaking Aspen - Oregon Boxleaf Talus Shrubland



Abbrev: POPTRE-PAXMYR

EL Code: CEGL008266

Macrogroup: Central Rocky Mountain Montane-Foothill Grassland & Shrubland

Group: Central Rocky Mountain-North Pacific High Montane Mesic Shrubland

Alliance: *Abies lasiocarpa - Populus tremuloides* / *Acer glabrum* Central Rocky Mountain Avalanche Chute Shrubland

Range: Documented in the North Cascade Mountains of Washington. It may also occur elsewhere in the Cascade Mountains and in the Rocky Mountains of Washington and British Columbia.

Plots: NOCA (7)

Environmental Description: Occurs on low to middle elevation talus fields. Stands frequently occur on south-facing lower 1/3 and toeslopes (166° average aspect) at elevations ranging from 308-1193 m. Slopes are relatively moderate (7-34°, 25° average). The substrate consists of boulders or occasional scree.

Vegetation Description: Vegetation is characterized by an open to moderately dense tall shrub layer dominated by shrub-form *Populus tremuloides*. *Paxistima myrsinites*, *Acer circinatum*, and *Amelanchier alnifolia* are the most frequent associate shrubs. The herb layer is usually poorly developed, with occasional *Cryptogramma acrostichoides*, but may also be characterized by large patches of *Pteridium aquilinum* or *Apocynum* and*rosaemifolium*. *Pseudotsuga menziesii* is sometimes present with low cover.

Classification Comments: This differs structurally and floristically from *Populus tremuloides*-dominated wetland and upland associations documented elsewhere in Washington. While those types occur as true forests, this association occurs as shrublands restricted to talus fields. *Paxistima myrsinites*, *Amelanchier alnifolia*, and *Rubus leucodermis* are strong differential species for this type. ABILAS-PSEMEN/ACECIR and PSEMEN/ACECIR-(HOLDIS) also occur on talus, but they are dominated by upright conifers rather than deciduous shrubs. POPTRE-PAXMYR occurs at somewhat lower elevations than those two associations, but with colder winters (east of the Cascade Crest).

Conservation Status Rank: GNR/SNR

Rank Justification:

Synonyms:

Populus tremuloides Shrubland (Crawford et al., 2009)

Rubus parviflorus / *Chamerion angustifolium - Heracleum maximum* Shrubland

Thimbleberry / Fireweed - Common Cow-parsnip Shrubland



Abbrev: RUBPAR/CHAANG-HERMAX

EL Code: CEGL001127

Macrogroup: Central Rocky Mountain Montane-Foothill Grassland & Shrubland

Group: Central Rocky Mountain-North Pacific High Montane Mesic Shrubland

Alliance: Abies lasiocarpa - Populus tremuloides / Acer glabrum Central Rocky Mountain Avalanche Chute Shrubland

Range: Currently known from northwestern Montana in Glacier National Park, and from the North Cascades and Olympic Mountains in western Washington. It is likely to occur in subalpine mountainous regions of much of Idaho, Montana, and eastern Washington.

Plots: NOCA (18), OLYM (5)

Environmental Description: Occurs on toeslope, lowslope, and midslope landforms with moderate to steep slopes, often in avalanche tracks where snow movement inhibits tree establishment or dislodges taller, established individuals. It occurs at a wide range of elevations, from 650 to 1550 m in Washington. Parent material is derived from a variety of glacial substrates, including till and fluvial deposits, and colluvium. The shallow, dry, rocky soils are typically sandy loams or sandy clay loams. The association often develops on the margins of more extensive, tall avalanche shrublands.

Vegetation Description: This is a diverse, dense, shrubby meadow association. Total cover of the shrub layer ranges from 30% to well over 90% (50% average in Washington), and the herb layer is equally abundant (75% average in Washington). The tall shrub *Rubus nutkanus* (= *parviflorus*) is dominant in most of these shrublands, with an average of 30-60% cover (39% average in Washington). Other frequent tall shrubs in Washington plots include *Acer glabrum*, *Acer circinatum*, and *Amelanchier alnifolia*. The forb component is often very diverse, and mesic forbs prevail. *Chamaenerion* (= *Chamerion*) *angustifolium* is usually prominent, a good indicator of the periodic disturbance that characterizes this association. Other common to abundant species in Washington include *Heracleum maximum*, *Pteridium aquilinum*, *Thalictrum occidentale*, *Hydrophyllum fendleri,* and *Urtica dioica*. *Valeriana sitchensis* and *Veratrum viride* can occur in subalpine settings.

Classification Comments: Plots with little *Rubus nutkanus* (= *parviflorus*) or *Pteridium aquilinum* and with substantial *Thalictrum occidentale*, *Heracleum maximum*, *Eucephalus engelmannii* and other diverse herbs may belong with HERMAX.

Conservation Status Rank: G4/S3S4

Rank Justification: Appears to be widespread and promoted by disturbance.

Synonyms:
Rubus parviflorus - *Epilobium angustifolium* Community (Douglas, 1972; Franklin & Dyrness, 1973)
Rubus parviflorus / *Epilobium angustifolium* (Bourgeron & Engelking, 1994)
Rubus parviflorus / *Chamerion angustifolium* Shrubland (Crawford et al., 2009)
> *Pteridium aquilinum* Herbaceous Vegetation (Crawford et al., 2009)

Symphoricarpos albus - Holodiscus discolor Avalanche Chute Shrubland

Common Snowberry - Oceanspray Avalanche Chute Shrubland



Abbrev: SYMALB-HOLDIS

EL Code: CEGL008285

Macrogroup: Central Rocky Mountain Montane-Foothill Grassland & Shrubland

Group: Central Rocky Mountain-North Pacific High Montane Mesic Shrubland

Alliance: Central Rocky Mountain Subalpine Fir - Quaking Aspen Avalanche Chute Shrubland

Range: Documented in the northeastern Olympic Mountains, but may occur elsewhere in western Washington and perhaps British Columbia and/or Oregon.

Plots: OLYM (8)

Environmental Description: Occurs at mid-montane elevations (1050 to 1200 m) on moderately sloped (20° mean) avalanche tracks or on debris aprons below chutes. Aspects for documented plots have tended to be east-facing (117° mean).

Vegetation Description: These are dense shrublands dominated by *Symphoricarpos albus*. *Holodiscus discol*or is always prominent and *Rubus nutkanus* (= *parviflorus*) may be prominent, as well. Other associated shrubs may include *Alnus viridis*, *Holodiscus discol*or, *Prunus emarginata*, and *Amelanchier alnifolia*. Surrounding forests are usually dominated by *Pseudotsuga menziesii* and/or Ab*ies lasiocarpa*. The herb layer is variable, with *Heracleum maximum* the only species with >60% constancy (4% average cover). Other common herbs with low cover include *Cerastium arvense*, *Artemisia ludoviciana*, *Thalictrum occidentale*, *Elymus glaucus*, and *Carex phaeocephala*.

Classification Comments: This association has been placed in A3968 due to frequent prominence of *Rubus nutkanus* (= *parviflorus*). The landscape position (avalanche runouts, etc.) fits with the alliance concept. *Holodiscus discol*or; *Symphoricarpos albus*, *Rosa nutkana*, *Artemisia ludoviciana*, *Carex phaeocephala*, and *Cerastium arvense* are differential relative to other associations in this alliance.

Conservation Status Rank: GNR/S2S4Q

Rank Justification: Occurs in a narrow environmental range on sites with few known.

Synonyms:
Symphoricarpos albus - Malus fusca Shrubland (Crawford et al., 2009)

Sorbus sitchensis / *Vaccinium deliciosum* - (*Phyllodoce empetriformis*) Shrubland

Western Mountain-ash / Cascade Bilberry - (Pink Mountain-heath) Shrubland



Abbrev: SORSIT/VACDEL-(PHYEMP)

EL Code: CEGL008280

Macrogroup: Central Rocky Mountain Montane-Foothill Grassland & Shrubland

Group: Central Rocky Mountain-North Pacific High Montane Mesic Shrubland

Alliance: Vaccinium membranaceum - Vaccinium myrtillus - Vaccinium scoparium Montane-Subalpine Shrubland

Range: Documented in the western Olympic Mountains and throughout the Washington Cascades. It may also be present in British Columbia and Oregon.

Plots: MORA (2), NOCA (18), OLYM (3)

Environmental Description: Occurs at upper-montane to subalpine elevations (1400 to 1700 m) on relatively steep (29° mean), frequently south-facing aspects (174° mean) near debris flows, on old talus, and on valley or cirque walls.

Vegetation Description: These shrublands frequently have an open structure due to the rocky substrate. *Sorbus sitchensis* codominates above *Vaccinium deliciosum*. *Phyllodoce empetriformis* is usually prominent to codominant. *Vaccinium membranaceum* is usually prominent, as well. The herb layer may be patchy, but usually has prominent *Valeriana sitchensis*, *Carex spectabilis*, *Arnica latifolia*, and/or *Lupinus latifolius*. *Paxistima myrsinites*, *Anaphalis margaritacea*, *Eucephalus paucicapitatus*, *Phlox diffusa*, and other indicators of drier, more erosive sites are usually absent.

Classification Comments: This association may represent a transitional state between heathland and lower elevation tall shrublands and/or subalpine forests.

Conservation Status Rank: GNR/S3S4

Rank Justification: Occurs within a narrow environmental range, on sites with few known.

Synonyms:
Sorbus sitchensis / *Phyllodoce empetriformis* - *Vaccinium deliciosum* Shrubland (Crawford et al., 2009)

Spiraea splendens / *Carex spectabilis* - (*Polygonum bistortoides*) Shrubland

Rose Meadowsweet / Showy Sedge - (American Bistort) Shrubland



Abbrev: SPISPL/CARSPE-(POLBIS)

EL Code: CEGL008281

Macrogroup: Central Rocky Mountain Montane-Foothill Grassland & Shrubland

Group: Central Rocky Mountain-North Pacific High Montane Mesic Shrubland

Alliance: *Vaccinium membranaceum* - *Vaccinium myrtillus* - *Vaccinium scoparium* Montane-Subalpine Shrubland

Range: Documented frequently in the Olympic Mountains also occurs in the Washington Cascades. It may also occur in British Columbia and Oregon.

Plots: MORA (1), NOCA (2), OLYM (11)

Environmental Description: Occurs at mid-montane to subalpine elevations (1200 to 1700 m) on steep (36° mean), frequently southeast-facing aspects (161° mean). This type usually occurs as small patches within matrices of subalpine parkland.

Vegetation Description: *Spiraea splendens* dominates and *Vaccinium membranaceum* and/or *V. deliciosum* are frequently present to prominent. The herb layer is characteristically lush, with dominant *Carex spectabilis* and a number of other mesic herbs like *Bistorta* (= *Polygonum*) *bistortoides*, *Erigeron glacialis*, *Lupinus latifolius* (= *arcticus*), etc.

Classification Comments: *Carex spectabilis*, *Bistorta* (= *Polygonum*) *bistortoides*, and *Senecio triangularis* are differential species relative to similar shrublands in this alliance, an indication that this shrubland is transitional to higher elevation types. This association is similar to *Vaccinium membranaceum* - *Vaccinium deliciosum* Alpine Dwarf-shrubland (CEGL001428) and in fact, many mapping plots were initially assigned to that association (which is included in Crawford et al. 2009). This relationship still needs to be clarified (*Vaccinium membranaceum* - *Vaccinium deliciosum* Alpine Dwarf-shrubland may now be redundant).

Conservation Status Rank: GNR/S3S4Q

Rank Justification: Occurs within a wide environmental range, on sites with few known.

Synonyms:

Spiraea splendens Shrubland (Crawford et al., 2009)

> *Vaccinium membranaceum* / *Vaccinium deliciosum* Shrubland (Crawford et al., 2009)

***Vaccinium* (*deliciosum*, *scoparium*) / *Festuca viridula* Dwarf-shrubland**

Cascade Bilberry / Greenleaf Fescue Dwarf-shrubland



Abbrev: VAC(DEL,SCO)/FESVIR

EL Code: CEGL008283

Macrogroup: Central Rocky Mountain Montane-Foothill Grassland & Shrubland

Group: Central Rocky Mountain-North Pacific High Montane Mesic Shrubland

Alliance: *Vaccinium membranaceum* - *Vaccinium myrtillus* - *Vaccinium scoparium* Montane-Subalpine Shrubland

Range: Documented throughout the Washington Cascades. It may also be present in British Columbia and Oregon.

Plots: MORA (1), NOCA (13)

Environmental Description: occurs at subalpine elevations (1750 to 2000 m) on relatively steep (31° mean), frequently south-facing aspects (170° mean) and ridgetops, frequently with evidence of fire.

Vegetation Description: This association consists of relatively dry dwarf-shrublands of the eastern North Cascades dominated or codominated by *Vaccinium deliciosum* and/or *V. scoparium*. The well-developed herb layer has the composition of a *Festuca viridula*-dominant meadow, often with prominent *Phlox diffusa*, *Lupinus latifolius*, *Eremogone* (= *Arenaria*) *capillaris*, and/or *Juncus parryi*. *Phyllodoce empetriformis* and *Juniperus communis* are absent or low in cover.

Classification Comments: This association represents a merger of three provisional dry dwarf-shrubland types from Crawford et al. 2009: *Vaccinium deliciosum-Festuca viridula* Dwarf-shrubland, *Vaccinium scoparium* Dwarf-shrubland, and *Vaccinium scoparium-Festuca viridula* Dwarf-shrubland (a variant of the generalized *Vaccinium scoparium* Dwarf-shrubland). Crawford et al. 2009 included a provisional *Vaccinium caespitosum* / *Festuca viridula* Dwarf-shrubland based on a single classification plot, but subsequent sampling failed to substantiate the type.

Conservation Status Rank: GNR/SNR

Rank Justification:

Synonyms:

> *Vaccinium deliciosum* - *Festuca viridula* Dwarf-shrubland (Crawford et al., 2009)
> *Vaccinium scoparium* Dwarf-shrubland (Crawford et al., 2009)
> *Vaccinium scoparium* - *Festuca viridula* Dwarf-shrubland (Crawford et al., 2009)

***Vaccinium membranaceum* - (*Sorbus sitchensis*) / (*Calamagrostis rubescens*) Shrubland**

Thinleaf Huckleberry - (Western Mountain-ash) / Pinegrass Shrubland



Abbrev: VACMEM-(SORSIT)/(CALRUB)

EL Code: CEGL008284

Macrogroup: Central Rocky Mountain Montane-Foothill Grassland & Shrubland

Group: Central Rocky Mountain-North Pacific High Montane Mesic Shrubland

Alliance: *Vaccinium membranaceum* - *Vaccinium myrtillus* - *Vaccinium scoparium* Montane-Subalpine Shrubland

Range: Occurs throughout the Olympic Mountains and Washington Cascades and may extend into British Columbia, Idaho, Montana, and Oregon. The potential subtype (VACMEM/CALRUB) is restricted to areas east of the Cascade Crest.

Plots: MORA (4), NOCA (17), OLYM (16)

Environmental Description: Occurs at upper-montane to subalpine elevations (1300 to 1950 m) on relatively steep (32° mean) slopes, in an extremely wide span of climates (January precipitation varies by over 500 cm between the 5th and 95th percentiles). Stands usually occur successionally after fire, on avalanche-prone upper montane valley floors, or as small patches in subalpine parklands.

Vegetation Description: *Vaccinium membranaceum* dominates these variably dense and variably tall shrublands. Associate shrubs are variable and any of *Spiraea splendens*, *Sorbus sitchensis*, *Paxistima myrsinites*, *Juniperus communis*, or *Vaccinium deliciosum* may be prominent. No herbs exceed 60% constancy besides *Lupinus latifolius* and *Chamaenerion angustifolium*, though *Calamagrostis rubescens* may occasionally dominate the herb layer and is differential when it does so. *Xerophyllum tenax* is characteristically absent.

Classification Comments: The relationship between this association and *Vaccinium membranaceum* - *Vaccinium deliciosum* Alpine Dwarf-shrubland (CEGL001428) still needs to be clarified (the latter association may now be redundant following recent additions to the USNVC). In the NCCN mapping project, stands with prominent/codominant *Sorbus sitchensis* and *Paxistima myrsinites*, along with relatively mesic herbs (*Valeriana sitchensis*, *Luzula hitchcockii*, *etc*.) are included in Map Class S5 (Big Huckleberry Shrubland). These were most common west of the Cascade Crest and were given the association name "*Vaccinium membranaceum* – (*Sorbus sitchensis* – *Paxistima myrsinites*) Shrubland" by INR (= "*Vaccinium membranaceum* Shrubland" in Crawford et al. 2009). East of the Crest, stands with an herb layer dominated by *Calamagrostis rubescens* were dubbed "*Vaccinium membranaceum* / *Calamagrostis rubescens* Shrubland" by both Crawford et al. 2009 and INR. These are included in Map Class Green fescue meadow (Green Fescue Meadow). Initial peer-reviewers of proposed USNVC changes in 2019 felt there was insufficient species turnover between these two types to justify separate associations, so a combined concept is presented here. Stands with an herb layer dominated by *Calamagrostis rubescens* may at least represent a separate *Vaccinium membranaceum* / *Calamagrostis rubescens* subtype. These stands receive meters less precipitation than *Vaccinium membranaceum* stands in the western Olympics Mountains.

Conservation Status Rank: GNR/SNR

Rank Justification:

Synonyms:

> Vaccinium membranaceum Shrubland (Crawford et al., 2009)

> Vaccinium membranaceum / Calamagrostis rubescens Shrubland (Crawford et al., 2009)

Vaccinium membranaceum / *Xerophyllum tenax* Shrubland

Thinleaf Huckleberry / Common Beargrass Shrubland



Abbrev: VACMEM/XERTEN

EL Code: CEGL005891

Macrogroup: Central Rocky Mountain Montane-Foothill Grassland & Shrubland

Group: Central Rocky Mountain-North Pacific High Montane Mesic Shrubland

Alliance: *Vaccinium membranaceum* - *Vaccinium myrtillus* - *Vaccinium scoparium* Montane-Subalpine Shrubland

Range: Occurs in the Cascades, Olympics, and Rocky Mountains of Washington, though it is absent from the North Cascades (no *Xerophyllum tenax*). The range extends to Montana and Alberta.

Plots: MORA (17), OLYM (3)

Environmental Description: Occurs primarily on steep, southeast- through south- to southwest-facing slopes. Topographic situation is variable and includes all slope positions, but upper slopes and slope shoulders are quite commonly represented. It develops on both calcareous and non-calcareous substrates. Soils are moderately to well drained with loamy textures predominating. The litter layer is nearly continuous. In Washington, it occurs from 1400 to 1700 m elevation.

Vegetation Description: The dense vegetation is dominated by *Vaccinium membranaceum*—in Washington it is occasionally joined or replaced by *Vaccinium deliciosum* (50% constancy, 20% average cover where present)—and *Xerophyllum tenax*. Other shrubs may be present to prominent, such as *Paxistima myrsinites*, *Juniperus communis*, *Sorbus sitchensis*, *Rhododendron albiflorum*, or *Phyllodoce empetriformis*. *Lupinus latifolius* (= *arcticus*) is typically present but often at low cover. *Phlox diffusa*, *Fragaria virginiana*, *Pteridium aquilinum*, *Rubus lasiococcus*, *Festuca viridula*, *Juncus parryi*, and *Elymus glaucus* frequently occur. Scattered short trees are common and typically include *Abies lasiocarpa*, *Abies amabilis* and/or *Pseudotsuga menziesii*.

Classification Comments: VACMEM-(SORSIT)/(CALRUB) lacks dominant *Xerophyllum tenax*. Crawford et al. 2009 proposed a separate *Vaccinium caespitosum* - *Xerophyllum tenax* Dwarf-shrubland, but this was not documented during map training data collection. Stands dominated by *Xerophyllum tenax* and little or no shrub cover (< 10%) may represent occurrences of *Xerophyllum tenax* Meadow (CEGL005859), which has yet to be documented in Washington.

Conservation Status Rank: G3?/S2S3

Rank Justification: Fire suppression has allowed trees to invade many occurrences.

Synonyms:
Vaccinium membranaceum / *Xerophyllum tenax* (Allen, 2005)
Vaccinium membranaceum / *Xerophyllum tenax* Community Type (Henderson, 1973)
Vaccinium membranaceum / *Xerophyllum tenax* Shrubland (Hop et al., 2007; Crawford et al., 2009)

***Arctostaphylos* (*nevadensis*, *uva-ursi*) - *Paxistima myrsinites* / *Pseudoroegneria spicata* Dwarf-shrubland**

Pinemat Manzanita, Bearberry - Oregon Boxleaf / Bluebunch Wheatgrass Dwarf-shrubland



Abbrev: ARC(NEV,UVA)-PAXMYR/PSESPI

EL Code: CEGL008249

Macrogroup: Central Rocky Mountain Montane-Foothill Grassland & Shrubland

Group: Central Rocky Mountain-North Pacific High Montane Mesic Shrubland

Alliance: *Arctostaphylos* (*nevadensis*, *uva-ursi*) Dwarf-shrubland & Montane Bald

Range: Occurs in the eastern North Cascades and perhaps in the Okanogan Mountains, as well. It may also be present in British Columbia.

Plots: NOCA (27)

Environmental Description: Occurs at low- to upper-montane elevations (500 to 1800 m) on rocky balds of various slopes (13-38°) and generally southwest-facing aspects (209° mean).

Vegetation Description: *Arctostaphylos nevadensis* (occasionally *A. uva-ursi*) dominates rocky sites, with prominent *Paxistima myrsinites*. The herb layer is usually sparse, though *Pseudoroegneria spicata* and/or *Calamagrostis rubescens* may be prominent to codominant. *Lewisia columbiana*, *Cryptogramma acrostichoides*, and *Eremogone* (= *Arenaria*) *capillaris* are often present and moss cover is frequently high.

Classification Comments: In the NCCN mapping project, this association is split into two mapping associations, one with codominant *Paxistima myrsinites* and relatively little *Pseudoroegneria spicata*, and one with the inverse relationship. Both types are treated as variation within the same association here. Crawford et al. (2009) proposed a *Arctostaphylos* (*nevadensis*, *uva-ursi*) - *Juniperus communis* Dwarf-shrubland association based largely on data from Chappell (2006b) from southwestern Washington, but additional sampling failed to establish its distribution in the national parks.

Conservation Status Rank: GNR/S3Q

Rank Justification: May have a limited range and may be negatively impacted by exotic species (e.g., *Bromus tectorum*).

Synonyms:
> Arctostaphylos (nevadensis, uva-ursi) - Paxistima myrsinites Dwarf-shrubland (Crawford et al., 2009)

Juniperus communis - Phlox diffusa Dwarf-shrubland

Common Juniper - Spreading Phlox Dwarf-shrubland



Abbrev: JUNCOM-PHLDIF

EL Code: CEGL008261

Macrogroup: Central Rocky Mountain Montane-Foothill Grassland & Shrubland

Group: Central Rocky Mountain-North Pacific High Montane Mesic Shrubland

Alliance: *Juniperus communis - Paxistima Myrsinites* Dwarf-shrubland

Range: Documented primarily in the northern and eastern Olympic Mountains and the western slopes Mount Rainier. It may occur elsewhere in the Cascades, particularly in Oregon. It may also occur in British Columbia.

Plots: MORA (1), OLYM (43), Other (9)

Environmental Description: Occur across a wide range of elevations, from 1350 to 2000 m, typically on rock outcrops or ridgeline openings in dry forests. Slopes can reach 40° and are frequently southwest-facing aspects (219° mean) with abundant direct radiation.

Vegetation Description: *Juniperus communis* dominates and *Phlox diffusa* is a characteristically prominent. *Selaginella wallacei*, *Cerastium arvense*, *Lupinus latifolius*, and *Eriophyllum lanatum* are frequently prominent as well. These dwarf-shrublands cover a wide elevation range (from 1300 to 2000 m) and associate species vary somewhat over that span.

Classification Comments: Crawford et al. 2009 proposed a higher elevation *Juniperus communis* Lithomorphic Vegetation Association (based primarily on plots from Houston (1994)) in a cliff, scree, and rock division. Plots originally assigned to that type had too much vegetation cover to be considered 'sparse' under current USNVC definitions. Additional sampling made clear that this type represents less vegetated variation within JUNCOM-PHLDIF. JUNCOM-PHLDIF is similar to PHLDIF-(LOMMAR), but *Juniperus communis* dominance is differential.

Conservation Status Rank: GNR/S3S4

Rank Justification: Occurs within a broad range of environments, with few known, within protected areas. Tree invasion is a threat at some sites.

Synonyms:

Juniperus communis - (*Phlox diffusa*) Dwarf-shrubland (Crawford et al., 2009)
> *Juniperus communis* Lithomorphic Vegetation (Crawford et al., 2009)
Juniperus communis - (*Phlox diffusa*) (Chappell, 2006b)

Paxistima myrsinites / *Phlox diffusa* Dwarf-shrubland

Oregon Boxleaf / Spreading Phlox Dwarf-shrubland



Abbrev: PAXMYR/PHLDIF

EL Code: CEGL008277

Macrogroup: Central Rocky Mountain Montane-Foothill Grassland & Shrubland

Group: Central Rocky Mountain-North Pacific High Montane Mesic Shrubland

Alliance: *Juniperus communis - Paxistima Myrsinites* Dwarf-shrubland

Range: Documented primarily in the eastern North Cascades, with some stands identified in the northern and eastern Olympic Mountains. It may occur elsewhere in the Cascades, particularly in Oregon, and/or in British Columbia.

Plots: NOCA (18), OLYM (7)

Environmental Description: Occurs at upper-montane to subalpine elevations (1650 to 2000 m) on frequently steep (34° average slope) southerly aspects (177° mean) with abundant direct radiation. Soils are coarse and well-drained.

Vegetation Description: These low shrublands can be characterized as species-rich meadows beneath dominant *Paxistima myrsinites*. *Vaccinium membranaceum* and *V. deliciosum* are common in small amounts. Diversity is high, but *Phlox diffusa* is the only herb with > 60% constancy besides *Achillea millefolium*. Other commonly prominent herbs include *Eremogone* (= *Arenaria*) *capillaris*, *Erythronium grandiflorum*, *Festuca viridula*, and *Juncus parryi*.

Classification Comments: FESVIR-(PHLDIF-ARECAP) is similar, but lacks *Paxistima myrsinites*. *Festuca viridula*, *Phlox diffusa*, *Castilleja miniata*, *Lomatium brandegeei*, *Juncus parryi*, *Eremogone capillaris*, *Penstemon procerus*, *Cryptogramma acrostichoides*, *Eucephalus engelmannii*, *Lewisia columbiana* are differential relative to similar dwarf-shrublands such as JUNCOM-PHLDIF. Crawford et al. (2009) proposed a *Paxistima myrsinites* / *Sedum divergens* Lithomorphic Vegetation association that appears—after additional sampling—to simply represent small-scale variation within this association (*Paxistima myrsinites* and *Phlox diffusa* are typically codominant in the Crawford type).

Conservation Status Rank: GNR/S3S4

Rank Justification: This association is restricted to a narrow range of habitats, but found in many protected areas, with few known.

Synonyms:

Paxistima myrsinites - Phlox diffusa Dwarf-shrubland (Crawford et al., 2009)

Calamagrostis nutkaensis - Elymus glaucus Grassland

Pacific Reedgrass - Blue Wildrye Grassland



Abbrev: CALNUT-ELYGLA

EL Code: CEGL001564

Macrogroup: Southern Vancouverian Lowland Grassland & Shrubland

Group: Southern Vancouverian Shrub & Herbaceous Bald, Bluff & Prairie

Alliance: *Festuca rubra - Calamagrostis nutkaensis* Exposed Coastal Headland Grassland

Range: Occurs along the West Coast from California to Washington.

Plots: Other (6)

Environmental Description: [Adapted from Chappell 2006b] In Washington, these sites vary from slightly dry to very moist portions of coastal bluffs with exceedingly wet, foggy (hypermaritime) climates. Slopes are moderately to very steep and located on southwest to west aspects. Stands may occur anywhere along the face of a bluff, from toeslopes directly adjacent to sandy beach habitat up to the upper slope. Microtopography is often complex and variable. Seeps are often present, though occurrences are not dependent upon them. Elevations range from just above sea level to about 60 m. Surficial geology is most often Fraser-age continental or alpine glacial deposits.

Vegetation Description: The association is dominated by *Calamagrostis nutkaensis* (60% average cover), >1 m tall and forming a dense and thick litter layer. *Elymus glaucus* averages about 2.5% cover in plots from Oregon, but is absent in Washington. *Symphyotrichum chilense* (= *Aster chilensis*), *Maianthemum dilatatum*, *Artemisia suksdorfii*, *Rubus ursinus*, *Festuca rubra*, *Heracleum maximum* (= *lanatum*), *Pteridium aquilinum*, *Marah oreganus*, and *Achillea millefolium* are common. Shrubs such as *Vaccinium ovatum* and trees such as *Picea sitchensis* may be present. In Washington, *Vicia nigricans* var. *gigantea* is present in all plots sampled and can be codominant. *Equisetum telmateia* can be abundant and *Carex obnupta* may be present where seeps occur. Additional species include *Gaultheria shallon*, *Anaphalis margaritacea*, *Fragaria chiloensis*, *Epilobium ciliatum*, *Polystichum munitum*, *Rubus spectabilis*, and *Solidago canadensis*. Stands in Oregon have much less *Vicia nigricans* var. *gigantea* and lack wet-site indicators like *Equisetum telmateia*.

Classification Comments: *Elymus glaucus* does not occur in this type in Washington. This association is not represented in the current plot data for national parks in Washington, although WNHP has records of occurrences on the coastal strip of OLYM. Chappell (2006b) advocates for a separate CALNUG-VICGIG-(EQUTEL) Association due to high constancy and cover of *Vicia nigra* ssp. *gigantea* and *Equisetum telmateia*, frequent presence of seeps, wet soils, and wetland plant species, and its occurrence as small patches on steep slopes in largely forested/shrub landscapes.

Conservation Status Rank: G2/S2

Rank Justification: This association has a naturally restricted range of distribution along the coast from Santa Cruz northward. Exotic perennials have invaded many occurrences. The type occurs in a dynamic habitat susceptible to disturbances, both natural and human-caused.

Synonyms:

Calamagrostis nutkaensis - Elymus glaucus (Ripley, 1983; Bourgeron & Engelking, 1994)

Calamagrostis nutkaensis - Vicia nigra ssp. *gigantea* - (*Equisetum telmateia*) Herbaceous Vegetation (Crawford et al., 2009)

Calamagrostis nutkaensis - Vicia nigricans ssp. *gigantea* - (*Equisetum telmateia*) Association (Chappell, 2006b)

Gaultheria shallon - Vaccinium ovatum / *Pteridium aquilinum* Shrubland

Salal - California Huckleberry / Western Brackenfern Shrubland

Abbrev: GAUSHA-VACOVAT/PTEAQU

EL Code: CEGL000972

Macrogroup: Southern Vancouverian Lowland Grassland & Shrubland

Group: Southern Vancouverian Shrub & Herbaceous Bald, Bluff & Prairie

Alliance: *Festuca rubra - Calamagrostis nutkaensis* Exposed Coastal Headland Grassland

Range: Occurs on the Olympic Peninsula coastline and south along the Oregon Coast.

Plots: None

Environmental Description: Occurs on dry to moist sand planes, ridges, headlands, and steep bluffs along the Pacific Coast.

Vegetation Description: The dense vegetation is dominated by *Gaultheria shallon*, often with *Vaccinium ovatum*. *Pteridium aquilinum* is a common associate.

Classification Comments: This association is not represented in current plot data from the Washington national parks, but has been documented along the Oregon Coast and observed by WNHP staff on coastal headlands and bluffs of Olympic National Park.

Conservation Status Rank: G3/S2S4Q

Rank Justification: Insufficient information for ranking

Synonyms:
Gaultheria shallon - Vaccinium ovatum (Wiedemann, 1984)
Gaultheria shallon - Vaccinium ovatum / *Pteridium aquilinum* (Bourgeron & Engelking, 1994)
Gaultheria shallon Shrubland (Crawford et al., 2009)

Danthonia intermedia - Racomitrium canescens Grassland

Timber Oatgrass - Racomitrium Moss Grassland



Abbrev: DANINT-RACCAN

EL Code: CEGL008243

Macrogroup: Southern Vancouverian Lowland Grassland & Shrubland

Group: Southern Vancouverian Shrub & Herbaceous Bald, Bluff & Prairie

Alliance: Festuca roemeri - Danthonia californica Interior Prairie, Bald & Bluff Grassland

Range: Occurs in the North Cascades, near Ross and Diablo Lakes. It has also been anecdotally observed elsewhere in the western North Cascades and its range likely extends north into British Columbia.

Plots: NOCA (3)

Environmental Description: Occur at low elevations (450 to 550 m) on sites with moderate slopes (22° mean) and easterly aspects (117° mean). Substrates consist of fractured bedrock.

Vegetation Description: Nonvascular cover is high and typically exceeds that of vascular vegetation. *Danthonia intermedia* dominates among vascular plants (14% average cover), while *Racomitrium canescens* averages 45% cover and *Cladonia* spp. may be prominent to codominant. *Arctostaphylos uva-ursi*, *Selaginella wallacei*, and *Micranthes ferruginea* are present in both documented plots. *Pinus cont*orta, *Pseudotsuga menziesii*, and other conifers may be present as isolated individuals.

Classification Comments: RACCAN-(PENDAV) occurs in similar settings, but has very little vascular plant cover. DANINT-POTFLA is a high subalpine wet/mesic meadow association.

Conservation Status Rank: GNR/S2

Rank Justification: Occurs within a very narrow range of environments and is geographically restricted.

Synonyms:
Danthonia intermedia - *Racomitrium canescens* Herbaceous Vegetation (Crawford et al., 2009)

Festuca roemeri - Cerastium arvense - Koeleria macrantha Grassland

Roemer's Fescue - Field Chickweed - Prairie Junegrass Herbaceous Vegetation



Abbrev: FESROE-CERARV-KOEMAC

EL Code: CEGL003349

Macrogroup: Southern Vancouverian Lowland Grassland & Shrubland

Group: Southern Vancouverian Shrub & Herbaceous Bald, Bluff & Prairie

Alliance: *Festuca roemeri - Danthonia californica* Interior Prairie, Bald & Bluff Grassland

Range: The vast majority of occurrences are in the San Juan Islands, Gulf Islands, and nearby southeastern Vancouver Island. A few outlier occurrences are found in the eastern Olympic Mountain foothills, Mason County, and on a local rain shadow in the Cascade foothills of Thurston County.

Plots: OLYM (21)

Environmental Description: Very dry sites on very shallow soil or bedrock on southern to western aspect slopes. It likely burned relatively frequently in the pre-Euroamerican era.

Vegetation Description: Grassland balds dominated or codominated by *Festuca roemeri*. *Mahonia aquifolium* occurs in about half the Puget Lowland plots with a maximum of 20% cover. *Arctostaphylos uva-ursi* is occasionally prominent. Native herbaceous species include *Koeleria macrantha*, *Luzula multiflora*, *Achillea millefolium*, *Eriophyllum lanatum*, *Cerastium arvense*, *Zigadenus venenosus*, *Fritillaria lanceolata*, and *Lomatium utriculatum*. *Selaginella wallacei* is usually present on small rock outcrops. The native grasses *Danthonia californica*, *Bromus sitchensis*, and *Agrostis pallens* occasionally are prominent to codominant.

Classification Comments: Subalpine stands with similar vegetation but with *Oxytropis monticola* and *Phlox diffusa* are included in FESROE-PHLDIF-ARECAP. Three variants of this association exist, associated with serpentine and non-serpentine soils, and sites moderately impacted by past grazing. The serpentine variant has *Aspidotis densa* and high constancy of *Bromus carinatus* and *Juniperus scopulorum*. The non-serpentine variant typically has high constancy of *Camassia quamash* and *Mahonia aquifolium*. An apparently moderately degraded variant typically has high cover of *Danthonia californica* and/or *Carex inops*, little *Festuca roemeri*, less cryptogam cover, and greater abundance of exotic species. In British Columbia, this association is known as *Festuca idahoensis* var. *roemeri - Koeleria macrantha*.

Conservation Status Rank: G1/S1

Rank Justification: This association occupies a very small global acreage. It has declined in extent significantly and been degraded through a combination of exotic species invasions, overgrazing, and tree invasion with fire suppression. It is specific to very dry sites in a dry climatic zone at low elevations in a limited geographic range. It is very susceptible to irreversible changes in species composition and continues to be highly threatened by exotic species, tree invasion, and, locally, recreational impacts and development.

Synonyms:
Festuca roemeri - (*Cerastium arvense - Koeleria macrantha*) (Chappell, 2006a)
Festuca roemeri - (*Cerastium arvense - Koeleria macrantha*) Association (Chappell, 2006b)
Festuca roemeri - Cerastium arvense - Koeleria macrantha Herbaceous Vegetation (Crawford et al., 2009)

Festuca roemeri - Plectritis congesta Meadow [Provisional]

Roemer's Fescue - Short-spur Seablush Meadow [Provisional]



Abbrev: FESROE-PLECON

EL Code: Provisional

Macrogroup: Southern Vancouverian Lowland Grassland & Shrubland

Group: Southern Vancouverian Shrub & Herbaceous Bald, Bluff & Prairie

Alliance: Festuca roemeri - Danthonia californica Interior Prairie, Bald & Bluff Grassland

Range: Known to occur in the Puget Lowlands and in the Elwha drainage of the Olympic Mountains

Plots: Other (9)

Environmental Description: This low-elevation herbaceous bald association occurs in microsite features that are moist in the spring but very dry later in the summer. They consist of the partially shaded portions or edges of balds or seasonally moist (but not the wettest) microsites within more extensive balds. These balds are found primarily on mid- to upper slopes, with southern to western aspects. Soils are shallow over sedimentary or volcanic bedrock. Rock outcrops (often covered with mosses) are typically present within or directly adjacent to the association. Soils are mostly loam in texture, but can be gravelly or sandy.

Vegetation Description: This association is dominated or codominated by *Festuca roemeri*. *Plectritis congesta* is always prominent to codominant. *Collinsia parviflora* is prominent to codominant in about half the plots, and *Prunella vulgaris* occurs with 30% constancy. Mosses and lichens typically cover the space between grasses and forbs. Frequent native herbaceous species include *Clarkia amoena*, *Daucus pusillus*, *Galium aparine*, *Camassia quamash*, *Acmispon parviflorus* (= *Lotus micranthus*), *Danthonia californica*, *Bromus sitchensis* var. *carinatus* (= *Bromus carinatus*), and *Luzula* spp. *Selaginella wallacei* is usually present on small rock outcrops within the association.

Classification Comments: This provisional association is not present in the NCCN mapping project data set, but it was documented in the Elwha drainage by Chappell (2006b). It likely occurs in patches that were too small for sampling via map training methodology.

Conservation Status Rank: GNR/S1

Rank Justification: There are few occurrences in Washington. This association is threatened by invasion and increase of non-native species. Other possible threats include development, and tree invasion due to fire suppression, and recreational impacts.

Synonyms:
Festuca roemeri - Plectritis congesta Association (Chappell, 2006b)
Festuca roemeri - Plectritis congesta Herbaceous Vegetation (Crawford et al., 2009)

Koeleria macrantha - (*Agrostis pallens - Racomitrium canescens*) Grassland

Prairie Junegrass - (Seashore Bentgrass - Silver Moss) Grassland



Abbrev: KOEMAC-(AGRPAL-RACCAN)

EL Code: CEGL008251

Macrogroup: Southern Vancouverian Lowland Grassland & Shrubland

Group: Southern Vancouverian Shrub & Herbaceous Bald, Bluff & Prairie

Alliance: Festuca roemeri - Danthonia californica Interior Prairie, Bald & Bluff Grassland

Range: Occurs in the southern Cascades of Washington, especially in the western Columbia River Gorge and north into Lewis County. It has also been documented in the North Cascades and may occur in the intervening lower montane areas of the West Cascades. It is possible that the association occurs in British Columbia and/or Oregon.

Plots: NOCA (3), Other (15)

Environmental Description: [Adapted from Chappell, 2006b] These sites are relatively dry portions of balds. They occur on moderate to steep slopes (13-34°), mostly facing east or west (rarely other aspects). Almost all sites are upper slopes, with an occasional mid-slope or ridgetop as well. Slope shape is variable. Bare soil or gravel is sometimes abundant on the soil surface. Soil texture is loam, sandy loam, or loamy sand, typically with abundant coarse fragments (mostly gravel, occasionally stones). Small rock outcrops are sometimes present within or directly adjacent to the association. Surficial geology includes basalt, andesite, sedimentary, and volcaniclastic rocks, as well as mass-wasting deposits. This montane association is documented from 600 to 930 m elevation.

Vegetation Description: These grassland balds are dominated by *Koeleria macrantha*. *Selaginella wallacei*, *Eriophyllum lanatum*, and *Toxicoscordion venenosum* are frequently prominent to codominant. *Polygonum douglasii* is sometimes prominent. *Racomitrium canescens* has high cover at sites in the North Cascades. In the South Cascades, *Agrostis pallens* and/or *Festuca rubra* can codominate, while *Gilia capitata*, *Elymus glaucus*, *Bromus carinatus*, *Mahonia aquifolium*, *Allium cernuum*, and *Lomatium nudicaule* may be prominent.

Classification Comments: The North and South Cascades variants may represent separate subtypes or potentially separate associations. They are lumped here due to a paucity of samples in the North Cascades, as well as their shared dominant (*Koeleria macrantha*) and environmental setting.

Conservation Status Rank: GNR/S1S2

Rank Justification: There are few occurrences in Washington. This association is threatened by invasion and increase of non-native species. Other possible threats include tree invasion due to fire suppression and recreational impacts.

Synonyms:
Koeleria macrantha - (*Agrostis pallens*) (Chappell, 2006b)
Koeleria macrantha - (*Agrostis pallens*) Herbaceous Vegetation (Crawford et al., 2009)

Polygonum minimum - Racomitrium elongatum Nonvascular Rock Vegetation [Provisional]

Broadleaf Knotweed - Elongate Racomitrium Moss Nonvascular Rock Vegetation [Provisional]



Abbrev: POLMIN-RACELO

EL Code: Provisional

Macrogroup: Southern Vancouverian Lowland Grassland & Shrubland

Group: Southern Vancouverian Shrub & Herbaceous Bald, Bluff & Prairie

Alliance: *Arctostaphylos uva-ursi* Dwarf-shrubland & Bald

Range: This association is currently described from a single plot at Mount Rainier

Plots: MORA (1)

Environmental Description: Occurs on scoured bedrock balds at mid-elevations, surrounded by *Abies amabilis* and *Callitropsis* (= *Cupressus*) *nootkatensis* forest.

Vegetation Description: This nonvascular community is dominated almost exclusively by *Racomitrium elongatum*. *Polygonum minimum* and *Sedum divergens* occur at low cover.

Classification Comments: This association is poorly sampled and may represent variation in another nonvascular association such as RACCAN-(PENDAV)

Conservation Status Rank: GNR/SUQ

Rank Justification: There is insufficient information to rank this association in Washington.

Synonyms:

Polygonum minimum - Racomitrium elongatum Lithomorphic Vegetation (Crawford et al., 2009)

Arctostaphylos uva-ursi - Fragaria virginiana - (*Festuca roemeri*) Dwarf-shrubland

Bearberry - Virginia Strawberry - (Roemer's Fescue) Dwarf-shrubland



Abbrev: ARCUVA-FRAVIR-(FESROE)

EL Code: CEGL008242

Macrogroup: Southern Vancouverian Lowland Grassland & Shrubland

Group: Southern Vancouverian Shrub & Herbaceous Bald, Bluff & Prairie

Alliance: *Arctostaphylos uva-ursi* Dwarf-shrubland & Bald

Range: [Adapted from Chappell, 2006b] This association occurs in the northern and eastern Olympic Mountains, the North Cascades, and sporadically in the Puget Trough of Washington. It may also occur in British Columbia and/or Oregon. In Pierce and Thurston counties, it is known in the context of prairies, not balds.

Plots: NOCA (5), Other (9)

Environmental Description: [Adapted from Chappell, 2006b] These sites appear to be moderately dry portions of balds. Stands occur mostly on moderate slopes (25° mean) and gentle benches. Topographic position is mostly upper slopes, along with ridgetops and mid-slopes. The most frequent slope shape is convex, with undulating and concave sites also represented in plot data. Aspects range from south-southeast to west (172° mean). Soil texture is loam or sandy loam, usually with abundant coarse fragments (gravel). Soil depth is consistently shallow, with a maximum depth of 20 cm and a more typical range of 4-6 cm. Small rock outcrops are usually present within this association. Surficial geology includes basalt, breccia, intrusive rocks, metasedimentary rocks, and quartz diorite (plutonic). Plot elevations range from 500 to 750 m, with stands reported on glacial outwash deposits in South Puget Sound Prairies as low as 50 m elevation.

Vegetation Description: These dwarf-shrublands are dominated by *Arctostaphylos uva-ursi* (always with at least 25% cover). *Juniperus communis*, *Penstemon davidsonii*, and *Arctostaphylos nevadensis* are absent. *Festuca roemeri* is usually present in the Olympics and Puget Lowlands, and sometimes codominant. *Fragaria virginiana* is usually present or prominent. *Eriophyllum lanatum*, *Luzula multifl*or*a* and *Zigadenus venenosus* are often present. *Calamagrostis rubescens* and *Danthonia intermedia* are rarely prominent (near Ross Lake in the North Cascades). *Racomitrium canescens* is frequently absent, but is prominent where it occurs.

Classification Comments: This association has far more vascular plant cover than RACCAN-(PENDAV), which occurs in similar settings. ARCUVA is an alpine association with far different setting and associate species.

Conservation Status Rank: GNR/S3

Rank Justification: Seems to be common within the limited habitat of balds and rock outcrops in the Olympics and northern Cascades. There may be some long-term threat from tree invasion and non-native species.

Synonyms:
Arctostaphylos uva-ursi - Fragaria virginiana - (*Festuca roemeri*) Dwarf-shrubland (Crawford et al., 2009)
Arctostaphylos uva-ursi - Fragaria virginiana - (*Festuca roemeri*) (Chappell, 2006b)

Racomitrium canescens - (*Penstemon davidsonii*) Nonvascular Rock Vegetation

Silver Moss - (Davidson's Penstemon) Nonvascular Rock Vegetation



Abbrev: RACCAN-(PENDAV)

EL Code: CEGL008244

Macrogroup: Southern Vancouverian Lowland Grassland & Shrubland

Group: Southern Vancouverian Shrub & Herbaceous Bald, Bluff & Prairie

Alliance: Arctostaphylos uva-ursi Dwarf-shrubland & Bald

Range: Occurs in the central North Cascades, particularly near Ross and Diablo Lakes. It may also occur elsewhere in the Washington Cascades and in British Columbia.

Plots: NOCA (8)

Environmental Description: Rocky bedrock balds at low to middle elevations.

Vegetation Description: *Racomitrium* spp. (all keyed samples were *R. canescens*) forms a nearly complete ground layer, with other mosses and lichens prominent. Few vascular plants occur in more than trace amounts, although *Penstemon davidsonii* is always present and may be prominent. *Cryptogramma acrostichoides* and *Selaginella wallacei* are frequently present. When present, *Danthonia intermedia* has low cover. Some dwarf shrubs (mainly *Arctostaphylos uva-ursi*) may be present in small amounts. *Juniperus communis*, *Polygonum minimum*, and *Sedum divergens* are absent.

Classification Comments: Physiognomy (nonvascular-dominant) and substrate (bedrock—never talus or scree) are the primary diagnostics. *Danthonia intermedia* is absent or low in cover. *Juniperus communis*, *Polygonum minimum*, and *Sedum divergens* are absent. This association is quite different from PENDAV, which occurs in subalpine/alpine settings with associate herbs such as *Phlox diffusa*, *Douglasia laevigata*, and little, if any, moss. Crawford et al. (2009) proposed a similar *Selaginella wallacei - Festuca* (*roemeri*, *saximontana*, *brachyphylla*) Herbaceous Vegetation association, but no additional plot data was collected to support that type.

Conservation Status Rank: GNR/SNR

Rank Justification:

Synonyms:

Arctostaphylos columbiana Shrubland

Hairy Manzanita - Silver Moss Shrubland



Abbrev: ARCCOL

EL Code: CEGL008247

Macrogroup: Southern Vancouverian Lowland Grassland & Shrubland

Group: Southern Vancouverian Shrub & Herbaceous Bald, Bluff & Prairie

Alliance: Arctostaphylos columbiana Shrubland

Range: Occurs in the northern and eastern Olympic Mountains, the southwestern Washington Cascades, and rarely in the northern Puget Trough (western Whatcom County). It may also occur elsewhere in the western Cascades, in the Georgia Basin of British Columbia, and in northwestern Oregon.

Plots: OLYM (4), Other (7)

Environmental Description: Occurs on relatively dry portions of balds. Stands occur on steep slopes (32° mean), with typically southeast-facing aspects (237° mean). Topographic position is usually upper slope, with mid-slope and ridgetop also represented. Slope shape is mostly convex, though occasionally straight. Soil texture is mostly sandy loam (one plot loam), with a major component of coarse fragments (usually gravel) in all but one plot. Soil depth is shallow (maximum recorded depth was 20 cm). Small rock outcrops are present in about half of plots. Surficial geology is usually basalt, but volcaniclastic and sedimentary rocks are also represented. Plots with GPS coordinates ranged from 650 to 900 m elevation, but the association is also documented down to as low as 370 m.

Vegetation Description: *Arctostaphylos columbiana* dominates a tall (> 50 cm) shrub layer. *Symphoricarpos mollis* and *Arctostaphylos uva-ursi* are frequently prominent beneath and *Holodiscus discol*or is usually present. *Elymus glaucus*, *Geranium carolinianum*, *Anemone* or*egana* are often present to prominent. *Arctostaphylos uva-ursi* or *Arctostaphylos nevadensis* are sometimes prominent. Small *Pseudotsuga menziesii* are usually present and *Juniperus scopulorum* has been reported. *Amelanchier alnifolia*, *Mahonia aquifolium*, *Lonicera ciliosa*, *Castilleja hispida*, *Collomia heterophylla*, *Fragaria virginiana*, *Achillea millefolium*, and *Eriophyllum lanatum* may also occur. *Racomitrium canescens* and other mosses typically form a thick nonvascular layer.

Classification Comments: This association could arguably be placed in the same alliance (A4385) as ARCUVA-FRAVIR-(FESROE) and RACCAN-(PENDAV), yet those two associations are structurally quite different and there are numerous floristic differences. Besides *Arctostaphylos columbiana*, the following species are differential for this association (relative to other types in this group): *Symphoricarpos mollis* var. *hesperius*, *Rosa gymnocarpa*, *Amelanchier alnifolia*, *Holodiscus discol*or, *Geranium carolinianum*, *Lonicera ciliosa*, *Collomia heterophylla*, *Festuca occidentalis*, *Castilleja hispida*, *Lomatium martindalei*, *Anemone* or*egana*, *Ceanothus sanguineus*, *Lysimachia latifolia*, and *Arbutus menziesii*.

Conservation Status Rank: GNR/S3

Rank Justification: Occurs within a restricted ecological range and threatened by tree encroachment.

Synonyms:
Arctostaphylos columbiana Shrubland (Crawford et al., 2009)
Arctostaphylos columbiana (Chappell, 2006b)

Danthonia intermedia - Potentilla flabellifolia - (*Festuca viridula*) Meadow

Timber Oatgrass - High Mountain Cinquefoil Meadow



Abbrev: DANINT-POTFLA-(FESVIR)

EL Code: CEGL008250

Macrogroup: Rocky Mountain-Vancouverian Subalpine-High Montane Mesic Meadow

Group: Rocky Mountain-North Pacific Subalpine-Montane Mesic Grassland & Meadow

Alliance: *Festuca viridula - Carex hoodii - Lupinus* spp. Subalpine Mesic Meadow

Range: Occurs at Mount Rainier and may occur elsewhere in the Oregon and Washington Cascades, and perhaps north into British Columbia.

Plots: MORA (6)

Environmental Description: Occurs at subalpine elevations (1500 to 1700 m) on essentially flat sites (1-3° average slope). When slope is measurable, the aspect is generally northwest-facing (41° mean).

Vegetation Description: *Danthonia intermedia* typically dominates a short herb layer with codominant *Potentilla flabellifolia*. Or*eostemma alpigenum* is usually prominent to codominant. *Festuca viridula* is frequently prominent. When present, *Carex spectabilis* has < 5% cover.

Classification Comments: The exact alliance placement of this association is up for debate, although it ordinates most closely with other associations in A1257 and *Festuca viridula* is present to prominent 50% of the time. DANINT (CEGL001794) is a more broadly defined PNV type that also includes *Potentilla flabellifolia* and a few other associate species found in this association. However, *Festuca viridula* is not associated with CEGL001794. CEGL001794 was included in the Crawford et al. 2009 classification and INR initially proposed a name change to clarify the type (i.e. make it more specific). Because CEGL001794 has a broad range, we have instead established a separate, new association with a range limited to Washington (though it may potentially occur in BC, Oregon, Idaho, and/or Montana). CARSPE-POTFLA is similar, but lacks *Festuca viridula* and has much greater cover and constancy of *Carex spectabilis*. ANTLAN occupies similar sites, but lacks dominant graminoids.

Conservation Status Rank: GNR/S3

Rank Justification:

Synonyms:

Festuca viridula - (*Phlox diffusa* - *Arenaria capillaris*) Grassland

Greenleaf Fescue - (Spreading Phlox - Slender Mountain Sandwort) Grassland



Abbrev: FESVIR-(PHLDIF-ARECAP)

EL Code: CEGL008235

Macrogroup: Rocky Mountain-Vancouverian Subalpine-High Montane Mesic Meadow

Group: Rocky Mountain-North Pacific Subalpine-Montane Mesic Grassland & Meadow

Alliance: *Festuca viridula* - *Carex hoodii* - *Lupinus* spp. Subalpine Mesic Meadow

Range: Occurs east of the Cascade Crest in the North Cascades of Washington. Its range may extend into the Okanogan Mountains to the east and/or north into British Columbia.

Plots: NOCA (29)

Environmental Description: These grasslands occur at subalpine elevations (1800 to 2150 m) on flat to steep (4-35°) frequently south- or southwest-facing aspects with rocky, well-drained soils that receive abundant direct radiation.

Vegetation Description: *Festuca viridula* dominates relatively dry, rocky meadows with abundant bare soil. *Phlox diffusa* and/or *Eremogone* (= *Arenaria*) *capillaris* are prominent. Other possibly prominent herbs include *Calamagrostis rubescens*, *Eriophyllum lanatum*, *Danthonia intermedia*, and *Trisetum spicatum*. *Eucephalus ledophyllus*, *E. engelmannii*, *Valeriana sitchensis*, and *Carex spectabilis* are characteristically absent or low in cover.

Classification Comments: This association is similar to FESROE-PHLDIF-ARECAP, but *Festuca viridula* replaces *F. roemeri*. Absence of *Lomatium martindalei* and presence of *Senecio integerrimus*, *Antennaria lanata*, *Castilleja miniata*, *Hieracium triste*, *Ligusticum grayi*, *Lomatium br*and*egeei*, *Veronica cusickii*, and *Pulsatilla* (= *Anemone*) *occidentalis* are additional indicators for this association. *Paxistima myrsinites* / *Phlox diffusa* Dwarf-shrubland [Proposed] is also similar, but has an open dwarf-shrub layer dominated by *Paxistima myrsinites*.

Conservation Status Rank: GNR/SNR

Rank Justification:

Synonyms:

Festuca viridula - Eucephalus (*engelmannii*, *ledophyllus*) Meadow

Greenleaf Fescue - Engelmann's Aster, Cascade Aster Meadow



Abbrev: FESVIR-EUC(ENG,LED)

EL Code: CEGL001632

Macrogroup: Rocky Mountain-Vancouverian Subalpine-High Montane Mesic Meadow

Group: Rocky Mountain-North Pacific Subalpine-Montane Mesic Grassland & Meadow

Alliance: *Festuca viridula - Carex hoodii - Lupinus* spp. Subalpine Mesic Meadow

Range: Occurs in northern and eastern Mount Rainier National Park and through the North Cascades.

Plots: MORA (26), NOCA (22), Other (8)

Environmental Description: Dry, midslope, subalpine meadows on steep to moderate south-facing slopes. More common on the east side of the Cascade Crest. Soils are well-drained and may form on old talus. Bare ground is common.

Vegetation Description: These meadows contain a mix of forbs, graminoids, and bare ground; they are dominated or codominated by *Festuca viridula*. *Eucephalus ledophyllus* (Mount Rainier) or *E. engelmannii* (North Cascades) is always present to codominant. *Lupinus latifolius* (= *arcticus*) and *Ligusticum grayi* are often prominent to codominant. *Arnica parryi* ssp. *parryi*, *Nothocalais alpestris*, and *Penstemon confertus* are somewhat frequent in higher elevation sites. *Xerophyllum tenax* is present to prominent in burned sites at Mount Rainier.

Classification Comments: FESVIR-LUPLAT is more mesic and typically occurs on gentler slopes near ridgetops or in basins. It is primarily distinguished by denser vegetation and lower cover of dry indicators like *Eucephalus* spp. and *Ligusticum grayi*. FESVIR-EUC(ENG,LED) is also transitional to fire-dependent types such as VAC(DEL,SCO)/FESVIR and VACMEM/XERTEN. VALSIT-CARSPE can occur in similar settings, but lacks prominent *Festuca viridula*.

Conservation Status Rank: G4/S3

Rank Justification: Occurs in a restricted range of environments with few known within protected areas. Impacts from climate change are likely.

Synonyms:
Festuca viridula - Aster ledophyllus (Bourgeron & Engelking, 1994)
Festuca viridula - Eucephalus ledophyllus Herbaceous Vegetation (Crawford et al., 2009)
Festuca viridula / *Aster ledophyllus* Association (Hamann, 1972)
Festuca / *Aster* Community Type (Henderson, 1973)

Festuca viridula - Lupinus latifolius Meadow

Greenleaf Fescue - Broadleaf Lupine Meadow



Abbrev: FESVIR-LUPLAT

EL Code: CEGL001635

Macrogroup: Rocky Mountain-Vancouverian Subalpine-High Montane Mesic Meadow

Group: Rocky Mountain-North Pacific Subalpine-Montane Mesic Grassland & Meadow

Alliance: *Festuca viridula - Carex hoodii - Lupinus* spp. Subalpine Mesic Meadow

Range: Northern and eastern Mount Rainier and south to Oregon.

Plots: MORA (31), Other (12)

Environmental Description: Mesic to dry subalpine and lower alpine meadows, on well-drained soils and southerly facing slopes, often on gentle to moderate slopes near ridgetops or in basins. Soils probably develop in pumice deposits and vary in depth, but are usually less than 16 cm deep.

Vegetation Description: The vegetation is dominated or codominated by *Festuca viridula*. *Lupinus latifolius* (= *arcticus*) is usually present to codominant. *Carex spectabilis*, *Luetkea pectinata*, and *Bistorta* (= *Polygonum*) *bistortoides* can be prominent. Other common species include *Pulsatilla* (= *Anemone*) *occidentalis*, *Potentilla flabellifolia*, *Antennaria lanata*, *Erigeron glacialis* (= *peregrinus*), *Hieracium gracile*, *Juncus parryi*, and *Ligusticum grayi*.

Classification Comments: FESVIR-EUC(ENG,LED) occurs in drier meadows, usually on steeper slopes and with prominent *Eucephalus spp*. CARSPE-POLBIS has dominant *Carex spectabilis* and usually lacks *Festuca viridula*. FESVIR-(PHLDIF-ARECAP), which is common at NOCA, has similar dominant plants, but tends to occur on drier and more exposed sites with prominent *Phlox diffusa*—it also lacks prominent *Carex spectabilis*, *Potentilla flabellifolia*, and *Bistorta* (= *Polygonum*) *bistortoides*, and has prominent *Arenaria capillaris*.

Conservation Status Rank: G4/S3

Rank Justification: Occurs within a restricted range of environments, with few known, within protected areas. Impacts from climate change are likely.

Synonyms:
Festuca / *Lupinus* Community Type (Henderson, 1973)
Festuca viridula - Lupinus (*arcticus*, *latifolius*) Herbaceous Vegetation (Crawford et al., 2009)
Festuca viridula - Lupinus latifolius (Bourgeron & Engelking, 1994)

***Valeriana sitchensis - Carex spectabilis* Meadow**

Sitka Valerian - Showy Sedge Herbaceous Vegetation



Abbrev: VALSIT-CARSPE

EL Code: CEGL001996

Macrogroup: Rocky Mountain-Vancouverian Subalpine-High Montane Mesic Meadow

Group: Rocky Mountain-North Pacific Subalpine-Montane Mesic Grassland & Meadow

Alliance: *Valeriana sitchensis - Luzula glabrata* var. *hitchcockii - Xerophyllum tenax* Subalpine Mesic Meadow

Range: Occurs in the Olympic Mountains and Cascade Range of Washington.

Plots: MORA (6), NOCA (29), OLYM (29), Other (2)

Environmental Description: Occurs on slopes in subalpine parkland between tree islands from 1250 to 1850 m elevation. Sites are well-drained and often influenced by upslope debris and avalanche chutes.

Vegetation Description: This herbaceous community is dominated by either *Valeriana sitchensis* or *Carex spectabilis*—both are typically at least prominent. *Lupinus latifolius* (= *arcticus*) and *Bistorta* (= *Polygonum*) *bistortoides* can be prominent, but not codominant. Several other species are often prominent in this lush and floristically diverse type, including *Senecio triangularis*, *Claytonia cordifolia*, and *Thalictrum occidentale*. This association may also occur in relatively sparse patches on steep, rocky sites where *Valeriana sitchensis* and *Carex spectabilis* are the most abundant vascular plants.

Classification Comments: Distinguished from CARSPE-POLBIS by dominance of *Valeriana sitchensis*.

Conservation Status Rank: G4/S3

Rank Justification: Occurs within a narrow environmental range. This association will likely be affected by climate change.

Synonyms:
Carex - Valeriana (Houston et al., 1994)
Valeriana sitchensis - Carex spectabilis Herbaceous Vegetation (Crawford et al., 2009)
Valeriana sitchensis Community Type (Henderson, 1973)
Moist *Valeriana* Forb Type (Kuramoto & Bliss, 1970)

Valeriana sitchensis - Ligusticum grayi Meadow

Sitka Valerian - Gray's Licorice-root Meadow



Abbrev: VALSIT-LIGGRA

EL Code: CEGL001997

Macrogroup: Rocky Mountain-Vancouverian Subalpine-High Montane Mesic Meadow

Group: Rocky Mountain-North Pacific Subalpine-Montane Mesic Grassland & Meadow

Alliance: Valeriana sitchensis - Luzula glabrata var. hitchcockii - Xerophyllum tenax Subalpine Mesic Meadow

Range: Occurs in the Washington Cascades and Olympic Mountains.

Plots: MORA (6), NOCA (1), OLYM (1), Other (3)

Environmental Description: Occurs in subalpine meadows from 1550 to 1900 m, usually on east-facing aspects. Slopes vary from moderately steep to gentle and concave (6 to 28°).

Vegetation Description: These diverse and lush herbaceous meadows often occur near *Abies lasiocarpa* tree islands. *Valeriana sitchensis* dominates and *Festuca viridula* often codominates. *Ligusticum grayi*, *Lupinus latifolius* (= *arcticus*), *Pulsatilla* (= *Anemone*) *occidentalis*, and *Erigeron glacialis* (= *peregrinus*) are usually prominent. *Arnica latifolia*, *Luzula hitchcockii* (= *glabrata* var. *hitchcockii*), and *Bistorta* (= *Polygonum*) *bistortoides* are also frequent.

Classification Comments: FESVIR-LUPLAT and FESVIR-EUC(ENG,LED) are similar, but lack prominent/codominant *Valeriana sitchensis*.

Conservation Status Rank: G3G4Q/S2S3

Rank Justification: Occurs in a narrow environmental range. This association will likely be affected by climate change.

Synonyms:
Valeriana sitchensis / *Ligusticum grayi* (Hamann, 1972)
Valeriana sitchensis - *Ligusticum grayi* Herbaceous Vegetation (Crawford et al., 2009)

Valeriana sitchensis - Veratrum viride Meadow

Sitka Valerian - Green False Hellebore Herbaceous Vegetation



Abbrev: VALSIT-VERVIR

EL Code: CEGL001998

Macrogroup: Rocky Mountain-Vancouverian Subalpine-High Montane Mesic Meadow

Group: Rocky Mountain-North Pacific Subalpine-Montane Mesic Grassland & Meadow

Alliance: *Valeriana sitchensis - Luzula glabrata* var. *hitchcockii - Xerophyllum tenax* Subalpine Mesic Meadow

Range: Occurs in the Oregon, Washington, and British Columbian Cascades and east through the Northern/Central Rocky Mountains to Alberta and Montana.

Plots: MORA (14), NOCA (13), OLYM (26), Other (1)

Environmental Description: Occurs as small-patch forb meadows associated with mesic sites of the upper subalpine to lower alpine zones; the observed elevation range in the Cascades was 1250 to 2150 m. In the Cascades, it occurs on southerly exposures of gentle to steep (4 to 37°), well-drained slopes that may be subject to recurring avalanches. Some occurrences are associated with small stream drainages or long-stabilized talus slopes. Mineral soil may be exposed, reflecting site disturbance from adjacent windthrown trees or animal activity.

Vegetation Description: This dense herbaceous community is dominated by *Veratrum viride*. In Washington, *Valeriana sitchensis* and *Carex spectabilis* often codominate and are usually at least prominent. Other frequently encountered species include *Lupinus latifolius* (= *arcticus*), *Bistorta* (= *Polygonum*) *bistortoides*, *Arnica latifolia*, *Potentilla flabellifolia*, and a variety of other forbs.

Classification Comments: One classification plot from MORA was dominated by *Carex scirpoidea* and *Veratrum viride*. The plot is considered to be variation in VALSIT-VERVIR, but it may represent a new association or an occurrence of *Carex scirpoidea* ssp. *pseudoscirpoidea* Alpine Meadow (CEGL001865).

USFWS Wetland System: Palustrine

Conservation Status Rank: G4/S3

Rank Justification: Occurs within a narrow environmental range.

Synonyms:
Valeriana sitchensis - Veratrum viride Herbaceous Vegetation (Crawford et al., 2009)
Veratrum viride / *Valeriana sitchensis* Association (Hamann, 1972; Franklin & Dyrness, 1973)

Agrostis (*capillaris*, *stolonifera*) Ruderal Grassland [Provisional]

Bentgrass Ruderal Grassland [Provisional]



Abbrev: AGR(CAP,STO)

EL Code: Provisional

Macrogroup: Western North American Ruderal Grassland & Shrubland

Group: Southern Vancouverian Lowland Ruderal Grassland & Shrubland

Alliance: Anthoxanthum odoratum - Holcus lanatus Ruderal Coastal Grassland

Range: Documented in the San Juan Islands and at Olympic National Park, with additional occurrences likely throughout the western Oregon, Washington, and British Columbia.

Plots: OLYM (6)

Environmental Description: Occurs in old fields (often previously plowed) on a variety of soils. At Olympic National Park, it is found on benches or terraces in valley bottoms.

Vegetation Description: This ruderal grassland community is dominated by exotic grasses such as *Agrostis capillaris*, *Agrostis stolonifera*, and *Holcus lanata*. The invasive shrub *Rubus laciniatus* is usually prominent. Exotic herbs such as *Trifolium repens*, *Ranunculus repens*, and *Cirsium arvense* dominate the herb layer along with the perennial grasses. Disturbance-tolerant native increaser species such as *Pteridium aquilinum* and *Achillea millefolium* may be present, but with far lower cover than exotic species.

Classification Comments:

Conservation Status Rank: GNA/SNA

Rank Justification: Ruderal communities are not assigned conservation status ranks.

Synonyms:
Agrostis (*capillaris*, *stolonifera*) Mesic Ruderal Grassland Association (Rocchio et al., 2012)

Ceanothus velutinus - Amelanchier alnifolia / *Maianthemum racemosum* Shrubland

Snowbrush Ceanothus - Western Serviceberry / Feathery False Lily-of-the-Valley Shrubland



Abbrev: CEAVEL-AMEALN/MAIRAC

EL Code: CEGL008241

Macrogroup: Cool Interior Chaparral

Group: Western North American Montane Sclerophyll Scrub

Alliance: *Ceanothus velutinus* Shrubland

Range: Occurs in the eastern North Cascades and may also be found in the Okanogan Mountains of Washington and British Columbia and perhaps the Central Rocky Mountains.

Plots: NOCA (13)

Environmental Description: Occur at mid-montane elevations (600 to 1250 m) on generally moderate (21° average slope) southerly aspects (181° average aspect) in avalanche chutes or on debris aprons, but never in riparian areas. Stands may represent a long-term post-fire seral stage.

Vegetation Description: These are dense shrublands with well-developed mesic herbaceous understories. *Ceanothus velutinus*, *Prunus emarginata*, and *Amelanchier alnifolia* codominate a tall shrub layer. *Acer glabrum*, *Sorbus scopulina*, and *Salix* spp. are usually present to prominent. Symph*oricarpos albus*, *Paxistima myrsinites*, *Spiraea lucida* (= *betulifolia*), *Rubus nutkanus* (= *parviflorus*) and *Rosa gymnocarpa* often occur in a shorter shrub layer. The typically rich herb layer has variable species composition, frequently including *Maianthemum racemosum*, *Thalictrum* spp., *Eucephalus engelmannii*, *Chamaenerion* (= *Chamerion*) *angustifolium*, and *Prosartes* (= *Disporum*) *hookeri*. *Calamagrostis rubescens* is often present, but never dominates. Trees may be present as regeneration or scattered surviving mature *Pseudotsuga menziesii*, or sometimes *Abies lasiocarpa*.

Classification Comments: CEAVEL has greater cover of *Ceanothus velutinus* (the one clear dominant, as opposed to this more diverse type) and a less species-rich herb layer that is almost always dominated by *Calamagrostis rubescens*. It occurs after recent fires and is rarely associated with avalanche chutes.

Conservation Status Rank: GNR/SNR

Rank Justification:

Synonyms:

Ceanothus velutinus Shrubland

Snowbrush Ceanothus Shrubland



Abbrev: CEAVEL

EL Code: CEGL002167

Macrogroup: Cool Interior Chaparral

Group: Western North American Montane Sclerophyll Scrub

Alliance: *Ceanothus velutinus* Shrubland

Range: Occurs in the East and North Cascades, Okanogan Mountains, and the Black Hills of South Dakota, western Colorado and northwestern Wyoming. It is likely to be locally abundant throughout the Rocky Mountains.

Plots: NOCA (34)

Environmental Description: Occurs on flat to steep (9-36°) south-facing aspects (186° average) from 400 to 1550 m, often in recently burned areas (though stands may persist long after fire in dry, rocky sites). This association is only rarely associated with avalanche chutes and never occurs in riparian settings.

Vegetation Description: Where sampled in Washington, the tall shrub layer dominated by *Ceanothus velutinus*, often accompanied in lesser amounts by *Amelanchier alnifolia*, Salix sp. (typically *Salix scouleriana*) and *Prunus emarginata*. *Paxistima myrsinites* typically dominates a shorter shrub layer, often with *Spiraea lucida* (= *betulifolia*) prominent. *Arctostaphylos nevadensis* is extremely diagnostic if present in more than trace amounts. *Calamagrostis rubescens* frequently dominates the herb layer, often accompanied by *Chamaenerion* (= *Chamerion*) *angustifolium*. Regenerating and/or scattered surviving mature *Pseudotsuga menziesii*, or sometimes *Abies lasiocarpa*, may be present.

Classification Comments: CEAVEL-AMEALN/MAIRAC is similar, but with codominant *Prunus emarginata* and/or *Amelanchier alnifolia* (along with *Ceanothus velutinus*), and typically a more species-rich herb layer with little *Calamagrostis rubescens*. Stands sampled in Washington (which have *Paxistima myrsinites* and *Salix scouleriana* prominent in the shrub layer and *Calamagrostis rubescens* often the dominant herb) may represent a distinct subtype or a separate association from this poorly sampled/described association.

Conservation Status Rank: GNR/S3S5Q

Rank Justification: Occurs within a wide geographic range with relatively narrow environmental conditions. Known sites are in protected areas.

Synonyms:
Ceanothus velutinus Shrubland (Crawford et al., 2009)

Salix scouleriana - Acer glabrum - (*Ceanothus velutinus*) Shrubland

Scouler's Willow - Douglas Maple - (Snowbrush Ceanothus) Shrubland



Abbrev: SALSCO-ACEGLA-(CEAVEL)

EL Code: CEGL008236

Macrogroup: Cool Interior Chaparral

Group: Western North American Montane Sclerophyll Scrub

Alliance: *Ceanothus velutinus* Shrubland

Range: Occurs in the eastern North Cascades. It may occur in the Okanogan Mountains of Washington and British Columbia and perhaps the Central Rocky Mountains.

Plots: NOCA (24)

Environmental Description: These shrublands initiate after stand-replacing fires at mid-montane elevations (700 to 1250 m) on generally moderate (21° average slope) southwesterly aspects (204° average aspect).

Vegetation Description: This association is characteristically species-rich. A dense, tall shrub layer is codominated by *Salix* sp. (usually *Salix scouleriana*) and *Acer glabrum*. *Paxistima myrsinites* typically dominates the shorter shrub layer. *Amelanchier alnifolia*, *Sorbus scopulina* (diagnostic), and *Rubus nutkanus* (= *parviflorus*) may be prominent among other diverse shrubs. Shrub-form *Acer macrophyllum*, *Vaccinium membranaceum* (diagnostic), *Acer circinatum*, and *Prunus emarginata* often occur. *Ceanothus velutinus* is often present, but usually not prominent. The herb layer is diverse and variable; *Thalictrum occidentale*, *Maianthemum racemosum*, *Pteridium aquilinum*, *Chamaenerion* (= *Chamerion*) *angustifolium*, and *Prosartes* (= *Disporum*) *hookeri* are common. *Pseudotsuga menziesii* and *Abies lasiocarpa* regeneration are often present.

Classification Comments: *Salix* spp. (usually *Salix scouleriana*) codominates with *Acer glabrum* and *Ceanothus velutinus* is absent or low in cover. *Sorbus scopulina*, *Rubus nutkanus* (= *parviflorus*), and *Viola glabella* are differential within this alliance. CEAVEL is similar, but *Ceanothus velutinus* is usually not prominent in this type (it may be present). Crawford et al. (2009) proposed a *Taxus brevifolia* / *Paxistima myrsinites* Shrubland association, but that type is included as minor variation within SALSCO-ACEGLA-(CEAVEL). Additional sampling showed that the single constituent classification plot was an outlier.

Conservation Status Rank: GNR/SNR

Rank Justification:

Synonyms:
> *Taxus brevifolia* / *Paxistima myrsinites* Shrubland (Crawford et al., 2009)

Ledum groenlandicum - Kalmia microphylla / *Sphagnum spp.* Shrub Bog

Bog Labrador-tea - Alpine Laurel / Peatmoss species Shrub Bog



Abbrev: LEDGRO-KALMIC/SPHAGN

EL Code: CEGL003414

Macrogroup: North Pacific Bog & Fen

Group: North Pacific Acidic Open Bog & Fen

Alliance: *Ledum groenlandicum - Kalmia microphylla - Rhynchospora alba* Shrub & Open Bog, p. B-22

Range: Occurs on the Olympic Peninsula and throughout the Puget Trough as far south as Olympia.

Plots: Other (22)

Environmental Description: These are low-elevation bogs or poor fens occurring in depressions or surrounding lakes or ponds. Water tables are at or near the surface for much of the growing season, with saturated peat soils and acidic, nutrient-poor conditions. Well-developed hummocks are often present.

Vegetation Description: *Rhododendron* (= *Ledum*) *groenlandicum* and/or *Kalmia microphylla* form a dense, short-shrub layer. Other dwarf-shrubs frequently present are *Vaccinium oxycoccos* and *Gaultheria shallon*. A variety of herbaceous species may occur, the most frequent are usually *Drosera rotundifolia* and *Comarum palustre* (= *Potentilla palustris*). *Sphagnum* spp. are the dominant feature in the between and beneath vascular plants.

Classification Comments: TSUHET-(THUPLI)/LEDGRO/SPHAGN is similar, but with an open canopy of stunted conifers.

Conservation Status Rank: G4/S2

Rank Justification: These communities are particularly sensitive to changes in hydrology and precipitation patterns.

Synonyms:

Kalmia occidentalis - Ledum groenlandicum / *Sphagnum* spp. community type (Kunze, 1994)

Ledum groenlandicum - Kalmia microphylla - Sphagnum Wb50 (MacKenzie & Moran, 2004)

Ledum groenlandicum - Kalmia microphylla / *Sphagnum* spp. Shrubland (Crawford et al., 2009; Copass & Ramm-Granberg, 2016)

Photo Credit: Joe Rocchio

Carex (*aquatilis* var. *dives*, *nigricans*, *utriculata*) - *Caltha leptosepala* ssp. *howellii* Fen

(Sitka Sedge, Black Alpine Sedge, Northwest Territory Sedge) - Howell's Marsh-marigold Fen



Abbrev: CAR(AQUD,NIG,UTR)-CALLEP

EL Code: CWWA000169

Macrogroup: North Pacific Bog & Fen

Group: North Pacific Circumneutral to Alkaline Open Fen

Alliance: *Carex aquatilis* var. *dives* - *Carex cusickii* Intermediate Fen, p. B-27

Range: Documented in the West and North Cascades of Washington.

Plots: MORA (3), NOCA (7), OLYM (12), Other (18)

Environmental Description: Occurs as small fens on flat or gently sloping sites in the lower subalpine zone, or at montane elevations with cold air drainage (500 to 2050 m). Soils are organic and permanently saturated. Small rivulet channels typically meander through the stand.

Vegetation Description: *Carex nigricans* and *Caltha leptosepala* typically dominate an extremely short herb layer. *Carex nigricans* is occasionally replaced by other montane/subalpine sedges (e.g., *Carex spectabilis*, *C. illota*, *C. aquatilis* var. *dives*, or *C. kelloggii*). *Leptarrhena pyrolifolia* is often present and in some cases replaces *Caltha leptosepala*. *Calamagrostis canadensis* is sometimes prominent to codominant in a taller graminoid layer. Scattered clumps of short subalpine willows (e.g., *Salix commutata*) may be present.

Classification Comments: INR proposed a *Carex nigricans* - *Carex lenticularis* - (*Calamagrostis canadensis*) association that lumped portions of CAR(AQUD,NIG,UTR)-CALLEP and CALCAN Pacific. Those two associations may occur in close proximity to one another, but WNHP considers them as separate communities.

Conservation Status Rank: GNR/S1S2

Rank Justification: This association may be particular vulnerable to changes in snowpack driven by climate change.

Synonyms:

Carex (*aquatilis* var. dives, nigricans) - *Caltha leptosepala* ssp. *howellii* Herbaceous Vegetation (Crawford et al. 2009)

> *Leptarrhena pyrolifolia* Herbaceous Vegetation (Crawford et al. 2009)

Carex / *Caltha* Community Type (Henderson, 1973)

Caltha leptosepala (Murray, 2000)

Pinus contorta var. *contorta* / *Ledum groenlandicum* / *Sphagnum* spp. Treed Bog

Beach Pine / Bog Labrador-tea / Peatmoss species Treed Bog

Abbrev: PINCON/LEDGRO/SPHAGN

EL Code: CEGL003337

Macrogroup: North Pacific Bog & Fen

Group: North Pacific Maritime Wooded Bog & Poor Fen

Alliance: *Pinus contorta* - *Tsuga heterophylla* / *Ledum groenlandicum* / *Sphagnum capillifolium* Bog Woodland, p. B-29

Range: Documented from coastal Washington and British Columbia.

Plots: Other (23)

Environmental Description: These are low-elevation bogs or poor fens occurring in depressions or surrounding lakes or ponds. Water tables are at or near the surface for much of the growing season, with saturated peat soils and acidic, nutrient-poor conditions. Substrates are a mixture of *Sphagnum*, fibrous, heath, and woody peat. Well-developed hummocks are often present.

Vegetation Description: The open woodland tree canopy is dominated by *Pinus contorta* var. *contorta*. *Tsuga heterophylla* or *Thuja plicata* may also occur in smaller amounts. The well-developed shrub layer is dominated by *Rhododendron* (= *Ledum*) *groenlandicum*, or codominated by that species and *Gaultheria shallon* or *Kalmia microphylla*. The herb layer can be sparse to moderately dense and often has abundant *Pteridium aquilinum*. A well-developed moss layer is usually dominated by *Sphagnum* spp., which is always at least present.

Classification Comments: TSUHET-(THUPLI)/LEDGRO/SPHAGN is similar, but dominated by *Tsuga heterophylla* and/or *Thuja plicata*.

Conservation Status Rank: G3/S2

Rank Justification: This association is represented by few occurrences within a limited geographic range. These communities are particularly sensitive to changes in hydrology and precipitation patterns.

Synonyms:
Pinus contorta / *Ledum groenlandicum* / *Sphagnum* spp. Community Type (Kunze, 1994)
Pinus contorta var. *contorta* / *Ledum groenlandicum* / *Sphagnum* spp. Woodland (Crawford et al., 2009)

Tsuga heterophylla - (*Thuja plicata*) / *Ledum groenlandicum* / *Sphagnum* spp. Treed Bog

Western Hemlock - (Western Red-cedar) / Bog Labrador-tea / Peatmoss species Treed Bog



Abbrev: TSUHET-(THUPLI)/LEDGRO/SPHAGN

EL Code: CEGL003339

Macrogroup: North Pacific Bog & Fen

Group: North Pacific Maritime Wooded Bog & Poor Fen

Alliance: *Pinus contorta - Tsuga heterophylla* / *Ledum groenlandicum* / *Sphagnum capillifolium* Bog Woodland, p. B-29

Range: Occurs primarily on the outer coast of the Olympic Peninsula, but also in the northern Puget Trough lowlands and possibly into British Columbia.

Plots: Other (14)

Environmental Description: These are low-elevation bogs or poor fens occurring in depressions or surrounding lakes or ponds. Water tables are at or near the surface for much of the growing season, with saturated peat soils and acidic, nutrient-poor conditions. Substrates are a mixture of *Sphagnum*, fibrous, heath, and woody peat. Well-developed hummocks are often present.

Vegetation Description: An extremely open tree layer is dominated by short (< 5 m), widely spaced, slow-growing *Tsuga heterophylla,* and/or *Thuja plicata*. *Pinus contorta* var. *contorta* may be present with less cover. Trees form an open overstory and are generally widely and irregularly spaced. The well-developed shrub layer is codominated by *Rhododendron* (= *Ledum*) *groenlandicum* and/or *Kalmia microphylla*. *Vaccinium oxycoccos* and *Gaultheria shallon* may also be present. Taller shrubs such as *Malus fusca* and *Frangula* (= *Rhamnus*) *purshiana* may be present, particularly on elevated hummocks. A variety of herbaceous species may be present, such as *Drosera rotundifolia*, *Rhynchospora alba*, and *Comarum palustre*, but these do not typically contribute much cover. *Pteridium aquilinum* is one common exception. *Sphagnum* spp. dominate a well-developed moss layer.

Classification Comments: This association is represented by few occurrences within a limited geographic range. These communities are particularly sensitive to changes in hydrology and precipitation patterns.

Conservation Status Rank: G3/S2

Rank Justification:

Synonyms:
Tsuga heterophylla / *Ledum groenlandicum* / *Sphagnum* spp. Community Type (Kunze, 1994)
Tsuga heterophylla - (*Thuja plicata*) / *Ledum groenlandicum* / *Sphagnum* spp. Woodland (Crawford et al., 2009)

Photo Credit: Joe Rocchio

***Thuja plicata - Tsuga heterophylla* / *Lysichiton americanus* / *Sphagnum spp*. Treed Fen**

Western Red-cedar - Western Hemlock / American Skunk-cabbage / Peatmoss species Woodland



Abbrev: THUPLI-TSUHET/LYSAME/SPHAGN

EL Code: CEGL001787

Macrogroup: North Pacific Bog & Fen

Group: North Pacific Maritime Wooded Bog & Poor Fen

Alliance: *Pinus contorta - Tsuga heterophylla* / *Ledum groenlandicum* / *Carex livida* Coastal Bog Woodland, p. B-31

Range: Common in hypermaritime coastal British Columbia and also occurs on the western coastal plain of the Olympic Peninsula.

Plots: OLYM (4), Other (5)

Environmental Description: Poor fens or bogs in basins or on gentle slopes. Soils are generally saturated and composed of a mixture of fibrous *Sphagnum* and woody peat.

Vegetation Description: An open and relatively stunted tree canopy is dominated by *Thuja plicata* and *Tsuga heterophylla*, frequently with *Picea sitchensis* present. The shrub layer (rooted on woody debris) is dominated by *Gaultheria shallon*, with frequent *Rhododendron menziesii* (= *Menziesia ferruginea*), *Frangula* (= *Rhamnus*) *purshiana*, and *Vaccinium ovalifolium* (= *alaskaense*). The well-developed herb layer is dominated by *Lysichiton americanus* and *Struthiopteris* (= *Blechnum*) *spicant*. *Carex obnupta*, *C*. *echinata* ssp. *echinata*, and/or *C*. *utriculata* are often present and sometimes codominant. *Sphagnum* spp. usually dominate the moss layer and have at least 15% cover.

Classification Comments: TSUHET-THUPLI/VACOVAL-GAUSHA/LYSAME typically occurs as a closed forest (not a stunted, open woodland) and has little or no *Sphagnum* spp.

Conservation Status Rank: G3G4/S1S2

Rank Justification: Occurs only in bogs or poor fens, and is sensitive to changes in hydrology or water quality and to logging disturbance.

Synonyms:

Thuja plicata - Tsuga heterophylla / *Gaultheria shallon* / *Lysichiton americanus* / *Sphagnum spp*. Community Type (Kunze, 1994b)

Thuja plicata - Tsuga heterophylla / *Lysichiton americanus* / *Sphagnum* spp. Woodland (Crawford et al., 2009)

Acer circinatum / (*Pteridium aquilinum*) Wet Shrubland

Vine Maple / (Bracken-fern) Wet Shrubland



Abbrev: ACECIR/(PTEAQU)

EL Code: CWWA000204

Macrogroup: Vancouverian Lowland Wet Shrubland, Wet Meadow & Marsh

Group: Vancouverian Wet Shrubland

Alliance: *Alnus viridis - Acer circinatum - Salix sitchensis* Montane Wet Shrubland, p. B-35

Range: Documented in the Olympic and Cascade Mountains of Washington.

Plots: MORA (8), NOCA (14), OLYM (6), Other (5)

Environmental Description: Occurs from low- to mid-montane elevations (500 to 1000 m) on talus, along intermittent streams, or as subirrigated seepage swamps on toeslopes. Some stands result from high-severity fires and persist due to repeated fire or other disturbance. Substrates are typically rocky.

Vegetation: The well-developed tall shrub layer is always dominated by *Acer circinatum*, though other shrubs are commonly present with lower constancy and cover, including *Alnus viridis*, *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*), *Rubus nutkanus* (= *parviflorus*), *Ribes lacustre*, and *Sambucus racemosa*. Shrubby *Acer macrophyllum*, *Acer glabrum*, and *Paxistima myrsinites* may occur in small amounts. *Corylus cornuta*, *Amelanchier alnifolia*, *Rubus spectabilis*, and *Oplopanax horridus* are absent or nearly so. The herb layer is typically sparse; when more developed, it is generally dominated by *Pteridium aquilinum*. *Maianthemum stellatum*, *Trillium ovatum*, and *Galium triflorum* are sometimes present. *Athyrium filix-femina* is absent or nearly so. The rocky substrate often has high nonvascular cover.

Similar Associations: *Acer circinatum*-dominated shrublands with prominent *Acer macrophyllum* and *Acer glabrum* and significant cover from *Paxistima myrsinites*, *Corylus cornuta*, and/or *Amelanchier alnifolia* usually represent ACEMAC/ACECIR-PAXMYR-(CORCOR), particularly east of the Cascade Crest. ABILAS-PSEMEN/ ACECIR is similar to occurrences of this association found on talus, but that association has relatively open tree and shrub layers. Riparian sites with substantial with *Athyrium filix-femina*, *Tolmiea menziesii*, or other wet site indicators are included in ACECIR/ATHFIL-TOLMEN, which tends to occur on cooler, often north-facing slopes.

Conservation Status Rank: GNR/S4

Rank Justification: This association occurs across a broad geographic range, with few known.

Synonyms:
Acer circinatum Shrubland (Crawford et al., 2009)
Acer circinatum Plant Community (Diaz & Mellen, 1996)

Acer circinatum / *Athyrium filix-femina - Tolmiea menziesii* Shrub Swamp

Vine Maple / Common Ladyfern - Piggyback Plant Shrub Swamp



Abbrev: ACECIR/ATHFIL-TOLMEN

EL Code: CEGL003291

Macrogroup: Vancouverian Lowland Wet Shrubland, Wet Meadow & Marsh

Group: Vancouverian Wet Shrubland

Alliance: *Alnus viridis - Acer circinatum - Salix sitchensis* Montane Wet Shrubland, p. B-35

Range: Occurs in the Olympic Mountains as the western Cascades of Oregon and Washington.

Plots: MORA (14), NOCA (6), OLYM (2), Other (8)

Environmental Description: Found at low to middle elevations (300 to 1250 m), typically on steep slopes, but occasionally on gentle slopes or flat sites. Sites include moist talus, lower ends of avalanche chutes, and headwater streambanks.

Vegetation Description: A well-developed tall shrub layer is dominated by *Acer circinatum*. Shorter shrubs, including *Rubus spectabilis* (77% constancy, 8% mean cover), *Oplopanax horridus* (87% constancy, 12% mean cover), and *Sambucus racemosa* (53% constancy, 3% mean cover) are often prominent. The well-developed herb layer is characterized by the presence to dominance of *Athyrium filix-femina* and/or *Tolmiea menziesii*. Other common herbaceous species include *Claytonia sibirica*, *Polystichum munitum*, *Maianthemum stellatum*, *Galium triflorum*, and *Stachys cooleyae* (= *chamissonis* var. *cooleyae*).

Classification Comments: Upland stands with substantial *Polystichum munitum*, but without *Athyrium filix-femina*, *Tolmiea menziesii*, or other wet site indicators are included in ACEMAC/ACECIR-PAXMYR-(CORCOR). That type tends to occur on warmer, often south-facing slopes. Ac*er circinatum - Oplopanax horridus* / *Athyrium filix-femina* Shrub Swamp may be a more appropriate name for this association (CEGL003291) than the name currently recognized in the USNVC.

Conservation Status Rank: G5/S4

Rank Justification: Many natural-origin stands occur on protected lands.

Synonyms:
Acer circinatum / *Stachys cooleyae* Association (Diaz & Mellen, 1996)
Acer circinatum / *Athyrium filix-femina - Tolmiea menziesii* Shrubland (Crawford et al., 2009)
Acer circinatum / *Corydalis scouleri* Community Type (Mycek, 1994)
Acer circinatum / *Oemleria cerasiformis* / *Athyrium filix-femina* Community Type (Mycek, 1994)
Acer circinatum / *Oplopanax horridum - Rubus spectabilis* Association (Kovalchik & Clausnitzer, 2004)
Acer circinatum / Forb Association (Henderson & Peter, 1982)

Alnus viridis ssp. *sinuata* - *Rubus spectabilis* - (*Oplopanax horridus*) Wet Shrubland

Sitka Alder - Salmonberry - (Devil's-club) Wet Shrubland



Abbrev: ALNVIR-RUBSPE-(OPLHOR)

EL Code: CWWA000045

Macrogroup: Vancouverian Lowland Wet Shrubland, Wet Meadow & Marsh Macrogroup

Group: Vancouverian Wet Shrubland Group

Alliance: *Alnus viridis* - *Acer circinatum* - *Salix sitchensis* Montane Wet Shrubland, p. B-35

Range: Documented in the Olympic and Cascade Mountains of Washington

Plots: MORA (16), NOCA (29), OLYM (18), Other (33)

Environmental Description: Occurs from lower montane to subalpine elevations (550 to 1750 m), usually on moderate to steep talus, debris fields, or subirrigated avalanche chutes.

Vegetation Description: The well-developed tall shrub layer is dominated by *Alnus viridis* and/or *Rubus spectabilis*, sometimes with a slightly lower shrub layer characterized by >10% cover of *Oplopanax horridus* (36% constancy). *Sambucus racemosa* is the only other shrub species present with >30% constancy. Frequently occurring herbs include *Athyrium filix-femina*, *Veratrum viride*, *and Claytonia sibirica*. *Streptopus lanceolatus*, *Maianthemum stellatum*, *Dicentra formosa*, and *Viola glabella*. *Callitropsis* (= *Cupressus*) *nootkatensis* is the most commonly occurring tree species, but it is never prominent.

Classification Comments: ALNVIR MESIC sometimes appears similar, but lacks prominent *Oplopanax horridus* and/or codominant *Rubus spectabilis*. This association concept represents a merger of *Alnus viridis* ssp. *sinuata* - *Oplopanax horridus* Shrubland (CEGL001157) and *Alnus viridis* ssp. *sinuata* - *Rubus spectabilis* / *Athyrium filix-femina* Shrubland, a preliminary association that was included in Crawford et al. (2009). This merged concept also includes all plots that made up INR's proposed *Alnus viridis* / *Pteridium aquilinum* - *Athyrium filix-femina* Shrubland. CALNOO/OPLHOR is similar, but it is dominated by scrubby *Callitropsis* (= *Cupressus*) *nootkatensis*.

Conservation Status Rank: GNR/S4

Rank Justification: This association is relatively widespread, with few known.

Synonyms:
> *Alnus viridis* ssp. *sinuata* - *Oplopanax horridus* Shrubland (Crawford et al., 2009)
> *Alnus viridis* ssp. *sinuata* - *Rubus spectabilis* / *Athyrium filix-femina* Shrubland (Crawford et al., 2009)

Alnus viridis ssp. *sinuata* - *Acer circinatum* Shrub Swamp

Sitka Alder - Vine Maple Shrub Swamp



Abbrev: ALNVIR-ACECIR

EL Code: CEGL001155

Macrogroup: Vancouverian Lowland Wet Shrubland, Wet Meadow & Marsh

Group: Vancouverian Wet Shrubland

Alliance: *Alnus viridis* - *Acer circinatum* - *Salix sitchensis* Montane Wet Shrubland, p. B-35

Range: Occurs in the Olympic Mountains and the Cascade Range of Oregon and Washington.

Plots: OLYM (2), Other (1)

Environmental Description: Occurs at low- to mid-montane elevations (650 to 1250 m), on frequently steep slopes (documented up to 45°) in talus fields or avalanche chutes. This association has also been reported from floodprone riparian settings (Diaz & Mellen, 1996).

Vegetation Description: The well-developed tall shrub layer is codominated by *Alnus viridis* ssp. *sinuata* and *Acer circinatum*. *Rosa nutkana* and *Rubus nutkanus* (= *parviflorus*) are usually present. Shrubby *Acer macrophyllum* may be prominent. The herb layer is variable, but often includes *Polystichum munitum*, *Anaphalis margaritacea*, *Castilleja miniata*, *Dichanthelium acuminatum*, *Eriophyllum lanatum*, *Lomatium martindalei*, *Campanula rotundifolia*, *Carex mertensii*, *Mycelis muralis*, *Prosartes smithii*, *Phlox diffusa*, *Fragaria virginiana* ssp. *glauca*, and/or *Heuchera micrantha* (all of which are differential relative to other *Alnus viridis*-dominated associations). Moss and lichen ground cover may be prominent.

Classification Comments: Despite the dominance of *Alnus viridis*, this poorly described association is better characterized as an upland association. Additional plot data may support moving this to an upland shrubland group. This Cascadian association is similar to ALNVIR MESIC (CEGL002633), but with codominant *Acer circinatum*. ALNVIR MESIC is more common east of the Cascade Crest.

Conservation Status Rank: G4G5/S4

Rank Justification: This association is relatively widespread and has few known, but its classification status is also unclear.

Synonyms:
Acer circinatum - *Alnus incana* association (Diaz & Mellen, 1996)
Alnus viridis ssp. *sinuata* / *Acer circinatum* Shrubland (Henderson & Peter, 1982; Crawford et al., 2009)
II. Shrubland *Alnus sinuata*, *Acer circinatum*, *Ribes bracteosum* (del Moral, 1973)

Cornus sericea Pacific Shrub Swamp

Red-osier Dogwood Pacific Shrub Swamp



Abbrev: CORSER Pacific

EL Code: CEGL005301

Macrogroup: Vancouverian Lowland Wet Shrubland, Wet Meadow & Marsh

Group: Vancouverian Wet Shrubland

Alliance: *Alnus viridis* - *Acer circinatum* - *Salix sitchensis* Montane Wet Shrubland, p. B-35

Range: This association is widespread in western Washington and Oregon.

Plots: NOCA (7), Other (4)

Environmental Description: Documented from sea level to 850 m on riparian floodplains, headwater streambanks, and, less frequently, gently sloping stabilized talus. Some stands occur in avalanche runout zones. Sites may be frequently flooded, but soils are somewhat well-drained and do not remain inundated.

Vegetation Description: These dense shrublands are dominated by *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*). Other shrub species are commonly present to prominent, including *Salix sitchensis* (45% constancy, 14% mean cover), *Acer circinatum* (45% constancy, 14% mean cover), and *Rubus spectabilis* (36% constancy, 2% mean cover). The herb layer varies from nearly nonexistent to well-developed. *Athyrium filix-femina*, *Maianthemum racemosum*, *M. stellatum*, *Galium triflorum*, *Tolmiea menziesii*, and *Urtica dioica* are most frequent. *Impatiens capensis* and *Ribes triste* are useful differential species when present.

Classification Comments: Crawford et al. (2009) included *Cornus sericea* Shrubland (CEGL001165), an extremely similar shrubland of the Columbia Basin, Intermountain Basin, Rocky Mountains, and portions of the Colorado Plateau. However, most *Cornus* (*stolonifera*, *occidentalis*) (= *sericea*)-dominated stands west of the Cascade Crest in the Washington national parks belong to CORSER Pacific. One stand of CORSER/ATHFIL (CWWA000336) has been documented in eastern NOCA. That association is differentiated by eastside indicators such as *Picea engelmannii*, *Acer glabrum* var. *douglasii*, and *Actaea rubra*. *Symphoricarpos albus*, *Cinna latifolia*, and *Trautvetteria caroliniensis* are also strong indicators for CORSER/ATHFIL. ALNVIR-RUBSPE-(OPLHOR) is a similar wet shrubland, but differentially dominated by *Alnus viridis* (*Oplopanax horridus* is also differential). SALSIT/EQUARV-PETFRI is sometimes similar, as well, but *Salix sitchensis*, *Ribes bracteosum*, and *Equisetum arvense* help differentiate it.

Conservation Status Rank: GNR/SU

Rank Justification: Insufficient information for ranking.

Synonyms:
Cornus sericea Pacific Coast Shrubland Association (Rocchio et al., 2012)
Cornus stolonifera Association (Diaz & Mellen, 1996)
Cornus sericea ssp. *sericea* / *Lysichiton americanum* (Murray, 2000)

Oplopanax horridus Pacific Coast Wet Shrubland

Devil's-club Pacific Coast Wet Shrubland



Abbrev: OPLHOR Pacific

EL Code: CWWA000114

Macrogroup: Vancouverian Lowland Wet Shrubland, Wet Meadow & Marsh

Group: Vancouverian Wet Shrubland

Alliance: *Alnus viridis - Acer circinatum - Salix sitchensis* Montane Wet Shrubland, p. B-35

Range: Occurs in the Olympic Mountains and the Cascade Range of Oregon, Washington, and British Columbia.

Plots: MORA (2), NOCA (1), Other (3)

Environmental Description: Occurs at low- to mid-montane elevations (700 to 1350 m) in floodplains, sloping seepage swamps, landslide zones, and along headwater streambanks.

Vegetation Description: The well-developed shrub layer is dominated by *Oplopanax horridus*. Some combination of *Ribes bracteosum*, *Rubus spectabilis*, and *Vaccinium ovalifolium* (= *alaskaense*) usually codominate, or are at least prominent. The rich herb layer often includes substantial *Athyrium filix-femina*, *Corydalis scouleri*, *Oxalis oregana*, *Polystichum munitum*, *Tolmiea menziesii*, *Petasites frigidus*, *Stachys cooleyae* (= *chamissonis* var. *cooleyae*), *Circaea alpina*, or *Claytonia sibirica*. This association occurs in much larger patches in British Columbia.

Classification Comments: This small-patch association was not documented in stands large enough for map training plots—INR lumped this with *Rubus spectabilis - Ribes bracteosum* Shrubland (= *Ribes bracteosum - Rubus spectabilis* Wet Shrubland, CWWA000135) in a combined RIBBRA-RUBSPE-(OPLHOR) mapping association.

Conservation Status Rank: GNR/S4

Rank Justification: This association occurs within a narrow environmental range, but is widespread in the Olympics and Cascades in Washington, as well as Oregon and British Columbia.

Synonyms:
Oplopanax horridus Shrubland (Chappell, 1999; Peter, 2000; Crawford et al., 2009)
Oplopanax horridus / *Corydalis scouleri* Community Type (Mycek, 1994)
Oplopanax horridus - Acer circinatum (Murray, 2000)
Oplopanax horridus Association (Diaz & Mellen, 1996)
Oplopanax horridum / Fern Association (Henderson & Peter, 1982)

Ribes bracteosum - Rubus spectabilis Wet Shrubland

Stink Currant - Salmonberry Wet Shrubland



Abbrev: RIBBRA-RUBSPE

EL Code: CWWA000135

Macrogroup: Vancouverian Lowland Wet Shrubland, Wet Meadow & Marsh

Group: Vancouverian Wet Shrubland

Alliance: *Alnus viridis - Acer circinatum - Salix sitchensis* Montane Wet Shrubland, p. B-35

Range: Documented in the Cascades, on the Olympic Peninsula, and elsewhere in western Washington.

Plots: MORA (2), OLYM (2), Other (7)

Environmental Description: Occurs at low to upper montane elevations (450 to 1450 m) on gently sloping depositional bars, lower streambanks, floodprone terraces, and landslide surfaces. Substrates vary from very coarse (cobbles and gravel) to relatively fine-textured sands and silts (generally overlaying cobbles) (Diaz & Mellen, 1996).

Vegetation Description: The well-developed shrub layer is dominated by *Rubus spectabilis* and/or *Ribes bracteosum*. The rich herb layer is usually dominated by *Athyirum filix-femina*. Common associate forbs include *Viola glabella*, *Stachys cooleyae* (= *chamissonis* var. *cooleyae*), *Adiantum aleuticum* (= *pedatum*), *Galium trifloum*, *Mertensia paniculata*, *Tolmiea menziesii*, and *Polystichum munitum*.

Classification Comments: *Rubus spectabilis* Wet Shrubland (CEGL003472) occurs on coastal bluffs and headlands; it is uncommon in Washington. *Ribes bracteosum* / *Athyrium filix-femina* Wet Shrubland (CWWA000394) is a very similar—but poorly described—association that lacks *Rubus spectabilis*. It is more common in the East and North Cascades (though it was not documented at NOCA). *Rubus spectabilis - Ribes hudsonianum* Wet Shrubland (CWWA000419) is a similar association of the East Cascades with *Ribes hudsonianum* present to codominant and with little or no *Ribes bracteosum*. (*Rubus spectabilis*) / *Athyrium filix-femina* Wet Shrubland (CWWA000417) is dominated by *Athyrium filix-femina*, with *Rubus spectabilis* merely present.

Conservation Status Rank: GNR/S4S5

Rank Justification: This association occurs within a narrow environmental range, but appears to be widespread in the Olympic and Cascade Mountains. Sites are naturally disturbance-driven.

Synonyms:
Rubus spectabilis - Ribes bracteosum Shrubland (Crawford et al., 2009)
Ribes bracteosum / *Athyrium filix-femina* (Murray, 2000)
Ribes bracteosum / Forb Association (Henderson & Peter, 1982)

Salix sitchensis / *Equisetum arvense* - *Petasites frigidus* Wet Shrubland

Sitka Willow / Field Horsetail - Arctic Sweet-colt's-foot Wet Shrubland



Abbrev: SALSIT/EQUARV-PETFRI

EL Code: CEGL003296

Macrogroup: Vancouverian Lowland Wet Shrubland, Wet Meadow & Marsh

Group: Vancouverian Wet Shrubland

Alliance: *Alnus viridis* - *Acer circinatum* - *Salix sitchensis* Montane Wet Shrubland, p. B-35

Range: This association is common in western Washington

Plots: MORA (1), NOCA (9), OLYM (3), Other (3)

Environmental Description: Occurs at low to montane elevations (300 to 1350 m) on well-developed floodplains or low terraces along larger streams and rivers. Soils are typically coarse (primarily gravel and sand).

Vegetation Description: *Salix sitchensis* dominates a moderate to well-developed tall shrub layer. Young *Alnus rubra* is often present to codominant in the tall shrub layer and shrubby *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*) is often present. The herb layer is variable in density and composition, though *Equisetum arvense* is usually present.

Classification Comments: SALSIT, SALIX-SPIDOU/CAR(AQUD,OBN,UTR), and CORSER-SALIX-SPIDOU are all swamp associations (rather than riparian). These associations typically have mucky soils and differential species such as *Lysichiton americanus*, *Spiraea douglasii*, *Carex utriculata*, *C. obnupta*, *C. aquatilis* var. *dives*, and *Malus fusca*. SAL(MEL,SIT) and ALNRUB ALLUVIAL also occur on alluvial bars, but they are more frequently flooded and typically much less vegetated. SALSIT-(ALNINC)/ANGARG is a mesic shrubland of higher elevations that is more common east of the Cascade Crest. It is differentiated by relatively mesic associate forbs, such as *Angelica arguta*.

Conservation Status Rank: G4?/S4?

Rank Justification: This association is widespread and common, but may be sensitive to changes in flood regime.

Synonyms:
Salix sitchensis / *Petasites frigidus* Association (Diaz & Mellen, 1996)
Salix sitchensis-Rubus spectabilis Community Type (Mycek, 1994)
Salix sitchensis / (*Equisetum arvense*) Association (Murray, 2000)
Salix sitchensis / *Equisetum arvense* - *Petasites frigidus* Shrubland (Crawford et al., 2009)
Salix sitchensis / *Equisetum arvense* Community (Diaz & Mellen, 1996; Chappell, 1999)
Salix sitchensis / *Equisetum arvense* Vegetation Types (4 variants) (Titus et al., 1999)

Salix sitchensis Wet Shrubland

Sitka Willow Wet Shrubland



Abbrev: SALSIT

EL Code: CEGL002896

Macrogroup: Vancouverian Lowland Wet Shrubland, Wet Meadow & Marsh

Group: Vancouverian Wet Shrubland

Alliance: *Alnus viridis - Acer circinatum - Salix sitchensis* Montane Wet Shrubland, p. B-35

Range: Occurs throughout western Oregon and Washington.

Plots: NOCA (2), OLYM (1), Other (6)

Environmental Description: Occurs at lower montane elevations (usually 500 to 1200 m) in low-gradient riparian settings with little scouring, backwaters, oxbows, filled-in beaver ponds, and flat swamps. Soils are frequently mucky.

Vegetation Description: *Salix sitchensis* dominates a well-developed tall shrub layer. *Spiraea douglasii* is often present, but never prominent. *Rubus spectabilis*, *Alnus viridis*, and/or *Cornus* (*stolonifera*, *occidentalis*) (= *sericea*) are sometimes present to prominent, but always have much less cover than *Salix sitchensis*. The herb layer varies with shrub density, but one or more of *Lysichiton americanus*, *Athyrium filix-femina*, *Carex aquatilis* var. *dives*, and *Scirpus microcarpus* are always dominant. *Equisetum arvense* may be present, but never dominates.

Classification Comments: SALSIT/EQUARV-PETFRI is a similar association of frequently flooded (and scoured) riparian sites. It occurs on coarser sediment and lacks swamp indicators such as *Lysichiton americanus*, *Carex aquatilis* var. *dives*, *etc*. SALIX-SPIDOU/CAR(AQUD,OBN,UTR) is more common at lower elevations and differentiated by dominant or codominant *Spiraea douglasii*. *Carex utriculata*, *Carex obnupta*, are also differential for that type. CORSER-SALIX-SPIDOU is another lowland swamp association. It is differentiated by *Malus fusca*, *Sparganium emersum*, *Carex obnupta*, and dominant or codominant *Cornus* (*stolonifera*, *occidentalis*) (= *sericea*).

Conservation Status Rank: G4/S3?

Rank Justification: This association occurs within a narrow environmental range, but is widespread in the Olympic and Cascade Mountains. It is likely sensitive to changes in hydrology.

Synonyms:
Salix sitchensis Association (Diaz & Mellen, 1996)
Salix sitchensis Complex (Christy, 2004a)
Salix sitchensis Shrubland (Crawford et al. 2009)

***Salix spp. - Spiraea douglasii* / *Carex* (*aquatilis* var. *dives*, *obnupta*, *utriculata*) Wet Shrubland**

Sitka Willow - Rose Spirea / (Sitka Sedge, Slough Sedge, Northwest Territory Sedge) Wet Shrubland



Abbrev: SALIX-SPIDOU/CAR(AQUD,OBN,UTR)

EL Code: CWWA000199

Macrogroup: Vancouverian Lowland Wet Shrubland, Wet Meadow & Marsh

Group: Vancouverian Wet Shrubland

Alliance: *Spiraea douglasii - Malus fusca - Salix sitchensis* Lowland Wet Shrubland, p. B-37

Range: Documented in the Puget Trough and North Cascades, as well as the southwestern Washington coast. Very common in the Big Beaver valley at NOCA.

Plots: NOCA (9), Other (22)

Environmental Description: Perennially saturated/inundated, flat shrub swamps at sea level to lower montane elevations (0 to 800 m). These often grade into neighboring herbaceous marshes and fens.

Vegetation Description: *Spiraea douglasii* and *Salix* spp. (usually *S. sitchensis*) codominate an open to well-developed tall shrub layer. *Lonicera involucrata*, *Malus fusca*, and/or *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*) are sometimes present, but rarely more than prominent. The well-developed herb layer is dominated by *Carex obnupta*, *C. aquatilis* var. *dives*, or *C. utriculata*. *Lysichiton americanus* is often prominent to codominant. *Sphagnum* spp. sometimes form a well-developed nonvascular layer.

Classification Comments: This association is very similar to *Salix* (*hookeriana*, *sitchensis*) - *Spiraea douglasii* Wet Shrubland (CEGL003386). Lumping the two associations may be appropriate. SALSIT is similar, but does not have codominant *Spiraea douglasii*, nor *Carex obnupta* or *C. utriculata*. CORSER-SALSIT-SPIDOU is another low-elevation shrub swamp. It is differentiated by dominant or codominant *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*).

Conservation Status Rank: GNR/S2Q

Rank Justification: The conservation status rank of this association is uncertain following classification updates.

Synonyms:

Salix spp. - *Spiraea douglasii* / *Carex obnupta* Community Type (Kunze, 1994b)

Kalmia microphylla / *Carex nigricans* Wet Dwarf-shrubland

Alpine Laurel / Black Alpine Sedge Wet Dwarf-shrubland



Abbrev: KALMIC/CARNIG

EL Code: CEGL001402

Macrogroup: Western North American Montane Marsh, Wet Meadow & Shrubland

Group: Vancouverian & Rocky Mountain Subalpine & Alpine Snowbed, Wet Meadow & Dwarf-Shrubland

Alliance: *Kalmia microphylla - Cassiope mertensiana - Dryas drummondii* Wet Dwarf-shrubland, p. B-44

Range: This association may be widespread throughout the western United States and western Canada. It is currently known from California, Washington, Oregon, Montana, Colorado, and British Columbia (Keeler-Wolf & Reid, 2018). In Washington, it has been documented in the West, North, and East Cascades and in the central Rocky Mountains.

Plots: MORA (2), NOCA (5), Other (9)

Environmental Description: Occurs in moist subalpine and alpine (1000 to 2050 m) meadows, snowbeds, lake margins, and other low-gradient depressions. Flat or gently sloping, with poorly drained soils, late melting snowfields and/or adjacent to streams or lakes. Water tables are often at or near the surface for much of the growing season, organic decomposition is slow, and soils are organic (Keeler-Wolf & Reid, 2018).

Vegetation Description: These communities are dominated by a mix of dwarf ericaceous shrubs and herbaceous wet meadow species. *Kalmia microphylla* dominates the dwarf-shrub layer (often < 25% total cover). *Vaccinium deliciosum*, *Vaccinium cespitosum*, and occasionally *Phyllodoce empetriformis* and *Cassiope mertensiana* may codominate. Dwarf *Salix* spp. may occur, but always with much less cover than the ericaceous shrubs. Graminoids typically dominate the herb layer, particularly *Carex nigricans*. *Carex scopulorum*, *Carex spectabilis*, *Danthonia intermedia*, *Carex kelloggii* (= *lenticularis*), and/or *Calamagrostis canadensis* may all occur in abundance. Forbs may be prominent, including *Caltha leptosepala*, *Tauschia stricklandii*, *Veronica cusickii*, *Potentilla flabellifolia*, *Oreostemma alpigenum*, and *Erigeron glacialis* (= *peregrinus*).

Classification Comments: CARNIG occasionally has *Kalmia microphylla* present (but only rarely as much as prominent). Stands with a nonvascular layer of *Sphagnum spp*. may represent *Kalmia microphylla* / *Carex spp*. - *Caltha leptosepala* ssp. *howellii* / *Sphagnum spp*. Fen (CWWA000225).

Conservation Status Rank: G3G4/S3

Rank Justification: This association occurs within a narrow range of environments, with few known, within protected areas. Climate change will likely affect this vegetation.

Synonyms:
Carex nigricans - Kalmia polifolia Herbaceous Vegetation (Keeler-Wolf, 2002; Keeler-Wolf et al., 2012)
Kalmia microphylla / *Carex nigricans* (Wooten & Morrison, 1995)
Kalmia microphylla / *Carex nigricans* Association (Crowe et al., 2004)
Kalmia microphylla - Carex nigricans Dwarf-shrubland (Crawford et al., 2009)
Kalmia polifolia / *Aster alpigenus* Association (Hamann, 1972)
Salix farriae / *Carex nigricans* Association (Kovalchik, 1993)
Blackish Sedge - Mountain Laurel Association (Taylor, 1984)

Carex nigricans Wet Meadow

Black Alpine Sedge Wet Meadow



Abbrev: CARNIG

EL Code: CEGL001816

Macrogroup: Western North American Montane Marsh, Wet Meadow & Shrubland

Group: Vancouverian & Rocky Mountain Subalpine & Alpine Snowbed, Wet Meadow & Dwarf-Shrubland

Alliance: *Carex nigricans - Sibbaldia procumbens - Trollius laxus* Wet Meadow, p. B-45

Range: Occurs in the Cascades from northern California to southern British Columbia and in the central Rocky Mountains of Idaho, Montana, and eastern Washington.

Plots: MORA (2), NOCA (16), OLYM (13), Other (27)

Environmental Description: Occurs in depressions, snowbeds, and seepy alluvial fans in subalpine heath. Soils are poorly drained and seasonally wet soils. Stands on alluvial fans occur below springs and seeps and may be laced with rivulets or irrigated by sheet flow (Christy, 2004c).

Vegetation Description: These small patch wet meadows are dominated by relatively dense *Carex nigricans*. In western Washington, *Luetkea pectinata*, *Carex spectabilis*, *Potentilla flabellifolia*, *Vahlodea atropurpurea*, and *Juncus drummondii* may be prominent. Dwarf-shrubs *Phyllodoce empetriformis*, *Vaccinium deliciosum* and *Cassiope mertensiana* frequently occur on slightly elevated hummocks, but contribute less than 10% cover. *Salix commutata* and/or *Kalmia microphylla* may be present in small amounts.

Classification Comments: KALMIC/CARNIG has dominant or codominant *Kalmia microphylla*. CAR(AQUD,NIG,UTR)-CALLEP has codominant *Caltha leptosepala*, *Carex aquatilis* var. *dives*, or *C. utriculata*. CARSPE-POTFLA is similar, but differentiated by codominant *Carex spectabilis*. It is usually more diverse, as well, with greater cover of relatively mesic species such as *Bistorta* (= *Polygonum*) *bistortoides*, *Erigeron glacialis* (= *peregrinus*), *Hieracium triste*, and *Lupinus latifolius*. The USNVC also recognizes *Carex nigricans - Erythronium montanum* Wet Meadow (CEGL001817) and *Carex nigricans - Luetkea pectinata* Wet Meadow (CEGL001819) in Washington. Crawford et al. (2009) proposed merging those into a single, coastal Pacific Northwest association included a *Carex nigricans* Wet Meadow concept. Further analysis showed insufficient differentiation between NCCN mapping plots for that merged concept and the existing *Carex nigricans* Wet Meadow (CEGL001816). CEGL001817 and CEGL001819 should be archived. Stands occurring near seeps and springs, with high moss cover (particularly *Philonotis fontana*) may represent CARNIG-(PETFRI)/PHIFON.

Conservation Status Rank: G4/S4

Rank Justification: This association is widely distributed, with many occurrences in protected areas.

Synonyms:

< *Carex nigricans* Herbaceous Vegetation (Crawford et al., 2009)
Carex nigricans (Kovalchik, 1987; McCain & Christy, 2005)
Carex nigricans Community (Douglas, 1972)
Carex nigricans Association (Henderson & Peter, 1982; Kovalchik, 1993; Christy, 2004a; Crowe et al., 2004; Kovalchik & Clausnitzer, 2004)

Carex spectabilis - Potentilla flabellifolia Wet Meadow

Showy Sedge - High Mountain Cinquefoil Wet Meadow



Abbrev: CARSPE-POTFLA

EL Code: CEGL001829

Macrogroup: Western North American Montane Marsh, Wet Meadow & Shrubland

Group: Vancouverian & Rocky Mountain Subalpine & Alpine Snowbed, Wet Meadow & Dwarf-Shrubland

Alliance: *Carex nigricans - Sibbaldia procumbens - Trollius laxus* Wet Meadow, p. B-45

Range: Restricted to the Washington Cascades and Olympic Mountains

Plots: MORA (16), NOCA (2), OLYM (5), Other (12)

Environmental Description: Moist basins from 1250 to 2100 m. Sites are typically flat to concave, seasonally wet, and may occur in small concavities on ridgetops.

Vegetation Description: Vegetation is codominated by *Potentilla flabellifolia* and *Carex spectabilis Carex nigricans* is usually prominent to codominant. *Caltha leptosepala* and *Juncus drummondii* are often prominent on moister sites. *Vaccinium deliciosum* and *Phyllodoce empetriformis* are frequently present, with low cover. Other frequent species with low cover include *Bistorta* (= *Polygonum*) *bistortoides*, *Erigeron glacialis* (= *peregrinus*), *Hieracium triste*, *Lupinus latifolius* (= *arcticus*), and *Luetkea pectinata*.

Classification Comments: This association has been moved back and forth between a wet meadow group (G520) and an alpine-subalpine tundra group (G320) in the USNVC. Plot notes and the presence of *Caltha leptosepala* suggests this type fits better in G520. CARNIG is differentiated from this association by clear dominance of *Carex nigricans* and greater cover from *Juncus drummondii* and snowbed species such as *Luetkea pectinata*, *Micranthes* (= *Saxifraga*) *tolmiei*, and *Luzula piperi*.

Conservation Status Rank: G4Q/S3

Rank Justification: Occurs within a limited geographic range and environment. Known sites are in protected areas. Climate change will likely affect this vegetation.

Synonyms:
Carex spectabilis - Carex nigricans - (*Potentilla flabellifolia*) Herbaceous Vegetation (Crawford et al., 2009)
Carex spectabilis - Potentilla flabellifolia (Bourgeron & Engelking, 1994)
Carex spectabilis / *Potentilla flabellifolia* Association (Hamann, 1972)
Carex spectabilis Association (Kovalchik, 2001)

Heracleum maximum Wet Meadow

Cow Parsnip Wet Meadow



Abbrev: HERMAX

EL Code: CEGL005857

Macrogroup: Western North American Montane-Subalpine-Boreal Marsh, Wet Meadow & Shrubland

Group: Vancouverian-Rocky Mountain Montane Wet Meadow & Marsh

Alliance: *Heracleum maximum - Carex scopulorum* var. *bracteosa - Veratrum viride* Wet Meadow, p. B-50

Range: Occurs in the Washington Cascades and Olympic Mountains. It is also found in Montana and Alberta.

Plots: NOCA (8), OLYM (24)

Environmental Description: Occurs at middle to high elevations, typically on moderate to steep south-facing slopes. May occur in avalanche tracks and meadows with evidence of fire or other disturbance, often on rocky soils.

Vegetation Description: A diverse, forb-dominated meadow dominated or codominated by *Heracleum maximum*. A variety of other species may be codominant, including *Thalictrum occidentale*, *Saussurea americana*, *Cirsium edule*, *Eucephalus engelmannii*, *Bromus sitchensis*, *Elymus glaucus* and *Chamaenerion* (= *Chamerion*) *angustifolium*. Other common associates include *Achillea millefolium*, *Artemisia ludoviciana*, *Senecio triangularis*, *Veratrum viride*, *Carex spectabilis*, *Anaphalis margaritacea*, *Lupinus latifolius* (= *arcticus*), *Hydrophyllum fendleri*, *Angelica arguta*, and others.

Classification Comments: Mixed shrub/herbaceous meadows with prominent *Rubus nutkanus* (= *parviflorus*) and *Pteridium aquilinum* are likely RUBPAR/CHAANG-HERMAX.

Conservation Status Rank: G3G4/S3S5

Rank Justification: Occurs within a narrow range of environments, with few known, within protected areas.

Synonyms:
Heracleum maximum Herbaceous Vegetation (Hop et al., 2007)

Saussurea americana - Heracleum maximum Wet Meadow

Cow Parsnip Wet Meadow

Abbrev: SAUAME-(HERMAX)

EL Code: CEGL001945

Macrogroup: Western North American Montane-Subalpine-Boreal Marsh, Wet Meadow & Shrubland

Group: Vancouverian-Rocky Mountain Montane Wet Meadow & Marsh

Alliance: *Heracleum maximum* - *Carex scopulorum* var. *bracteosa* - *Veratrum viride* Wet Meadow, p. B-50

Range: Occurs in the northeastern Olympic Mountains. It is also found in Montana and Alberta.

Plots: OLYM (4), Other (1)

Environmental Description: Occurs at middle to high elevations, typically on moderate to steep south-facing slopes. May occur in avalanche tracks and meadows with evidence of fire or other disturbance, often on rocky soils.

Vegetation Description: These are dense tall meadows with dominant or codominant *Saussurea americana*. *Heracleum maximum* is sometimes present and can be codominant. *Bromus sitchensis* is also frequent and sometimes codominant. Several other forbs and grasses occur commonly and can be prominent to codominant.

Classification Comments: INR merged this association with HERMAX for modeling purposes. Mixed shrubland/ herbaceous meadows with prominent *Rubus nutkanus* (= *parviflorus*) and *Pteridium aquilinum* are likely RUBPAR/CHAANG-HERMAX.

Conservation Status Rank: G3G4/S2S3?

Rank Justification: Occurs within a limited environmental range.

Synonyms:
Moist *Saussurea* forb type (Kuramoto & Bliss, 1970)
Saussurea americana - (*Heracleum maximum*) Herbaceous Vegetation (Crawford et al., 2009)

Salix commutata / Senecio triangularis Wet Shrubland

Undergreen Willow / Arrowleaf Ragwort Wet Shrubland



Abbrev: SALCOM/SENTRI

EL Code: CWWA000397

Macrogroup: Western North American Montane Marsh, Wet Meadow & Shrubland

Group: Western Montane-Subalpine Riparian & Seep Shrubland

Alliance: *Salix commutata* Wet Shrubland, p. B-51

Range: Documented in the Olympic Mountains and the North Cascades of Washington, likely extending into British Columbia.

Plots: NOCA (4), OLYM (6), Other (10)

Environmental Description: Occurs on gently sloping toeslopes and debris aprons, often with rocky substrates, usually where perennial streams and snowmelt drain into subalpine alluvial fans and flat basins. Elevations range from 900 to 1950 m. Stands may be flooded by normal peak streamflow events.

Vegetation Description: These shrublands are dominated by *Salix commutata* or, less frequently, *Salix barclayi*, with moist herbs such as *Valeriana sitchensis*, *Senecio triangularis*, *Potentilla flabellifolia*, and *Arnica latifolia* dominant beneath, without significant graminoid cover. *Caltha leptosepala* and *Equisetum* spp. are frequently present.

Classification Comments: *Salix commutata* / *Carex scopulorum* Wet Shrubland (CEGL001189) is similar, but more frequently occurs in shrub carr settings east of the Cascade Crest (and into the Blue and Rocky Mountains) with saturated, organic soils and a lush herb layer dominated by *Carex scopulorum* var. *bracteosa*. SALCOM is another similar association with organic soils. It occurs primarily west of the Cascade Crest, but with differential species such as *Leptarrhena pyrolifolia* and *Carex aquatilis* var. *dives*.

Conservation Status Rank: GNR/SNR

Rank Justification: This association has not been ranked, but many occurrences are found in protected areas.

Synonyms:

Salix commutata / Mesic Forb (Kovalchik & Clausnitzer, 2004)

Salix commutata Wet Shrubland

Undergreen Willow Wet Shrubland



Abbrev: SALCOM

EL Code: CWWA000236

Macrogroup: Western North American Montane Marsh, Wet Meadow & Shrubland

Group: Western Montane-Subalpine Riparian & Seep Shrubland

Alliance: *Salix commutata* Wet Shrubland, p. B-51

Range: Occurs in the Cascade Range (primarily west of the Cascade Crest) and in the Olympic Mountains.

Plots: NOCA (4), OLYM (16), Other (2)

Environmental Description: Occurs in high elevation (1250 to 1800 m) valley bottoms and on gentle slopes with saturated organic soils (shrub carrs), often with braided, meandering channels throughout.

Vegetation Description: *Salix commutata* or *Salix barclayi* dominate an open shrub layer (usually < 2 m tall). The lush herb layer is often diverse, but usually characterized by a combination of *C. kelloggii*, *C. aquatilis* var. *dives*, *C. nigricans*, *C. neurophora*, *Leptarrhena pyrolifolia*, *Caltha biflora*, *Pedicularis groenlandica*, *Juncus drummondii*, *Equisetum arvense*, and/or *Parnassia fimbriata*. Relatively mesic herbs such *Lupinus latifolius* (= *arcticus*), *Phleum alpinum* and *Potentilla flabellifolia* may be present, but are rarely prominent.

Classification Comments: SALCOM/SENTRI occurs on primarily mineral soils, with relatively mesic forbs such as *Valeriana sitchensis*, *Senecio triangularis*, *Potentilla flabellifolia*, and *Arnica latifolia*. *Salix commutata* / *Carex scopulorum* Wet Shrubland (CEGL001189) is a similar shrub carr association that is more common east of the Cascade Crest (and into the Blue and Rocky Mountains) and with an herb layer dominated *Carex scopulorum* var. *bracteosa*.

Conservation Status Rank: GNR/S2

Rank Justification: This association occurs within a narrow environmental range. It may be sensitive to changes in snowpack related to climate change.

Synonyms:
Salix commutata Association (Christy, 2004a)
Salix commutata (Murray, 2000)
Salix commutata / *Heracleum lanatum* Community Type (Henderson et al., 1979)
Salix commutata / *Lupinus latifolius* Community Type (Henderson et al., 1979)
Salix commutata Shrubland (Crawford et al, 2009)

Alnus viridis ssp. *sinuata* / Mesic Forbs Wet Shrubland

Sitka Alder / Mesic Forbs Wet Shrubland



Abbrev: ALNVIR MESIC

EL Code: CEGL002633

Macrogroup: Western North American Montane Marsh, Wet Meadow & Shrubland

Group: Western Montane-Subalpine Riparian & Seep Shrubland

Alliance: *Alnus viridis* ssp. *sinuata* Riparian Shrubland, p. B-52

Range: Occurs in the north-central Rocky Mountains of Montana and Alberta, as well as the Cascade Range and eastern Olympic Mountains of Washington.

Plots: MORA (1), NOCA (11), OLYM (8), Other (17)

Environmental Description: Occurs at mid- to upper-montane elevations (700 to 1950 m in the Washington national parks) in low-gradient creek drainages, midslope avalanche chutes, cirque basins, and in relatively steep headwater drainages, all of which flood from spring snowmelt or summer rainstorms. The wet soils and frequent fluvial disturbance act to discourage colonization by coniferous trees and allow full sunlight to reach the ground at these sites. Soils are often well-drained colluvial or glacial-fluvial deposits, generally sandy loam to clay loam over sorted gravels and sands (Kittel, 2004).

Vegetation Description: The well-developed tall shrub layer is dominated by *Alnus viridis*. In Washington, few other shrubs are present, with the exception *of Sambucus racemosa* and occasionally *Rubus nutkanus* (= *parviflorus*). The herb layer is diverse but variable: *Thalictrum occidentale*, *Claytonia sibirica*, *Viola glabella*, *Heracleum maximum*, *Prosartes* (= *Disporum*) *hookeri, Hydrophyllum fendleri,* and *Maianthemum stellatum* occur most frequently. Ferns are typically not prominent. Scattered subalpine trees (*Callitropsis* (= *Cupressus*) *nootkatensis* and *Abies lasiocarpa*) may be present.

Classification Comments: ALNVIR-RUBSPE/(ATHFIL) occurs in wetter sites, with *Rubus spectabilis* and higher fern cover. ACEMAC/ACECIR-PAXMYR-(CORCOR) is a scrubby upland association with dry-site indicators such as *Corylus cornuta*, *Paxistima myrsinites*, and *Amelanchier alnifolia*. Crawford et al. (2009) included *Alnus viridis* ssp. *sinuata* Shrubland (CEGL001154), with the note that, “More plots or a broader regional analysis may be needed to better describe and distinguish this association from related types. This is association is very similar to the *Alnus viridis* ssp. *sinuata* / Mesic Forbs Shrubland association (CEGL002633).” Additional analysis supports merger of those two associations and placement of the resulting unit in Western Montane-Subalpine Riparian & Seep Shrubland (G527). For the time being, CEGL002633 is included in this document, as it represents the majority of sampled plots.

Conservation Status Rank: G3G4/S3S4

Rank Justification: This association is relatively widespread and has few known.

Synonyms:
Alnus sinuata / Mesic Forb (Crowe & Clausnitzer, 1997; Kovalchik & Clausnitzer, 2004)
Alnus viridis ssp. *sinuata* Shrubland (Crawford et al., 2009)

Salix sitchensis - (*Alnus incana*) / *Angelica arguta* Wet Shrubland

Sitka Willow - Gray Alder / Lyall's Angelica Wet Shrubland



Abbrev: SALSIT-(ALNINC)/ANGARG

EL Code: CWWA000403

Macrogroup: Western North American Montane Marsh, Wet Meadow & Shrubland

Group: Western Montane-Subalpine Riparian & Seep Shrubland

Alliance: *Alnus viridis* ssp. *sinuata* Riparian Shrubland, p. B-52

Range: Occurs in the East and North Cascades, Okanogan Mountains, Blue Mountains, and Canadian Rockies.

Plots: NOCA (3), Other (19)

Environmental Description: These occur on relatively mesic slopes, headwater streambanks, and avalanche chutes from 700 to 1600 m elevation. Overbank flooding/scouring is uncommon.

Vegetation Description: *Salix sitchensis* dominates an open to well-developed shrub layer. *Alnus incana* or (more commonly in the Cascades) *A. viridis* are often prominent to codominant. The frequently lush and diverse herb layer may be dominated by *Angelica arguta*, *Viola glabella*, *Chamaenerion* (= *Chamerion*) *angustifolium*, *Heracleum maximum* (= *lanatum*), *Thalictrum occidentale*, *Canadanthus modestus*, *Mertensia paniculata*, and/or *Valeriana sitchensis*, among others.

Classification Comments: INR proposed a SALSIT-ALNVIR/(CHAANG-HERMAX) association occupying higher topographic positions and elevations than other *Salix sitchensis*-dominated communities. Such stands were often at the bottom of avalanche chutes. Most plots near the Cascade Crest (and further east) are a better fit for this existing type.

Conservation Status Rank: GNR/SNR

Rank Justification: This association has not been ranked.

Synonyms:
Salix spp. / Mesic Forb (Crowe & Clausnitzer, 1997; Kovalchik & Clausnitzer, 2004)

Salix (*melanopsis*, *sitchensis*) Cobble Bar Wet Shrubland

(Dusky willow, Sitka Willow) Cobble Bar Wet Shrubland



Abbrev: SAL(MEL,SIT)

EL Code: CEGL002705

Macrogroup: Western North American Montane Marsh, Wet Meadow & Shrubland

Group: Western Montane-Subalpine Riparian & Seep Shrubland

Alliance: *Alnus incana - Cornus sericea* Riparian Shrubland, p. B-55

Range: In Washington, this association has been documented near the Cascade Crest and on the east slope of the North Cascades, as well as the Okanogan and Rocky Mountains. It is wide-ranging, also occurring in eastern Oregon and Idaho and possibly extending into California, Montana, Utah, and Wyoming (Murphy & Reid, 2004).

Plots: NOCA (1), Other (11)

Environmental Description: These are early-seral communities on low- to moderate-gradient montane rivers and streams of wide canyons and U-shaped valleys. Elevations are typically 900 to 1500 m. Stands usually form on cobble-rich alluvial bars, with varying amounts of gravel and boulders intermixed, overlain by thin sandy deposits. Sites are point bars, sidebars, and mid-channel bars that are flood-scoured nearly every year, with minimal deposition of sand occurring in microsites with low fluvial energy (Murphy & Reid, 2004).

Vegetation Description: In the Cascades, this association is typically dominated by a sparse to moderately developed shrub layer of *Salix sitchensis*. Further east and south, *Salix melanopsis* codominates or replaces *S. sitchensis* as the dominant shrub. Other *Salix* spp. may be present, but never dominant. *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*) and (in the Cascades) *Alnus rubra* seedlings and saplings (< 5 m tall) are frequently present. The herb layer is generally sparse, low in diversity, and highly variable across stands. The most common species are tolerant of flood scouring and seasonal desiccation and include "weedy" species adapted to disturbed and open sites (e.g., *Achillea millefolium*, *Anaphalis margaritacea*, *Phacelia hastata*, *Chamaenerion* (= *Chamerion*) *latifolium*, *Eriophyllum lanatum*, *Hieracium albiflorum*, and *Solidago canadensis*). Weedy grasses are common, particularly at lower elevations. *Equisetum arvense* is frequently present (Murphy & Reid, 2004).

Classification Comments: Alluvial bars dominated by *Alnus rubra* and/or *Populus trichocarpa* seedlings and saplings represent occurrences of ALNRUB ALLUVIAL. SALSIT/EQUARV-PETFRI is an extremely similar association that is much more common west of the Cascade Crest. It typically has a more developed shrub layer. The presence of *Athyrium filix-femina*, *Ribes bracteosum*, and/or *Rubus spectabilis* is strongly differential for SALSIT/EQUARV-PETFRI, relative to this association. This association is an early seral stage of deciduous floodplain forests and riparian shrublands and may develop into any number of other associations given periods without regular flooding.

Conservation Status Rank: G3G4/S1?

Rank Justification: Stands form on frequently flood-scoured alluvial cobble bars. Such sites are widely dispersed and dependent on stream meandering and alluvial bar formation resulting from a natural hydrologic regime. Although this cobble bar association has been documented at only 32 stands in mountainous areas of eastern Washington, eastern Oregon, and central Idaho, this association is likely to occur in suitable habitat elsewhere in these areas. The actual number of occurrences is probably higher than currently known. (Murphy & Reid, 2004).

Synonyms:

Salix melanopsis Association (Crowe et al., 2004)
Salix melanopsis Community Type (Kerr, 2000)
Salix sitchensis Plant Community (Diaz & Mellen, 1996)
Salix / Alluvial Bar Association (Kovalchik & Clausnitzer, 2004)

***Athyrium americanum* - *Cryptogramma acrostichoides* Alpine Sparse Vegetation**

Alpine Ladyfern - American Rockbrake Alpine Sparse Vegetation



Abbrev: ATHAME-CRYACR

EL Code: CEGL005900

Macrogroup: Rocky Mountain-Sierran Alpine Tundra

Group: Rocky Mountain & Sierran Alpine Bedrock & Scree

Alliance: Rocky Mountain Alpine Sparse Herb Bedrock & Scree

Range: Occurs in northwestern Montana west to the North Cascades and northeastern Olympic Mountains in Washington State.

Plots: NOCA (13), OLYM (3)

Environmental Description: Mid-montane elevations on steep, often subirrigated talus with late-persisting snow cover.

Vegetation Description: Pockets of vegetation are dominated by *Athyrium distentifolium* ssp. *americanum* (= *A. americanum*) and *Cryptogramma acrostichoides*. In the Washington Cascades and Olympic Mountains, the following herbs are frequently present in small amounts: *Carex spectabilis*, *Luetkea pectinata*, *Juncus drummondii*, *Veratrum viride*, *Valeriana sitchensis*, and *Vahlodea atropurpurea*.

Classification Comments: ELMRAC is similar, but generally occurs on scree (rather than talus) with codominant *Elmera racemosa*. CHALAT-OXYDIG-(VALSIT) is another similar type more common on scree than talus, with forbs greatly exceeding fern cover.

Conservation Status Rank: G2G3/S2S3

Rank Justification: Ecologically restricted, though apparently over a wide geographic range. There are few known.

Synonyms:

Athyrium americanum - *Cryptogramma acrostichoides* Sparse Vegetation (Hop et al., 2007)
Athyrium americanum - *Cryptogramma acrostichoides* Lithomorphic Vegetation (Crawford et al., 2009)
Cryptogrammo crispae - *Athyrietum distentifolii* Association (Damm, 2001)

Saxifraga bronchialis Scree Slope Alpine Sparse Vegetation

Yellow-spot Saxifrage Scree Slope Alpine Sparse Vegetation



Abbrev: SAXBRO

EL Code: CEGL005902

Macrogroup: Rocky Mountain-Sierran Alpine Tundra

Group: Rocky Mountain & Sierran Alpine Bedrock & Scree

Alliance: Rocky Mountain Alpine Sparse Herb Bedrock & Scree

Range: Documented at Glacier National Park, Montana, Waterton Lakes National Park, Alberta, and Olympic National Park, Washington. It may also occur in the Washington Cascades, north into British Columbia.

Plots: NOCA (1), OLYM (5)

Environmental Description: In Washington, this association occurs on rocky ridges and moderately steep slopes near treeline (1650 to 2050 m), frequently with exposed bedrock and scree. Soil development is minimal; what little organic and inorganic matter that accumulates does so under the protective mat of *Saxifraga bronchialis*.

Vegetation Description: The indicator species for this community, *Saxifraga bronchialis*, has a highly variable cover, from trace amounts in exceedingly rocky expressions to approaching 20%. It consistently has the greatest cover of any vascular species, establishing in dense mats that act to block the movement of scree, which lodges upslope against the stout cushions. In the Olympic Mountains, *Douglasia laevigata*, *Cryptogramma acrostichoides*, *Penstemon davidsonii*, *Phacelia sericea*, *Phlox diffusa*, and *Sedum oreganum* join *Achillea millefolium* as common associates with very low cover.

Classification Comments:

Conservation Status Rank: G3?/S2S3

Rank Justification: Appears to have a narrow geographic and environmental range, but occurs on habitats with few known.

Synonyms:
Saxifraga bronchialis scree slope community (Damm, 2001)
Saxifraga bronchialis Scree Slope Sparse Vegetation (Hop et al., 2007)
Saxifraga bronchialis Lithomorphic Vegetation (Crawford et al., 2009)

Empetrum nigrum - Lupinus sellulus Dwarf-shrubland

Black Crowberry - Donner Lake Lupine Dwarf-shrubland



Abbrev: EMPNIG-LUPSEL

EL Code: CEGL001400

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Dwarf-shrubland & Heath

Alliance: Empetrum nigrum Alpine Dwarf-shrubland

Range: Occurs in the Washington Cascades from Mount Rainier north.

Plots: MORA (19), NOCA (4)

Environmental Description: Occurs above upper treeline, on well-drained slopes with north aspects at Mount Rainier and south to west aspects in the North Cascades.

Vegetation Description: The dwarf-shrub *Empetrum nigrum* dominates the vegetation, which typically covers approximately half of the ground surface. Other dwarf-shrubs such as *Phyllodoce glanduliflora* or *Salix nivalis* may be present. *Lupinus lepidus* var. *lobbii* (= *sellulus* var. *lobbii*) is usually present to prominent at Mount Rainier but is less prominent in the North Cascades. The forbs *Erigeron aureus*, *Oreostemma alpigenum*, and *Pedicularis contorta* are frequent at Mount Rainier. *Salix cascadensis* and *Vaccinium cespitosum* are associated short shrubs in the North Cascades.

Classification Comments:

Conservation Status Rank: G3G4/S3

Rank Justification: Occurs on protected land within a restricted range of environments with few known.

Synonyms:
Empetrum nigrum - Lupinus sellulus var. *lobbii* Dwarf-shrubland (Crawford et al., 2009)
Empetrum nigrum / *Lupinus lepidus* (Bourgeron & Engelking, 1994)
Empetrum nigrum / *Lupinus lepidus* Association (Hamann, 1972)

Phyllodoce glanduliflora / *Oreostemma alpigenum* Alpine Dwarf-shrubland

Yellow Mountain-heath / Tundra Aster Alpine Dwarf-shrubland



Abbrev: PHYGLA/OREALP

EL Code: CEGL001408

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Dwarf-shrubland & Heath

Alliance: *Empetrum nigrum* Alpine Dwarf-shrubland

Range: Occurs in the Washington Cascades and Olympic Mountains.

Plots: NOCA (5), OLYM (3), Other (3)

Environmental Description: Occurs above treeline, usually on upper slopes and ridgelines. Soils are usually well-drained.

Vegetation Description: *Phyllodoce glanduliflora* dominates or codominates the open vegetation. *Cassiope mertensiana* is usually present and occasionally codominant. Other species can include *Penstemon procerus*, *Carex spectabilis*, *Phyllodoce empetriformis*, *Lupinus lepidus* var. *lobbii* (= *sellulus* var. *lobbii*), and *Oreostemma alpigenum*.

Classification Comments: Crawford et al. 2009 recommended a name change to *Phyllodoce glanduliflora* - (*Cassiope mertensiana*) Dwarf-shrubland.

Conservation Status Rank: G3G4/S3

Rank Justification: Occurs at few sites, but is represented within protected areas and has few known. Climate change will likely affect this vegetation.

Synonyms:

Cassiope mertensiana - Phyllodoce glanduliflora Community (del Moral, 1979)
Phyllodoce glanduliflora - (*Cassiope mertensiana*) Dwarf - shrubland (Crawford et al., 2009)
Phyllodoce glanduliflora / *Aster alpigenus* (Bourgeron & Engelking, 1994)
Phyllodoce glanduliflora / *Aster alpigenus* Association (Hamann, 1972)
Phyllodoce glanduliflora Community (Henderson, 1973; Douglas & Bliss, 1977)

Cassiope mertensiana - Phyllodoce empetriformis Alpine Dwarf-shrubland

Western Moss-heather - Pink Mountain-heath Alpine Dwarf-shrubland



Abbrev: CASMER-PHYEMP

EL Code: CEGL001398

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Dwarf-shrubland & Heath

Alliance: *Phyllodoce empetriformis - Cassiope mertensiana - Vaccinium deliciosum* Alpine Dwarf-shrubland

Range: Occurs in the Oregon and Washington Cascades and Olympic Mountains, south to California, and east into Idaho.

Plots: MORA (27), NOCA (38), OLYM (42), Other (6)

Environmental Description: Occurs at or above treeline, usually in the lower portion of the alpine zone. Sites have well-drained mesic soils, and can be rocky. At MORA and OLYM, this type frequently occurs in flat or concave basins that may lie below treeline.

Vegetation Description: The vegetation is dominated by Cassiope mertensiana and/or Phyllodoce empetriformis. Both are typically present and more often prominent. Tree species are usually absent. Other relatively abundant species (sometimes prominent) include Luetkea pectinata, Vaccinium deliciosum, Carex spectabilis, Pedicularis ornithorhyncha, and Antennaria lanata. Trees are usually absent.

Classification Comments: PHYEMP-VACDEL is a similar subalpine type, while this association is more frequent in alpine settings (*Phyllodoce glanduliflora* present, few lush, subalpine herbs, and reduced cover and stature of *Vaccinium deliciosum*). Relatively sparse sites may appear similar to LUEPEC-SAXTOL, but have greater cover of *Cassiope mertensiana* and *Phyllodoce empetriformis* and are characterized by greater soil development.

Conservation Status Rank: G5/S3S4

Rank Justification: Occurs within a limited geographic range and environment. Known sites are in protected areas. Climate change will likely affect this vegetation.

Synonyms:
Cassiope mertensiana - Phyllodoce empetriformis Alpine Dwarf-shrubland (Crawford et al., 2009)
Cassiope mertensiana - Phyllodoce empetriformis (Bourgeron & Engelking, 1994)
Cassiope mertensiana Community (Edwards, 1980)

Phyllodoce empetriformis - Vaccinium deliciosum Alpine Dwarf-shrubland

Pink Mountain-heath - Cascade Bilberry Alpine Dwarf-shrubland



Abbrev: PHYEMP-VACDEL

EL Code: CEGL001407

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Dwarf-shrubland & Heath

Alliance: *Phyllodoce empetriformis - Cassiope mertensiana - Vaccinium deliciosum* Alpine Dwarf-shrubland

Range: Occurs in the Olympic Mountains and Washington Cascades. It may extend into British Columbia.

Plots: MORA (30), NOCA (35), OLYM (75), Other (26)

Environmental Description: This association represents the most common subalpine meadow type in moister climatic areas outside of rain shadows. It is usually found on moderate to gentle slopes with well-drained soils.

Vegetation Description: These are relatively dense dwarf-shrublands codominated by *Phyllodoce empetriformis* and *Vaccinium deliciosum*. *Cassiope mertensiana* can be prominent but is rarely codominant. Numerous other species can be present, although typically at low cover. *Luetkea pectinata*, *Bistorta* (= *Polygonum*) *bistortoides*, and *Carex spectabilis* are most frequent.

Classification Comments: The subalpine setting, greater abundance of *Vaccinium deliciosum*, and lack of alpine-associated species distinguishes this association from CASMER-PHYEMP (CEGL001398). The two could be combined into a generalized heather type encompassing alpine and subalpine sub-associations. Dwarf shrublands with significant herbaceous cover may represent occurrences of PHYEMP/LUPLAT, which has higher cover of *Lupinus latifolius* (= *arcticus*) and other subalpine herbs.

Conservation Status Rank: G4/S3

Rank Justification: This association is very common in subalpine settings. It is represented within protected areas, with few known. Climate change will likely affect this vegetation.

Synonyms:

Cassiope mertensiana - Phyllodoce empetriformis Community (Douglas, 1972)
Phyllodoce empetriformis - Vaccinium deliciosum - (*Cassiope mertensiana*) Subalpine Dwarf - shrubland (Crawford et al., 2009)
Phyllodoce empetriformis / *Vaccinium deliciosum* (Bourgeron & Engelking, 1994)
Phyllodoce empetriformis / *Vaccinium deliciosum* Association (Henderson & Peter, 1982)
Phyllodoce / *Vaccinium* Community Type (Henderson, 1973)
Heath - Shrub Type (Kuramoto & Bliss, 1970)

Phyllodoce empetriformis / *Lupinus latifolius* Alpine Dwarf-shrubland

Pink Mountain-heath / Broadleaf Lupine Alpine Dwarf-shrubland



Abbrev: PHYEMP/LUPLAT

EL Code: CEGL001406

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Dwarf-shrubland & Heath

Alliance: *Phyllodoce empetriformis* - *Cassiope mertensiana* - *Vaccinium deliciosum* Alpine Dwarf-shrubland

Range: Occurs in the Olympic Mountains and Washington Cascades. It may extend into British Columbia.

Plots: MORA (33), NOCA (8), OLYM (16), Other (6)

Environmental Description: Occurs in the subalpine and lower alpine zones, from 1460 to 2165 m elevation. Soils can be rocky.

Vegetation Description: Dominated by *Phyllodoce empetriformis* or *Vaccinium deliciosum*. *Cassiope mertensiana* is frequently prominent. *Lupinus latifolius* (= *arcticus*) is present to codominant and exceeds cover of *Vaccinium deliciosum* and *Cassiope mertensiana* combined. Other common frequent species include *Luetkea pectinata*, *Hieracium gracile*, *Carex spectabilis*, *Castilleja parviflora* and *Bistorta* (= *Polygonum*) *bistortoides*.

Classification Comments:

Conservation Status Rank: G4?/S2S3

Rank Justification: Occurs at few sites. The association is represented within protected areas and has few known. Climate change will likely affect this vegetation.

Synonyms:

Phyllodoce empetriformis - (*Vaccinium deliciosum*) - *Lupinus* (*arcticus*, *latifolius*) Dwarf-shrubland (Crawford et al., 2009)

Phyllodoce empetriformis / *Lupinus latifolius* (Bourgeron & Engelking, 1994)

Phyllodoce / *Lupinus* Community Type (Henderson, 1973)

Tauschia stricklandii - Vaccinium deliciosum Alpine Meadow

Strickland's Umbrella-wort - Cascade Bilberry Alpine Meadow



Abbrev: TAUSTR-VACDEL

EL Code: CEGL001994

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Dwarf-shrubland & Heath

Alliance: *Phyllodoce empetriformis - Cassiope mertensiana - Vaccinium deliciosum* Alpine Dwarf-shrubland

Range: Restricted to the northern and western sides of Mount Rainier National Park, in Washington.

Plots: MORA (5)

Environmental Description: Occurs on flat, seasonally wet subalpine meadows with poor drainage. Soils are wet in early spring (after snowmelt) and then dry out completely by late summer.

Vegetation Description: The vegetation is dominated by forbs, or a mixture of forbs and dwarf-shrubs. *Tauschia stricklandii* is always dominant or codominant. *Vaccinium deliciosum* is common and typically codominant. *Ranunculus eschscholtzii*, *Oreostemma alpigenum* (= *Aster alpigenus*), *Claytonia lanceolata*, *Danthonia intermedia*, *Lupinus latifolius* (= *arcticus*), and *Antennaria lanata* are frequent. Moss and lichen cover is typically nearly continuous in spaces between vascular plants.

Classification Comments: INR reassigned plots from this association to ANTLAN or KALMIC/CARNIG due to rarity (5 total plots). It may be better classified as a temporarily flooded wetland, rather than an upland association.

Conservation Status Rank: G2/S1S2

Rank Justification: This association has a very small natural range in Washington, being restricted to a portion of Mount Rainier National Park. It occurs in a specific environmental setting. It naturally occurs over a small acreage and there are naturally few sites that support it. Recreational impacts are a possible threat in the form of trampling and trail proliferation.

Synonyms:

Vaccinium deliciosum - Tauschia stricklandii Dwarf-shrubland (Crawford et al., 2009)

Vaccinium deliciosum Parkland Alpine Dwarf-shrubland

Cascade Bilberry Parkland Alpine Dwarf-shrubland



Abbrev: VACDEL

EL Code: CEGL001427

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Dwarf-shrubland & Heath

Alliance: *Phyllodoce empetriformis - Cassiope mertensiana - Vaccinium deliciosum* Alpine Dwarf-shrubland

Range: Occurs in the Washington Cascades and Olympic Mountains and may also occur in Oregon.

Plots: MORA (7), NOCA (1), OLYM (39), Other (5)

Environmental Description: Occurs in subalpine parklands and may extend to lower alpine reaches. Sites have well-drained soils and occur on gentle to moderate slopes.

Vegetation Description: The vegetation is dominated by *Vaccinium deliciosum*. *Phyllodoce em*petriformis and *Cassiope mertensiana*, when present, have less than 10% cover. Associated species are variable. Frequently occurring species include *Bistorta* (= *Polygonum*) *bistortoides*, *Lupinus latifolius* var. *subalpinus* (= *arcticus* ssp. *subalpinus*), *Hieracium gracile*, *Carex spectabilis*, *Veronica cusickii*, and *Valeriana sitchensis*.

Classification Comments: This diverse association is very common as currently defined, with a range of codominant herbs. INR assigned individual mapping plots to alternative associations in order to create functional map classes (e.g., small patches embedded in larger herbaceous meadows were lumped with those communities). Some confusion may be caused by the differing scales between the association concept and NCCN mapping efforts. *Xerophyllum tenax* dominates the herb layer in two Olympic plots and one Mount Rainier plot and may represent a sub-association. Alpine and subalpine sub-associations could also be recognized within this association concept. This association may appear as a sparsely vegetated lithomorphic type on steep, rocky sites where *Vaccinium deliciosum* is the most abundant vascular plant.

Conservation Status Rank: G4G5/S2S3

Rank Justification: This association will likely be affected by climate change.

Synonyms:
Vaccinium deliciosum Dwarf-shrubland (Crawford et al., 2009)
Vaccinium deliciosum / *Valeriana sitchensis - Polygonum bistortoides* Community (Wooten & Morrison, 1995)
Vaccinium deliciosum Community (Douglas, 1972)
Vaccinium deliciosum Community Type (Henderson, 1973)
Vaccinium Community (Houston et al., 1994)

Arctostaphylos uva-ursi Alpine Dwarf-shrubland

Bearberry Alpine Dwarf-shrubland



Abbrev: ARCUVA

EL Code: CEGL001392

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Dwarf-shrubland & Heath

Alliance: A*rctostaphylos uva-ursi* Cascadian Alpine Dwarf-shrubland

Range: This association has been documented at Mount Rainier, but may occur elsewhere in the Washington Cascades.

Plots: MORA (12)

Environmental Description: Occurs at high elevations (1800 to 2225m) on southerly aspects with dry soils in alpine or upper subalpine parklands.

Vegetation Description: *Arctostaphylos uva-ursi* dominates or codominates with *Dasiphora fruticosa* (= *floribunda*). *Juniperus communis* or *Empetrum nigrum* are occasionally prominent to codominant. *Carex nigricans* and *Artemisia furcata* can be prominent. Many herbaceous species typical of high elevations can occur, such as *Festuca brachyphylla*, *Lupinus lepidus* (= *sellulus*) var. *lobbii*, *Cherleria* (= *Minuartia*) *obtusiloba*, *Sabulina* (= *Minuartia*) *rubella*, *Penstemon procerus*, and *Solidago simplex* var. *nana*.

Classification Comments: This is the only association in this alliance. Depending on rangewide analysis, A4086 could potentially be merged with A1078 *Empetrum nigrum* Alpine Dwarf-shrubland Alliance. Additional plots from Mount Rainier had 60% constancy of *Empetrum nigrum* (10% average cover when present) and occupied the same habitat as EMPNIG-LUPSEL Alpine Dwarf-shrubland. Sample sizes were small, however.

Conservation Status Rank: G3G4/S3

Rank Justification: Occurs within a limited geographic and ecological range, but faces few near-term threats.

Synonyms:
Arctostaphylos uva-ursi - (*Dasiphora fruticosa*) Dwarf-shrubland (Crawford et al., 2009)
Arctostaphylos uva-ursi / *Solidago spathulata* Association (Hamann, 1972)
Arctostaphylos uva-ursi (Bourgeron & Engelking, 1994)
Arctostaphylos uva-ursi Community Type (Douglas & Bliss, 1977)

Artemisia ludoviciana - Lomatium martindalei Dry Meadow

White Sagebrush - Cascade Desert-parsley Dry Meadow



Abbrev: ARTLUD-LOMMAR

EL Code: CEGL008245

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Bedrock & Scree

Alliance: Phlox spp. - Lomatium spp. - Carex spp. Alpine Talus & Scree Sparse

Range: Occurs in the Olympic Mountains and at North Cascades National Park. It may also occur in British Columbia.

Plots: NOCA (1), OLYM (13)

Environmental Description: Occur at subalpine elevations (1600 to 2000 m) on moderately sloping (21° mean) south-facing aspects, on scree or unconsolidated talus.

Vegetation Description: *Artemisia ludoviciana* is the most abundant plant (27% average cover). Other herbs may be sparse or form a continuous dry meadow. *Lomatium martindalei* and *Phacelia heterophylla* occur in most sites. *Delphinium glareosum*, *Erysimum arenicola*, *Epilobium anagallidifolium*, *Achillea millefolium*, *Poa secunda*, and *Phlox diffusa* are other frequent associates, though typically with low cover.

Classification Comments: *Artemisia ludoviciana*, *Phacelia heterophylla*, *Delphinium glareosum*, *Poa secunda*, *Epilobium glaberrimum*, and *Penstemon procerus* are differential relative to other associations in this alliance. This type is also typically lusher than other associations in this alliance. Stands on bedrock balds dominated by *Lomatium martindalei* may represent occurrences of the preliminary *Lomatium martindalei* Lithomorphic Vegetation association proposed in Crawford et al. (2009) (based on data from Chappell (2006b)). That is an extremely small-patch type that may occur in the parks (particularly at MORA), but would not have been sampled via the map training methodology.

Conservation Status Rank: GNR/S4

Rank Justification: Occurs within a restricted ecological range with few known.

Synonyms:

Artemisia ludoviciana - Lomatium martindalei Herbaceous Vegetation (Crawford et al., 2009)

Chamerion latifolium - Oxyria digyna* - (*Valeriana sitchensis*) *Alpine Sparse Vegetation

Dwarf Fireweed - Alpine Mountain-sorrel - (Sitka Valerian) Alpine Sparse Vegetation



Abbrev: CHALAT-OXYDIG-(VALSIT)

EL Code: CEGL008263

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Bedrock & Scree

Alliance: Phlox spp. - Lomatium spp. - Carex spp. Alpine Talus & Scree Sparse

Range: Occurs in the North Cascades. It likely occurs elsewhere in the Cascades, as well.

Plots: NOCA (12)

Environmental Description: Occurs on moist, north-facing scree slopes in high elevation basins, typically fed by snowmelt from upslope.

Vegetation Description: Vegetation is typically sparse to open and forb-dominated, with *Chamaenerion* (= *Chamerion*) *latifolium*, *Oxyria digyna*, *Valeriana sitchensis*, and *Athyrium distentifolium* ssp. *americanum* (= *A. americanum*) most common. *Erythranthe* (= *Mimulus*) *lewisii*, *Arnica longifolia*, *Epilobium* spp., and *Senecio triangularis* are often present. *Carex* spp. and *Luetkea pectinata* may be present, but if so, occur with very little cover.

Classification Comments: ELMRAC may appear to be similar, but has codominant Elmera racemosa and typically less total cover. ATHAME-CRYACR is a similar type more common on talus than on scree, with ferns greatly exceeding forb cover. *Athyrium distentifolium* ssp. *americanum* (= *A. americanum*), *Oxyria digyna*, *Chamaenerion latifolium*, *Aruncus dioicus*, *Erythranthe* (= *Mimulus*) *lewisii*, *Senecio triangularis*, *Valeriana sitchensis*, *Alnus viridis* ssp. *sinuata*, *Ribes lacustre*, *Juncus mertensianus*, *Leptarrhena pyrolifolia*, and *Vahlodea atropurpurea* are differential species relative to other associations in this alliance.

Conservation Status Rank: GNR/SNR

Rank Justification:

Synonyms:

> *Valeriana sitchensis-Athyrium filix-femina* Herbaceous Vegetation (Crawford et al., 2009) [Misidentified *Athyrium*]

Dasiphora fruticosa ssp. *floribunda* - (*Phlox diffusa*) Dwarf-shrubland

Shrubby-cinquefoil - (Spreading Phlox) Dwarf-shrubland



Abbrev: DASFRU-(PHLDIF)

EL Code: CEGL008252

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Bedrock & Scree

Alliance: *Phlox* spp. - *Lomatium* spp. - *Carex* spp. Alpine Talus & Scree Sparse

Range: Occurs in the Olympic Mountains and at Mount Rainier National Park, it may be present occasionally elsewhere in the Cascades.

Plots: MORA (3), OLYM (15)

Environmental Description: Occur at high subalpine elevations (1900 to 2150 m) on moderately sloping (22°) frequently southwest-facing aspects, on scree. There is usually some degree of soil development, rather than bedrock or large talus.

Vegetation Description: *Dasiphora fruticosa* dominates this community. *Phlox diffusa*, *Lupinus lepidus*, *Phacelia sericea*, *Solidago multiradiata*, *Smelowskia americana*, *Elymus elymoides*, and *Carex phaeocephala* are frequent associates with lower cover.

Classification Comments: An even more sparsely vegetated *Dasiphora fruticosa* Lithomorphic Vegetation association was proposed in Crawford et al. 2009. This proved to be indistinguishable during map training data collection and has been lumped into this association. Patches of *Dasiphora fruticosa* (= *floribunda*) in non-alpine settings (e.g. bedrock openings, subalpine meadows) are likely variation within another association.

Conservation Status Rank: GNR/S3S5

Rank Justification: Occurs within a limited range of environments within protected areas.

Synonyms:

Dasiphora fruticosa - (*Phlox diffusa*) Dwarf-shrub*land* (Crawford et al., 2009)
> *Dasiphora fruticosa* Lithomorphic Vegetation (Crawford et al., 2009)
Phlox - *Potentilla* community (Houston et al., 1994)

Elmera racemosa Alpine Sparse Vegetation

Yellow Coralbells Alpine Sparse Vegetation



Abbrev: ELMRAC

EL Code: CEGL008253

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Bedrock & Scree

Alliance: *Phlox* spp. - *Lomatium* spp. - *Carex* spp. Alpine Talus & Scree Sparse

Range: Occurs in the Olympic Mountains. It may also occur in high areas of the Washington and Oregon Cascades.

Plots: NOCA (1), OLYM (8)

Environmental Description: Occur at subalpine elevations (1450 to 1900 m) on steep (33° average slope) north-facing aspects, on loose scree. Sites are typically well-shaded and have extremely late snowmelt.

Vegetation Description: *Elmera racemosa* dominates—with average cover of only 6%—the extremely sparse vegetation. *Epilobium anagallidifolium* occurs at most sites. No other species have >45% constancy, but *Valeriana sitchensis*, *Phacelia hastata*, *Luetkea pectinata*, and *Athyrium distentifolium* ssp. *americanum* (= *A. americanum*) are frequently present in small amounts.

Classification Comments: Crawford et al. 2009 proposed this type as Elmera racemosa-(Senecio neowebsteri) Lithomorphic Vegetation. Most supporting plots were from a rare plant (*Senecio neowebsteri*) monitoring data set. In the final mapping data set, *Senecio neowebsteri* was present with only 14% constancy and was not a statistically significant indicator. ATHAME-CRYACR is similar, but generally occurs on talus (rather than scree) without dominant Elmera racemosa. CHALAT-OXYDIG-(VALSIT) is also similar, but has a richer forb layer and again lacks dominant Elmera racemosa.

Conservation Status Rank: GNR/S2S3

Rank Justification: Occurs within limited environments with few known. Sites are within protected areas.

Synonyms:

> *Elmera racemosa* - (*Senecio neowebsteri*) Lithomorphic Vegetation (Crawford et al., 2009)

Eucephalus paucicapitatus - (*Phacelia hastata - Castilleja miniata*) Dry Meadow

Olympic Mountain Aster - (Silverleaf Phacelia - Great Red Indian-paintbrush) Dry Meadow



Abbrev: EUCPAU-(PHAHAS-CASMIN)

EL Code: CEGL008254

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Bedrock & Scree

Alliance: *Phlox* spp. - *Lomatium* spp. - *Carex* spp. Alpine Talus & Scree Sparse

Range: Restricted to the Olympic Mountains and Vancouver Island.

Plots: OLYM (30)

Environmental Description: Occurs at upper montane to subalpine elevations (1400 to 1850 m) on steep (36° average slope), usually south-facing aspects, sometimes on colluvial fans. Soils are poorly developed, with patches of scree or talus.

Vegetation Description: Variably dense vegetation is dominated by *Eucephalus paucicapitatus*. *Castilleja miniata*, *Phacelia hastata*, *Artemisia ludoviciana*, *Lupinus latifolius*, *Phlox diffusa*, and *Valeriana sitchensis* are frequently prominent. Graminoid cover is typically low, though *Festuca roemeri* may be prominent in some stands.

Classification Comments: Dominance by *Eucephalus paucicapitatus* is highly diagnostic. *Phacelia hastata*, *Lupinus latifolius*, and *Castilleja miniata* are differential relative to other associations documented in this alliance. Crawford et al. (2009) proposed a separate *Phacelia hastata* Lithomorphic Vegetation association, but additional sampling indicates that the concept more likely represents variation in other scree associations (such as EUCPAU-(PHAHAS-CASMIN)).

Conservation Status Rank: GNR/S2

Rank Justification: Endemic to the Olympic Mountains and Vancouver Island and occurs within a restricted ecological range on protected land with few known.

Synonyms:
Eucephalus paucicapitatus Herbaceous Vegetation (Crawford et al., 2009)

Luina hypoleuca* - (*Lomatium martindalei* - *Castilleja parviflora*) *Alpine Sparse Vegetation

Littleleaf Silverback - (Cascade Desert-parsley - Mountain Indian-paintbrush) Alpine Sparse Vegetation



Abbrev: LUIHYP-(LOMMAR-CASPAR)

EL Code: CEGL008260

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Bedrock & Scree

Alliance: *Phlox* spp. - *Lomatium* spp. - *Carex* spp. Alpine Talus & Scree Sparse

Range: Documented in the Olympic Mountains. It may also occur in the Cascades from Oregon to British Columbia.

Plots: OLYM (14)

Environmental Description: Occurs on steep, gravelly slopes, along ridges, near-vertical cliffs or within rock crevices at 1300 to 1700 m elevation, usually with exposed mineral soil, scree, or bedrock.

Vegetation Description: Typically sparse vegetation dominated or codominated by *Luina hypoleuca*, usually accompanied by small amounts of *Juniperus communis*, *Lomatium martindalei*, *Castilleja parviflora*, *Lupinus latifolius*, *Phlox diffusa*, and/or *Sedum* spp. *Cryptogramma acrostichoides* and *Silene parryi* are sometimes present.

Classification Comments: This association could arguably be placed in A3781 *Paxistima myrsini*tes - *Saxifraga* spp. - *Luina hypoleuca* Alpine Rock Crevice Alliance, but the habitat is better characterized as scree. Stands on bedrock balds dominated by *Lomatium martindalei* may represent occurrences of the preliminary *Lomatium martindalei* Lithomorphic Vegetation association proposed in Crawford et al. (2009) (based on data from Chappell (2006b)). That is an extremely small-patch type that may occur in the parks (particularly at MORA), but would not have been sampled via the map training methodology.

Conservation Status Rank: GNR/S3S4

Rank Justification: Restricted to a narrow range of habitat, represented in many protected areas with few known.

Synonyms:

Luina hypoleuca Lithomorphic Vegetation (Crawford et al., 2009)

Phlox diffusa - (*Lomatium martindalei*) Meadow

Spreading Phlox - (Cascade Desert-parsley) Meadow



Abbrev: PHLDIF-(LOMMAR)

EL Code: CEGL008262

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Bedrock & Scree

Alliance: *Phlox* spp. - *Lomatium* spp. - *Carex* spp. Alpine Talus & Scree Sparse

Range: Documented in the Olympic Mountains and at Mount Rainier. It may also occur in the North Cascades and elsewhere in the Washington and Oregon Cascades, and perhaps into British Columbia.

Plots: MORA (4), NOCA (1), OLYM (44), Other (7)

Environmental Description: Occurs from 1400 to 1900 m elevation on moderate to steep, south-facing slopes, with well-drained, very shallow, or rocky soils.

Vegetation Description: *Phlox diffusa* is always prominent to codominant. *Lomatium martindalei* is usually present to prominent. Other herbaceous species are present, although few appear consistently. *Achillea millefolium*, *Erysimum arenicola*, and *Phacelia hastata* are frequent associates. *Juniperus communis* is frequently present, but not dominant.

Classification Comments: JUNCOM-PHLDIF is similar, but dominated by the dwarf-shrub *Juniperus communis*. FESVIR-(PHLDIF-ARECAP) shares may species, but is dominated by graminoids. Stands on bedrock balds dominated by *Lomatium martindalei* may represent occurrences of the preliminary *Lomatium martindalei* Lithomorphic Vegetation association proposed in Crawford et al. (2009) (based on data from Chappell (2006b)). That is an extremely small-patch type that may occur in the parks (particularly at MORA), but would not have been sampled via the map training methodology. *Phlox diffusa* Lithomorphic Vegetation and *Phlox diffusa* - *Allium crenulatum* Lithomorphic Vegetation (both also proposed in Crawford et al. (2009)) are additional types that would likely have been too small for map training plots—they occur as alpine stands where *Phlox diffusa* or *Phlox diffusa* AND *Allium crenulatum* are most abundant. High elevation (near and above treeline) stands dominated by *Carex phaeocephala* may represent occurrences of the *Carex phaeocephala* Herbaceous Vegetation association from Crawford et al. (2009). That type was based on data from Houston (1994), but again, it was never found in large enough patches for sampling during map training data collection.

Conservation Status Rank: GNR/S3S4

Rank Justification: Occurs on many sites over a wide elevation range. Lower elevation sites are more subject to exotic species invasion and recreational activities than high elevation sites.

Synonyms:
Phlox diffusa - (*Lomatium martindalei* - *Penstemon subserratus*) (Chappell, 2006b)
Phlox diffusa - (*Lomatium martindalei* - *Carex phaeocephala*) Herbaceous Vegetation (Crawford et al., 2009)
Phlox - *Carex phaeocephala* Community(Houston et al., 1994)

***Lewisia columbiana* - (*Juncus parryi*) Rock Vegetation**

Columbian Bitterroot - (Parry's Rush) Rock Vegetation



Abbrev: LEWCOL-(JUNPAR)

EL Code: CEGL008248

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Bedrock & Scree

Alliance: *Paxistima myrsinites* - *Saxifraga* spp. - *Luina hypoleuca* Alpine Rock Crevice

Range: Documented in the North Cascades. It likely occurs elsewhere east of the Cascade Crest, such as in the Okanogan Mountains.

Plots: NOCA (4)

Environmental Description: Occurs on steep (30° mean), high montane and subalpine balds with southwest-facing aspects (214° mean).

Vegetation Description: *Lewisia columbiana* is the most abundant species in a poorly developed herb layer. *Juncus parryi* is usually prominent, but may be absent. A sparse dwarf-shrub layer may contain *Paxistima myrsinites* and *Arctostaphylos nevadensis*. Common associate herbs include *Sedum divergens*, *Saxifraga ferruginea*, *Lomatium brandegeei*, *Danthonia intermedia*, *Festuca viridula*, *Eremogone* (= *Arenaria*) *capillaris* and *Phlox diffusa*. *Selaginella wallacei* may be prominent. *Lomatium martindalei* is absent.

Classification Comments: This association ordinates closely with ARC(NEV,UVA)-PAXMYR/PSESPI and occurs in similar habitats (though higher elevations).

Conservation Status Rank: GNR/SNR

Rank Justification:

Synonyms:

Penstemon davidsonii Alpine Rock Vegetation [Provisional]

Davidson's Penstemon Alpine Rock Vegetation [Provisional]

Abbrev: PENDAV

EL Code: Provisional

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Bedrock & Scree

Alliance: *Paxistima myrsinites* - *Saxifraga* spp. - *Luina hypoleuca* Alpine Rock Crevice

Range: Occurs in the Olympic and Cascade Mountains of Washington.

Plots: MORA (1), OLYM (14)

Environmental Description: Occurs in open, rocky areas such as active and stabilized scree and bedrock, at high elevations. Slopes are moderately steep and frequently west-facing.

Vegetation Description: *Penstemon davidsonii* is the most abundant plant in this sparsely vegetated association. *Phlox diffusa* is the most frequent associate. *Erysimum arenicola*, *Douglasia laevigata*, and *Lomatium martindalei* also occur, but with low cover. Moss and lichen cover may be prominent on more stabilized sites.

Classification Comments: This association is absent from the map training data set and may occur in patches too small to be captured by that methodology.

Conservation Status Rank: GU/SU

Rank Justification: There is insufficient information to rank this association in Washington.

Synonyms:
< *Juniperus* - *Phlox* community (Houston et al., 1994)

Bromus sitchensis - Carex phaeocephala Alpine Meadow [Provisional]

Alaska Brome - Mountain Hare Sedge Alpine Meadow [Provisional]

Abbrev: BROSIT-CARPHA

EL Code: Provisional

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Tundra

Alliance: Carex spectabilis Subalpine Meadow

Range: Observed in the Olympic Mountains, but may also occur in the Washington Cascades.

Plots: OLYM (3)

Environmental Description: Occurs in dry avalanche chutes and debris slides between 1450 and 1700 m. Slopes are typically steep (29-35°) and south- to southwest-facing. Abundant litter and/or bare mineral soil may be present.

Vegetation Description: *Bromus sitchensis* dominates the dense vegetation with other graminoids—such as *Carex phaeocephala*, *Carex spectabilis*, *Carex rossii*, and/or *Trisetum spicatum*—present in lesser amounts. Associate forbs include *Phacelia hastata*, *Lupinus latifolius* (= *arcticus*), *Bistorta* (= *Polygonum*) *bistortoides*, and *Cirsium edule*.

Classification Comments: This association was documented in only a single plot during map training data collection, but it may occur elsewhere in the Olympic Mountains. Open/sparse alpine stands dominated by *Carex phaeocephala* may represent stands of *Carex phaeocephala* Herbaceous Vegetation, a preliminary type proposed in Crawford et al. (2009) but not documented during map training data collection. It may occur in patches too small to be documented with that methodology.

Conservation Status Rank: GNR/S2S4

Rank Justification: This provisional association occurs within a limited geographic range and environment. Known occurrences are in protected areas.

Synonyms:
Bromus sitchensis - *Carex phaeocephala* Herbaceous Vegetation (Crawford et al., 2009)

Carex spectabilis - Polygonum bistortoides Alpine Meadow

Showy Sedge - American Bistort Alpine Meadow



Abbrev: CARSPE-POLBIS

EL Code: CEGL001828

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Tundra

Alliance: Carex spectabilis Subalpine Meadow

Range: Occurs in the Washington Cascades and Olympic Mountains and possibly in British Columbia.

Plots: MORA (23), NOCA (10), OLYM (87)

Environmental Description: Occurs from 1050 to 2050 m elevation on well-drained, somewhat moist soils, usually on gentle to moderate slopes. Stands may occur in avalanche chutes where trees and other woody species are periodically removed.

Vegetation Description: These are lush meadows dominated or codominated by *Carex spectabilis*. *Bistorta* (= *Polygonum*) *bistortoides* and *Lupinus latifolius* (= *arcticus*) are usually present to prominent. *Erigeron glacialis* (= *peregrinus*), *Luetkea pectinata*, *Potentilla flabellifolia*, and *Valeriana sitchensis* are often present but always less abundant than *Carex spectabilis*. Many other species may occur, but are rarely more than prominent.

Classification Comments: CARSPE-POTFLA is similar, but occurs in topographically flat or concave, marginal wetland settings, usually with prominent to codominant *Carex nigricans*, *Potentilla flabellifolia*, and/or *Oreostemma alpigenum* and little or no *Lupinus latifolius* (= *arcticus*). *Phlox diffusa* ssp. *longistylis* - *Carex spectabilis* Alpine Meadow (CEGL001979) is a similar type that was included in Crawford et al. (2009), however, no plots representing that association were collected during map training data collection (plots initially called to this association were better fits for CARSPE-POLBIS, ANTLAN, or LUEPEC-SAXTOL). Further analysis is required to determine whether CEGL001979 remains a valid USNVC association.

Conservation Status Rank: G4/S3S4

Rank Justification: Occurs within a limited geographic range and environment. Known sites are in protected areas.

Synonyms:

Carex spectabilis - (*Lupinus* (*arcticus*, *latifolius*) -*Polygonum bistortoides* Herbaceous Vegetation (Crawford et al., 2009)

Carex spectabilis - *Polygonum bistortoides* (Bourgeron & Engelking, 1994)

Antennaria lanata Alpine Meadow

Woolly Pussytoes Meadow



Abbrev: ANTLAN

EL Code: CEGL001949

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Tundra

Alliance: Antennaria lanata - Juncus parryi Alpine Meadow

Range: Occurs in the Washington Cascades and Olympic Mountains and north into British Columbia.

Plots: MORA (2), OLYM (6)

Environmental Description: Subalpine or alpine meadows, usually on gentle slopes or flats with relatively late snowmelt and above average moisture. Soils are well-drained and often rocky.

Vegetation Description: *Antennaria lanata* and/or *Oreostemma alpigenum* codominate this short, often open vegetation, usually with more cover than all other species. *Carex nigricans*, *Carex spectabilis*, *Bistorta* (= *Polygonum*) *bistortoides*, *Hieracium gracile and*/or *Juncus parryi* are often present. Dwarf-shrubs such as *Salix cascadensis*, *Vaccinium deliciosum*, and/or *Phyllodoce empetriformis* can be present but with less cover than herbaceous species. Nonvascular cover can be high.

Classification Comments: JUNPAR-(POLBIS) has numerous co-occurring species, but it occurs on rocky slopes with dominant *Juncus parryi*. *Phlox diffusa*, *Festuca roemeri*, *Bistorta* (= *Polygonum*) *bistortoides*, *Juniperus communis*, *Eremogone capillaris* var. *americana*, *Hieracium triste*, *Eucephalus paucicapitatus*, *Silene parryi*, *Lomatium martindalei*, *Danthonia intermedia*, *Penstemon davidsonii*, and *Campanula rotundifolia* are additional differential species. *Phlox diffusa* ssp. *longistylis* - *Carex spectabilis* Alpine Meadow (CEGL001979) is a similar type that was included in Crawford et al. (2009), however, no plots representing that association were collected during map training data collection (plots initially called to this association were better fits for CARSPE-POLBIS, ANTLAN, or LUEPEC-SAXTOL). Further analysis is required to determine whether CEGL001979 remains a valid USNVC association.

Conservation Status Rank: G4/S3S4

Rank Justification: Occurs within a limited environmental range in Washington, but with few short-term threats. This association will likely be affected by climate change.

Synonyms:

Antennaria lanata Herbaceous Vegetation (Crawford et al., 2009)
Antennaria lanata (Bourgeron & Engelking, 1994)
Antennaria lanata Association (Hamann, 1972)
Antennaria lanata Community (Douglas & Bliss, 1977)
Antennaria lanata Community Type (Henderson, 1973)

Juncus parryi - (*Polygonum bistortoides*) Alpine Meadow

Parry's Rush - (American Bistort) Alpine Meadow



Abbrev: JUNPAR-(POLBIS)

EL Code: CEGL008257

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Tundra

Alliance: *Antennaria lanata - Juncus parryi* Alpine Meadow

Range: Occurs at Olympic National Park. It may also occur elsewhere in the Cascades.

Plots: OLYM (17)

Environmental Description: Occurs at subalpine elevations (1650 to 1900 m) on moderate slopes (18° mean) with southerly aspects (191° mean) with rocky soils.

Vegetation Description: *Juncus parryi* dominates this herbaceous community. *Antennaria lanata*, *Hieracium triste*, *Phlox diffusa*, *Festuca roemeri*, *Eremogone* (= *Arenaria*) *capillaris*, *Lupinus latifolius*, *Luetkea pectinata*, *Bistorta* (= *Polygonum*) *bistortoides*, and *Carex spectabilis* are frequent to occasionally prominent, but are never more abundant than *Juncus parryi*.

Classification Comments: ANTLAN shares many species, but is usually found on flatter topographic positions with little *Juncus parryi*, *Phlox diffusa*, or *Festuca roemeri*. *Bistorta* (= *Polygonum*) *bistortoides*, *Juniperus communis*, *Eremogone capillaris* var. *americana*, *Hieracium triste*, *Eucephalus paucicapitatus*, *Silene parryi*, *Lomatium martindalei*, *Danthonia intermedia*, *Penstemon davidsonii*, and *Campanula rotundifolia* are also differential relative to ANTLAN.

Conservation Status Rank: GNR/S3S4

Rank Justification: Occurs within a narrow range of environments, with few known, within protected areas.

Synonyms:

Juncus parryi - (*Polygonum bistortoides*) Herbaceous Vegetation (Crawford et al., 2009)

Juncus parryi - Polygonum bistortoides Community Type (Henderson et al., 1979)

Eriogonum pyrolifolium - Polygonum davisiae Alpine Sparse Vegetation

Shasta Buckwheat - Davis' Knotweed Alpine Sparse Vegetation



Abbrev: ERIPYR-POLDAV

EL Code: CEGL008258

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Tundra

Alliance: *Eriogonum* spp. - *Luzula* spp. Alpine Snowbed

Range: Likely restricted to alpine areas with soils of volcanic origin in Washington and Oregon

Plots: MORA (10)

Environmental Description: Found above treeline on moderately sloped, east-facing sites w/ rocky (often pumice), well-drained soils. Exposed mineral soil is common.

Vegetation Description: *Eriogonum pyrolifolium* and/or *Aconogonon* (= *Polygonum*) *davisiae* are diagnostically most abundant. *Luzula piperi*, *Lupinus latifolius*, *Penstemon davidsonii*, *Luetkea pectinata*, *Oreostemma alpigenum*, and *Achillea millefolium* are frequent associates with low cover.

Classification Comments: These sites are typically fell-fields, not traditional snowbeds (the concept of this alliance), but they do hold snow quite late and share many associate species. A3336 also allows for well-drained soils. Crawford et al. 2009 originally proposed separate *Eriogonum pyrolifolium* and *Polygonum davisiae* associations, but the two species were almost always co-occurring in NCCN plots and either taxon is diagnostic in differentiating this type from other sparse associations. A *Polygonum davisiae - Eriogonum pyrolifolium* Fell-field association was recently proposed based on data from Crater Lake National Park. That also occurs on pumice soils, though it is even more sparsely vegetated (<10%) and has numerous associates species not found in the NCCN data set (*Eremogone pumicola*, *Raillardella argentea*, etc.). These stands may represent variation within the same association.

Conservation Status Rank: GNR/SNR

Rank Justification: Occurs within a restricted range of environments with few known.

Synonyms:

> *Eriogonum pyrolifolium* Lithomorphic Vegetation (Crawford et al., 2009)

> *Polygonum davisiae* Herbaceous Vegetation (Crawford et al., 2009)

Luetkea pectinata - Saxifraga tolmiei Alpine Meadow

Partridgefoot - Tolmie's Saxifrage Alpine Meadow



Abbrev: LUEPEC-SAXTOL

EL Code: CEGL001918

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Tundra

Alliance: *Eriogonum* spp. - *Luzula* spp. Alpine Snowbed

Range: Occurs in the Oregon and Washington Cascades and in the Olympic Mountains. It also extends into British Columbia and California.

Plots: MORA (9), NOCA (15), OLYM (27), Other (1)

Environmental Description: Occurs in the upper subalpine to alpine zones, on moderate to steep slopes of all aspects, frequently on stabilized talus and scree and typically with fairly low total cover.

Vegetation Description: This open to sparse, short vegetation, typically ~15cm tall, is dominated by *Luetkea pectinata* and/or *Carex spectabilis*, though often with low total cover. Many herbaceous species can occur, all typically with low cover. *Lupinus latifolius* (= *arcticus*), *Luzula piperi*, *Hieracium gracile*, *Juncus parryi*, *Bistorta* (= *Polygonum*) *bistortoides* and *Valeriana sitchensis* frequently occur, also at low cover. Several NCCN plots included here also have prominent *Cassiope mertensiana* or *Phyllodoce empetriformis*. Houston (1994) notes that this vegetation appears to occur on recently colonized sites.

Classification Comments: Crawford et al. (2009) proposed a *Carex spectabilis* Lithomorphic Vegetation association in which, "*Polygonum* [=*Bistorta*] *bistortoides*, *Luetkea pectinata*, *Lupinus* (*arcticus* ssp *subalpinus*, *latifolius*) and *Valeriana sitchensis* frequently occur, in equal abundance with *Carex spectabilis*." In the final plot data from vegetation mapping in the Washington national parks, this type was indistinguishable from CEGL001918 and the plots were subsequently subsumed. ANTLAN (CEGL001949) may occasionally have similar floristics, but it occurs in the subalpine zone on sites with far greater soil development. *Antennaria lanata*, *Oreostemma alpigenum*, *Potentilla flabellifolia*, and *Bistorta* (= *Polygonum*) *bistortoides* are strongly differential for that type. *Phlox diffusa* ssp. *longistylis* - *Carex spectabilis* Alpine Meadow (CEGL001979) is a similar type that was included in Crawford et al. (2009), however, no plots representing that association were collected during map training data collection (plots initially called to this association were better fits for CARSPE-POLBIS, ANTLAN, or LUEPEC-SAXTOL). Further analysis is required to determine whether CEGL001979 remains a valid USNVC association.

Conservation Status Rank: G5/S4S5

Rank Justification: Restricted to high elevations at numerous sites in the maritime Pacific Northwest and represented within many protected areas, with few known. This association will likely be affected by climate change.

Synonyms:

Luetkea - *Saxifraga* community (Houston et al., 1994)
Luetkea pectinata Herbaceous Vegetation (Crawford et al., 2009)
> *Carex spectabilis* Lithomorphic Vegetation (Crawford et al., 2009)
Luetkea pectinata - *Saxifraga tolmiei* (Bourgeron & Engelking, 1994)
Luetkea pectinata Community Type (Henderson, 1973)

Saxifraga tolmiei - Luzula piperi Alpine Snowbed

Tolmie's Saxifrage - Piper's Woodrush Alpine Snowbed



Abbrev: SAXTOL-LUZPIP

EL Code: CEGL001986

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Tundra

Alliance: *Eriogonum* spp. - *Luzula* spp. Alpine Snowbed

Range: Occurs in the Cascades and Olympic Mountains in Washington. Also found in British Columbia.

Plots: MORA (7), NOCA (31), OLYM (12), Other (3)

Environmental Description: Occurs at high elevations (1450 to 2050 m) in snowbeds on slopes or benches with very long-lasting snowpacks, on bedrock and talus. It is particularly common as a colonizing community on moraines. In subalpine parklands, it occurs on north-facing slopes. In the alpine zone, it occurs on a variety of aspects. It may be associated with mossy snowmelt seeps.

Vegetation Description: The vegetation is sparse—typically less than 25% total cover—and characterized by the prominence of *Micranthes* (= *Saxifraga*) *tolmiei*. *Luzula piperi* is usually present to prominent in the North Cascades but is less frequent at Mount Rainier. *Luetkea pectinata*, *Carex spectabilis*, *Carex nigricans*, or *Juncus drummondii* are usually present but are less abundant than *Micranthes* (= *Saxifraga*) *tolmiei* or *Luzula piperi*. However, *Carex nigricans* may occasionally codominate.

Classification Comments: LUEPEC-SAXTOL is similar, but typically has greater overall cover. It usually lacks *Micranthes* (= *Saxifraga*) *ferruginea* and has much less *Micranthes* (= *Saxifraga*) *tolmiei*, *Luzula piperi*, *Carex nigricans*, and moss cover. LUEPEC-SAXTOL may be transitional to VALSIT-CARSPE. SAXTOL-LUZPIP may intergrade with CARNIG, as both types occur in snowmelt/snowbed areas. However, that type tends to occur on flatter sites with greater soil development. SAXBRO occurs on drier, more exposed, rockier outcrops and is dominated by cushion plants.

Conservation Status Rank: G4/S4

Rank Justification: Appears to have a narrow environmental range, but occurs on habitats with few known. Climate change will likely affect this vegetation.

Synonyms:

Eriogonum pyrolifolium - Saxifraga tolmiei Community (Edwards, 1980)
Luetkea - Saxifraga community (Houston et al., 1994)
Saxifraga tolmiei - Luzula piperi (Bourgeron & Engelking, 1994)
Saxifraga tolmiei - Luzula piperi Community Type (Douglas & Bliss, 1977)
Saxifraga tolmiei - Luzula piperi Lithomorphic Vegetation (Crawford et al., 2009)
Saxifraga tolmiei Association (Hamann, 1972)
Saxifraga tolmiei Community (Douglas, 1972)
Saxifraga tolmiei Community Type (Henderson, 1973)

Carex breweri Alpine Meadow

Brewer's Sedge Alpine Meadow

Abbrev: CARBRE

EL Code: CEGL001805

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Tundra

Alliance: *Festuca roemeri - Festuca saximontana* Alpine Meadow

Range: Known from the vicinity of Yosemite National Park to the North Cascades of Washington.

Plots: MORA (1)

Environmental Description: This alpine turf association occurs only above upper treeline (alpine zone). Sites have well-drained soils and occur on relatively gentle slopes

Vegetation Description: Vegetation cover varies from moderate to dense and may occur within fell-fields. The association is comprised entirely of herbaceous species, often occurring as a 'turf' of sod-forming sedges, dominated by *Carex breweri*. *Carex phaeocephala*, *Sibbaldia procumbens*, *Erigeron aureus*, and *Lupinus lepidus* var. *lobbii* (= *sellulus* var. *lobbii*) are some of the more common associates.

Classification Comments: This association is not represented in current map training data from the Washington national parks. However, the association was previously documented in the North Cascades (Douglas & Bliss, 1977) and *Carex breweri* (the community dominant) is known to occur at both MORA and NOCA. Crawford et al. (2009) considered sparser stands codominated by *Carex phaeocephala* as a provisional *Carex breweri - Carex phaeocephala* Fellfield Lithomorphic Vegetation association. With no additional plot data collected for either type during map training data collection, that association is not included here.

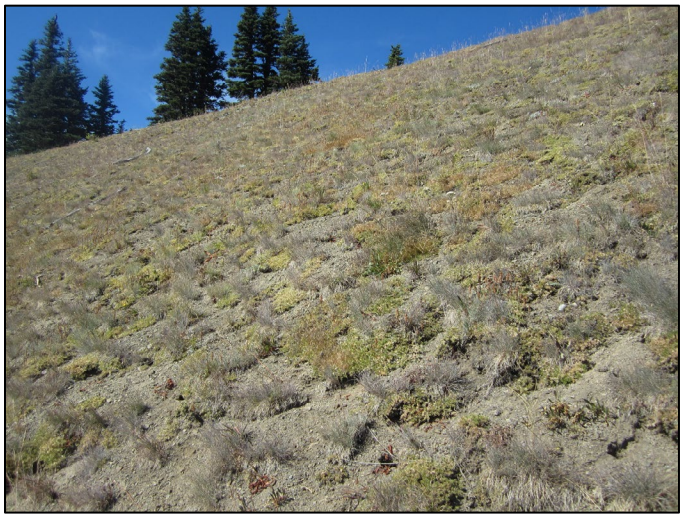
Conservation Status Rank: G3?/S2S3

Rank Justification: This association occurs within a limited geographic range and environment. Known sites are in protected areas.

Synonyms:
Carex breweri (Kovalchik, 1987; Sawyer et al., 2009)
Carex breweri Association (Crowe et al., 2004)
Carex breweri Community Type (Douglas & Bliss, 1977)
Carex breweri Herbaceous Vegetation (Keeler-Wolf, 2002; Crawford et al., 2009; Keeler-Wolf et al., 2012)
Brewer Sedge Association (Taylor, 1984)

Festuca roemeri - Phlox diffusa - Arenaria capillaris Alpine Meadow

Roemer's Fescue - Spreading Phlox - Slender Mountain Sandwort Alpine Meadow



Abbrev: FESROE-PHLDIF-ARECAP

EL Code: CEGL008255

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Tundra

Alliance: *Festuca roemeri - Festuca saximontana* Alpine Meadow

Range: Occurs within a very limited dry climatic zone in the northeastern Olympic Mountains

Plots: OLYM (65)

Environmental Description: Occupies cold, dry sites in subalpine parkland and alpine zones. Elevation ranges from 1400 to 1950 m. Sites are typically on moderate slopes (8-30°) with relatively warm south to west exposures. Soils are acidic, relatively deep, poorly developed sandy loams that can be rocky.

Vegetation Description: This association consists of a moderately dense (~70% cover) mixed graminoid/forb herb layer less than 0.5 m tall that is dominated or codominated by *Festuca roemeri*. *Phlox diffusa* and *Eremogone* (= *Arenaria*) *capillaris* is typically prominent to codominant. Other common species include *Achillea millefolium*, *Juncus parryi*, and *Bistorta* (= *Polygonum*) *bistortoides*. *Lupinus lepidus* (= *sellulus*) occasionally codominates. *Delphinium glareosum* reportedly also codominates in restricted locales (though this is not documented in any NCCN plots). Dry sites often include *Lomatium martindalei*. A shrub or dwarf-shrub layer is characteristically sparse or absent.

Classification Comments: PHLDIF-(LOMMAR) is similar, but occupies a broader environmental niche and lacks diagnostic *Festuca roemeri* dominance. JUNCOM-PHLDIF is also similar, but also lacks *Festuca roemeri* and is dominated by dwarf-shrubs. This association represents a merging of the concepts for *Festuca roemeri - Delphinium glareosum* Alpine Meadow (CEGL001613) and *Festuca roemeri - Phlox diffusa* ssp. *longistylis* Alpine Meadow (CEGL001622) and elimination of those two types).

Conservation Status Rank: GNR/S2

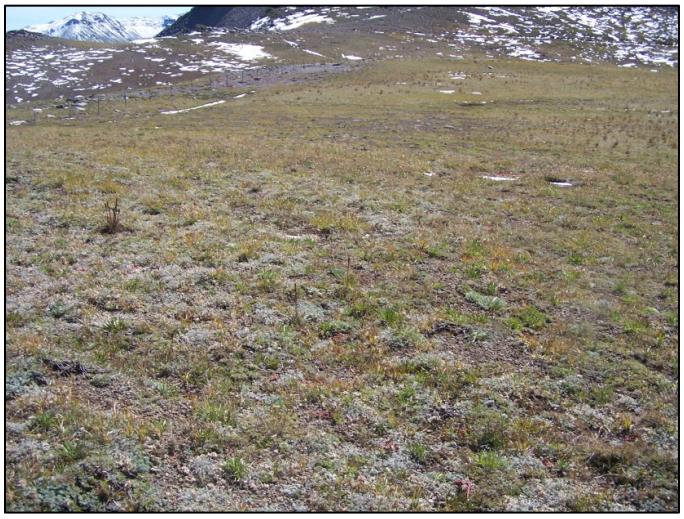
Rank Justification: Naturally globally rare, with few occurrences (certainly less than 50, quite possibly less than 20) covering a relatively small area. This association's range is extremely restricted within a small rain shadow zone of the northeastern Olympic Mountains, where it is locally frequent. Stands are somewhat threatened by recreational impacts and face moderate long-term threats from treeline changes associated with climate change.

Synonyms:

Festuca roemeri - (*Phlox diffusa* - *Arenaria capillaris*) Herbaceous Vegetation (Crawford et al., 2009)

Phlox diffusa - Lupinus sellulus - (*Pedicularis contorta*) Alpine Meadow

Spreading Phlox - Donner Lake Lupine - (Coiled Lousewort) Alpine Meadow



Abbrev: PHLDIF-LUPSEL-(PEDCON)

EL Code: CEGL008265

Macrogroup: Vancouverian Alpine Tundra

Group: North Pacific Alpine-Subalpine Tundra

Alliance: *Minuartia obtusiloba - Lupinus sellulus* var. *lobbii* Cascade Alpine Fell-field

Range: Documented at Mount Rainier, but may occur in other alpine zones with well-drained soils in the Pacific Northwest.

Plots: MORA (21), OLYM (1)

Environmental Description: Occurs on well-drained soils on flat or gentle slopes in the alpine zone.

Vegetation Description: This low herbaceous community is characterized by codominant *Phlox diffusa* and *Lupinus lepidus* var. *lobbii* (= *sellulus* var. *lobbii*). *Pedicularis contorta*, *Oreostemma alpigenum*, and/or *Carex spectabilis* are typically present to prominent. *Artemisia furcata*, *Dasiphora fruticosa* (= *floribunda*), and *Achillea millefolium* occur frequently. At the highest elevations and harshest sites, the association includes additional alpine species such as *Minuartia obtusiloba* and *Erigeron aureus*.

Classification Comments: Besides dominant *Phlox diffusa* and *Lupinus lepidus* var. *lobbii* (= *sellulus* var. *lobbii*), *Pedicularis contorta*, *Artemisia furcata*, *Oreostemma alpigenum*, *Dasiphora fruticosa*, and *Erigeron compositus* are differential species relative to other types in this group. Crawford et al. (2009) proposed a *Lupinus sellulus* var. *lobbii* - (*Erigeron aureus - Minuartia obtusiloba*) Lithomorphic Vegetation association. The Crawford type merged *Minuartia obtusiloba - Lupinus sellulus* var. *lobbii* Alpine Fell-field (CEGL001952) and *Erigeron aureus - Lupinus sellulus* var. *lobbii* Alpine Fell-field (CEGL001961), along with part of the variation in the *Phlox-Carex* community from Houston et al. (1994). However, additional plot data failed to support the proposed merger. All plots initially assigned to the Crawford type in the NCCN data were ultimately better fits for either PHLDIF-LUPSEL-(PEDCON) or EMPNIG-LUPSEL.

Conservation Status Rank: GNR/S3

Rank Justification: Occurs at few sites, but these are within protected areas with few known threats. Climate change will likely affect this vegetation.

Synonyms:

Phlox diffusa - Lupinus sellulus var. *lobbii* - (*Pedicularis contorta*) Herbaceous Vegetation (Crawford et al., 2009)

Phlox diffusa - Eriogonum pyrolifolium Community (del Moral, 1979

Section B: Wetland Alliances of Mount Rainier, North Cascades, and Olympic National Parks

Each alliance description includes the following:

- **Alliance Scientific Name** — Following USNVC conventions (Federal Geographic Data Committee, 2008; Jennings et al., 2009), alliance scientific names generally follow Kartez (Kartesz, 1999; USDA NRCS, 2006). USNVC alliances are defined by "diagnostic species, including some from the dominant growth form or layer, and moderately similar composition that reflect regional to subregional climate, substrates, hydrology, moisture/nutrient factors, and disturbance regimes" (Faber-Langendoen et al., 2009).
- **Alliance common name** — Translation of scientific name, using common names that are officially recognized by NatureServe.
- **EL Code** —The code used to track USNVC alliances.
- **Macrogroup** — USNVC Macrogroup, distinguished by "diagnostic plant species and growth forms, and sub-continental to regional differences in mesoclimate, geology, substrates, hydrology and disturbance regimes" (Faber-Langendoen et al., 2009).
- **Group** — USNVC Group, defined by "relatively narrow sets of diagnostic plant species (including dominants and codominants), broadly similar composition, and diagnostic growth forms that reflect regional mesoclimate, geology, substrates, hydrology and disturbance regimes" (Faber-Langendoen et al., 2009).
- **Range** — Geographic range, with a focus on range within Washington State.
- **Plots** — Total number of NCCN classification and mapping plots for this alliance, subdivided by park unit. Only plots included in WNHP's USNVC analysis (e.g. plots with full species lists, etc.) are included here, so these numbers may differ from the number of plots used in map modeling.
- **Environmental Description** — Typical range of environmental settings in which the alliance may develop, with a focus on its environmental template in Washington.
- **Vegetation Description** — Typical physiognomy and floristics of the alliance, including dominant, diagnostic, and differential species, with a focus on its expression in Washington.
- **Classification Comments** — Guidance for distinguishing this alliance from similar types. This section may also contain ongoing classification questions.
- **NCCN Associations** — Table of plant associations in this alliance that have been confirmed (via plot data) or are highly probable to occur at MORA, NOCA, and/or OLYM.

The following terms are used to describe the distribution and abundance of individual species:

- **Dominant**: Clearly the most abundant species in a well-developed stratum
- **Codominant**: A species sharing dominance with other species in a well-developed stratum, usually with cover between 5-50%
- **Prominent**: Common species that are readily observed (but not dominant) in most plots, generally with cover between 3-15%.
- **Present**: Species that are typically found in a representative plot, but with less than 3% cover.
- **Usually**: Found with > 60% constancy in a given alliance
- **Sometimes/Often**: Found with 40-60% constancy in a given alliance
- **Occasionally**: Found with 10-40% constancy in a given alliance
- **Well-developed**: A stratum of vegetation with > 10% cover

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Picea engelmannii Swamp Forest Alliance

Engelmann Spruce Swamp Forest Alliance



EL Code: A3775

Macrogroup: Rocky Mountain-Great Basin Montane Riparian & Swamp Forest

Group: Rocky Mountain-Great Basin Swamp Forest

Range: Documented in the Central Rocky Mountains of Colorado, Wyoming, Montana, Idaho, and in Washington as far west as the North Cascades

Plots: NOCA (1), Other (72)

Environmental Description: In Washington, these swamps are primarily found from 650 to 2200 m (mean = 1400 m). They often occur as seepage swamps (groundwater discharge) with poorly drained soils that are saturated year-round or seasonally flooded or saturated in the spring. They may also occur on flats, in depressions, and around lake and pond shore margins. Windthrow creates canopy gaps and pit-mound topography that increases microsite diversity. Downed trees, root wads, and mounds provide suitable substrates for tree and shrub species that are not able to establish on saturated soils. Hollows created by windthrow are often dominated by species tolerant of saturated soil conditions. Canopy gaps create a diversity of light conditions in the swamp. Beaver activity may also occur in these swamps.

Vegetation Description: Trees are typically larger than in treed fens, with growth forms more closely resembling those found in uplands; tree canopies are typically closed. Tree species are diverse, but typically dominated by *Picea engelmannii*. *Abies lasiocarpa*, *Pinus contorta* var. *latifolia*, *Abies grandis*, and/or *Tsuga heterophylla* may be prominent to codominant. Deciduous trees *Betula papyrifera*, *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*), and/or *Populus tremuloides* are frequently present, but never codominant. Some of the most typical herbaceous species include *Alopecurus aequalis*, *Athyrium filix-femina*, *Calamagrostis canadensis*, *Carex disperma*, *C. scopulorum* var. *prionophylla*, *Dryopteris spp.*, *Eleocharis palustris*, *Equisetum arvense*, *Lysichiton americanus*, *Pectiantia* (= *Mitella*) *breweri*, *Pectiantia* (= *Mitella*) *pentandra*, *Senecio triangularis*, and *Streptopus amplexifolius*. Common shrubs include *Alnus incana*, *Cornus stolonifera*, *Rhamnus alnifolia*, and *Salix* spp.

Classification Comments: This alliance encompasses basin and seepage swamps dominated by *Picea engelmannii*. It also includes calcareous swamps, although additional plot data may support splitting such types out as a separate alliance. A3757 is floristically very similar, but occurs in riparian settings.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
PICENG-TSUHET/LYSAME	Picea engelmannii - Tsuga heterophylla / Lysichiton americanus Swamp Forest	CWWA000376	Confirmed	A-116
PICENG/EQUARV	Picea engelmannii / Equisetum arvense Swamp Forest	CEGL005927	Probable	n/a

Photo Credit: Joe Rocchio

Thuja plicata - Tsuga heterophylla Rocky Mountain Swamp Forest Alliance

Rocky Mountain Western Red-cedar - Western Hemlock Swamp Forest Alliance



EL Code: A3776

Macrogroup: Rocky Mountain-Great Basin Montane Riparian & Swamp Forest

Group: Rocky Mountain-Great Basin Swamp Forest

Range: [Adapted from Kittel (2014c)] Occurs in the marine-influenced interior mountains of northeastern Washington, northern Idaho, southeastern British Columbia and northwestern Montana. It also occurs in climatically moist pockets of eastern NOCA.

Plots: NOCA (6), Other (53)

Environmental Description: [Adapted from Kittel (2014c)] Occurs on all slopes and aspects, but generally on toeslope or valley bottom sites that are flooded or subirrigated for a substantial portion of the growing season. The seasonal flooding originates mostly from precipitation and snowmelt collecting in basins. The soils are organic and saturated for part of the growing season. These forests are often transitional to non-forested wetlands (ringing shrub swamps, for example). Documented elevations in Washington range from 550 to 1400 m (mean = 900 m).

Vegetation Description: [Adapted from Kittel (2014c)] These seasonally flooded forests are characterized by a dense to somewhat open coniferous canopy dominated by *Thuja plicata*. *Tsuga heterophylla* is a typical associate in these stands. *Pseudotsuga menziesii*, *Abies grandis*, and *Abies lasiocarpa* may also share the upper tree canopy. The shrub layer varies from sparse to well-developed and may include *Oplopanax horridus*, *Ribes lacustre*, *Rubus nutkanus* (= *parviflorus*), *Cornus stolonifera*, and/or *Acer circinatum*. The herbaceous layer is diverse and dominated by wetland and moist forest species, including *Lysichiton americanus*, *Athyrium filix-femina*, *Achlys triphylla*, and *Senecio triangularis*. Mosses and lichens are common on trees, downed logs, and the forest floor.

Classification Comments: This alliance encompasses swamps where a maritime climatic influence allows *Thuja plicata* and *Tsuga heterophylla* to grow in the interior Rocky Mountains. A4432 is similar, but occurs in headwater or perennial riparian settings.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
THUPLI-TSUHET/OPLHOR	Thuja plicata - Tsuga heterophylla / Oplopanax horridus Rocky Mountain Swamp Forest	CEGL000479	Confirmed	A-117
THUPLI/ATHFIL	Thuja plicata / Athyrium filix-femina Swamp Forest	CEGL000473	Confirmed	n/a

Populus tremuloides Riparian Forest Alliance

Quaking Aspen Riparian Forest Alliance



EL Code: A3760

Macrogroup: Rocky Mountain-Great Basin Montane Riparian & Swamp Forest

Group: Rocky Mountain-Great Basin Montane Riparian Forest

Range: [Adapted from Kittel (2014d)] Occurs in the Rocky Mountains of Alberta, Montana, Idaho, Wyoming, Colorado, Utah, eastern Oregon and Washington, and Great Basin mountain ranges of Nevada, possibly extending into the Sierra Nevada of California. It also occurs on high plateaus and canyons of New Mexico.

Plots: NOCA (1), Other (34)

Environmental Description: [Adapted from Kittel (2014d)] Occur in seasonally flooded areas at elevations from 850 to 3150 m (600 to 1350 m in Washington). Climate is temperate with a relatively long growing season, typically cold winters and often deep snow. Stands are restricted to sites saturated by seepage from springs and snowmelt-driven streams. They occur gentle slopes, wet draws and flats, and on streambank terraces. Aspects are variable. In Washington, soils are typically alluvial and coarse-textured, permitting rapid groundwater movement (Hansen et al., 1995). The water table is typically at or near the soil surface in the spring ,but may drop > 1 m by midsummer (Hansen et al., 1995).

Vegetation Description: The moderate to closed tree canopy is dominated by *Populus tremuloides*. In Washington, *Betula papyrifera* sometimes codominates and *Abies grandis*, *Pinus ponderosa*, *Pseudotsuga menziesii*, and/or *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*) are occasionally prominent. Relatively open stands have a prominent shrub layer containing species such as *Alnus incana*, *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*), *Symphoricarpos albus*, *Rosa nutkana*, *Amelanchier alnifolia*, *Rubus nutkanus*, *Acer glabrum* var. *douglasii*, and *Salix* spp. Common herbs include *Maianthemum stellatum*, *Actaea rubra*, *Circaea alpina*, *Geum macrophyllum*, and *Linnaea borealis*.

Classification Comments: Populus tremuloides - Betula papyrifera Swamp Forest Alliance (A4431) is similar, but occurs in depressional settings (frequently below lower treeline) with associate herbs like *Carex pellita*.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
POPTRE/CORSER	Populus tremuloides / Cornus sericea Riparian Forest	CEGL000582	Probable	n/a
POPTRE/SYMALB	Populus tremuloides / Symphoricarpos albus Riparian Forest	CEGL000609	Confirmed	A-118

Thuja plicata - Tsuga heterophylla Rocky Mountain Riparian Forest Alliance

Rocky Mountain Western Red-cedar - Western Hemlock Riparian Forest Alliance



EL Code: A4432

Macrogroup: Rocky Mountain-Great Basin Montane Riparian & Swamp Forest

Group: Rocky Mountain-Great Basin Montane Riparian Forest

Range: [Adapted from Kittel (2014c)] Occurs in the marine-influenced interior mountains of northeastern Washington, northern Idaho, southeastern British Columbia and northwestern Montana. It also occurs in climatically moist pockets of eastern NOCA.

Plots: NOCA (1), Other (47)

Environmental Description: These are montane (400 to 1150 m) riparian forests on streambanks and alluvial terraces in valley bottoms and floodplains. These communities are most common in wide valleys along low-gradient, perennial streams, but may also be found in relatively confined headwater draws. Flooding is infrequent, but stands experience elevated water tables and persistent hyporheic flow.

Vegetation Description: The dense to somewhat open coniferous canopy is dominated by *Thuja plicata* and or *Tsuga heterophylla*. *Pseudotsuga menziesii*, *Abies grandis*, and *Picea engelmannii* also share the upper tree canopy. More frequently flooded stands may have significant *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*) in the canopy. The shrub layer is often well-developed and may be diverse, with both hydrophilic shrubs (e.g., *Alnus incana* and *Cornus stolonifera*) and relatively mesic species (e.g., *Acer circinatum*, *Paxistima myrsinites*, and *Rosa gymnocarpa*). The herbaceous layer primarily consists of moist forest species, including *Clintonia uniflora*, *Linnaea borealis*, *Maianthemum stellatum*, *Athyrium filix-femina*, *Gymnocarpium dryopteris*, *Tiarella trifoliata*, and *Achlys triphylla*. Stands with more frequent flooding may also have prominent to dominant *Petasites frigidis*, *Calamagrostis canadensis*, and *Equisetum arvense*. Mosses and lichens are common on trees, downed logs, and the forest floor. The one association documented at NOCA is represented by a single plot codominated by *Thuja plicata*, *Abies grandis*, and *Populus trichocarpa*, with a well-developed shrub layer codominated by *Acer circinatum* and *Rubus nutkanus* (= *parviflorus*).

Classification Comments: This alliance is closely related to A3776, but occurs in riparian settings. Many associations in this alliance resemble upland communities from climatically wetter regions.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
THUPLI-(ABIGRA)/ACECIR	Thuja plicata - (Abies grandis) / Acer circinatum Riparian Forest	CWWA000409	Confirmed	n/a

Populus balsamifera ssp. *trichocarpa* Northern Rocky Mountain Riparian Forest Alliance

Northern Rocky Mountain Riparian Black Cottonwood Forest Alliance



EL Code: A0311

Macrogroup: Rocky Mountain-Great Basin Montane Riparian & Swamp Forest

Group: Northern Rocky Mountain Lowland & Foothill Riparian Forest

Range: Occurs throughout the northern Interior West from the foothills of the Sierra Nevada to Montana, from southern British Columbia to Nevada, Utah and western Wyoming (Kittel, 2014a). In the Washington national parks, it is restricted to eastern NOCA.

Plots: NOCA (16), Other (68)

Environmental Description: Occurs on streambanks, alluvial terraces, and floodplains along both confined and unconfined stream channels subject to periodic seasonal flooding. Flooding is driven by spring or late winter runoff. Stands may also be found on the margins of lakes or on moist, disturbed toe slopes. Elevations in Washington range from 350 to 1400 m. Overbank flooding and gravel areas are required for regeneration of many of these riparian forests and woodlands, especially for *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*) stands. Water tables may drop > 1m below the soil surface in summer, but soils remain moist due to capillary action (Kittel, 2014a). Fluctuating water tables frequently produced mottled soils, which are generally entisols overlying gravel and/or cobbles (Kittel, 2014a). Beavers may crop younger trees and willows and frequently dam side channels.

Vegetation Description: Large streams and rivers have a mosaic of vegetation primarily controlled by valley width, sediment type, and overbank flooding. *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*) characteristically dominates in Washington. In areas of the Columbia Basin with significant floodplain development, *Alnus rhombifolia*, *Salix amygdaloides*, and *Salix lasiandra* are common codominants. In lower montane areas, *Pinus ponderosa*, *Pseudotsuga menziesii*, *Thuja plicata*, *Picea engelmannii*, *Acer macrophyllum*, *Betula papyrifera*, and/or *Abies grandis* may be present to prominent. A number of different shrubs may dominate, including *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*), *Alnus incana*, *Oplopanax horridus*, *Crataegus douglasii*, *Salix* spp., *Philadelphus lewisii*, and particularly *Symphoricarpos albus*. Herbs are typically diverse and *Equisetum arvense* is common. Other common herbs include *Maianthemum stellatum*, *Elymus glaucus*, *Athyrium filix-femina*, *Galium triflorum*, and *Circaea alpina*.

Classification Comments: This is a broad alliance consisting of dozens associations, most of which occur below lower treeline in Washington.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
POPBAL/ACEGLA	Populus balsamifera ssp. trichocarpa / Acer glabrum Riparian Woodland	CWWA000020	Confirmed	n/a
POPBAL/CORSER	Populus balsamifera ssp. trichocarpa / Cornus sericea Riparian Forest	CEGL000672	Confirmed	A-119
POPBAL/OPLHOR-ACEGLA	Populus balsamifera ssp. trichocarpa / Oplopanax horridus - Acer glabrum Riparian Forest	CEGL000482	Confirmed	n/a

Alnus rhombifolia - *Alnus rubra* Interior Swamp & Riparian Forest

White Alder - Red Alder Interior Swamp & Riparian Forest Alliance



EL Code: A4429

Macrogroup: Rocky Mountain-Great Basin Montane Riparian & Swamp Forest

Group: Northern Rocky Mountain Lowland & Foothill Riparian Forest

Range: Primarily documented from the Blue Mountains and Columbia Basin of eastern Washington, northeastern Oregon, and Idaho. It likely occurs at NOCA and elsewhere in the East Cascades.

Plots: Other (16)

Environmental Description: These riparian woodlands occur on geomorphically diverse streambanks, alluvial bars, and river floodplains in lower montane and foothill zones. Sites vary from narrow to wide, flat to v-shaped, low to steep gradients, with moderate to steep sideslopes, and may be found along Rosgen type B/C streams. The water table usually remains high throughout the growing season. Complex geomorphic and biotic components and processes maintain the long-term integrity of these communities (Gregory et al., 1991). Annual flooding is a key ecological process and beaver activity is an important driver of hydrological change. Elevations range from 450 to 1350 m in Washington. Most stands occur in fire-dominated landscapes, with warmer summers, and are biogeographically distinct from *Alnus* stands of the West Cascades.

Vegetation Description: Dominated by *Alnus rubra* or *A. rhombifolia*. *Abies grandis* is occasionally present in the understory and increases in cover with stand age. Common dominant shrubs include *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*), *Physocarpus capitatus*, *Philadelphus lewisii*, *Rubus nutkanus* (= *parviflorus*), and *Symphoricarpos albus*. Herbs can be extremely diverse. Characteristic dominant herbs include *Athyrium filix-femina*, *Asarum caudatum*, and *Petasites frigidus*. *Carex leptopoda* (=*C. deweyana*), *Prosartes hookeri* var. *hookeri* (=*Disporum hookeri*), *Geum macrophyllum*, *Tiarella trifoliata*, *Adenocaulon bicolor*, *Galium triflorum*, *Gymnocarpium dryopteris*, *Cinna latifolia*, *Urtica dioica*, *Claytonia cordifolia*, and *Heracleum maximum* commonly have significant cover, as well. The association likely to occur at NOCA consists of sparse *Alnus rubra* and/or *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*) seedlings and saplings on alluvial bars (gravel, cobbles, or coarse sand).

Classification Comments: This alliance contains *Alnus rubra* riparian associations of the Blue Mountains (further inland than most *Alnus rubra* types, most of which are in A3768) and the disjunct *Alnus rhombifolia*-dominated associations of Oregon, Washington, and Idaho that are currently in A0306. Most of the *Alnus rubra*-dominated associations in this proposed alliance are Washington state types (CWWA codes) based on the classifications of Crowe & Clausnitzer (1997) and Crowe et al. (Crowe et al., 2004). INR proposed a gravel bar association that lumped early successional shrub-height *Populus trichocarpa*, *Alnus rubra*, and *Salix sitchensis* stands. WNHP found that *Salix sitchensis*-dominated stands with at least moderately developed shrub layers fit the concept of SALSIT/EQUARV-PETFRI (A4418), while stands with abundant bare alluvium fit SAL(MEL,SIT) (A4421). The remaining stands in our data set had abundant exotic grasses and key to ALNRUB Nonnative. While not represented in the map training data set, sparse stands of *Alnus rubra* and/or *Populus trichocarpa* seedlings/saplings were observed. These fit the concept of ALNRUB Alluvial (A4429).

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
ALNRUB Alluvial	Alnus rubra / Alluvial Bar Riparian Forest	CWWA000300	Probable	A-120

Tsuga (*mertensiana*, *heterophylla*) - *Abies amabilis* Riparian & Swamp Forest Alliance

(Mountain, Western) Hemlock - Pacific Silver Fir Riparian & Swamp Woodland Alliance



EL Code: A3766

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Montane Riparian & Seepage Swamp Forest

Range: Occurs in the Coast and Cascade Ranges of Washington and Oregon, the Olympic Mountains, and the Coastal Mountains of British Columbia.

Plots: MORA (14), NOCA (27), OLYM (22), Other (46)

Environmental Description: This alliance encompasses floristically similar, but hydrologically distinct, coniferous forest communities of montane seepage swamp, basin swamp, perennial riparian, and headwater riparian settings. Elevations range from 250 to 1500 m. Riparian communities develop in moderately wide valley bottoms on floodplains of meandering rivers, as well as confined and unconfined streams channels. Narrow and steep (i.e. confined) drainages have minimal to no floodplain development. The wider, shallow-sloped valley bottoms (i.e. unconfined) of low gradient riparian forests often have significant floodplain development. Overbank flooding produces a periodic or seasonal hydroperiod. Basin swamps occur in glacial depressions, river valleys, or around the edges of lakes and marshes. Stands are saturated or seasonally flooded, with surface water slowly moving through the site or sitting in stagnant pools. In seasonally flooded sites, surface water is present for extended periods, especially early in the growing season, but absent by the end of the season in most years. The water table often remains near the surface when surface water is absent. Seepage swamps develop where persistent groundwater discharge or subirrigation occurs on sloping sites, such as on toeslopes above depressional wetlands. Podsolization is the dominant soil formation process (Kittel, 2014e). Accumulation of organic matter (muck, or less commonly woody peat) can be significant in occurrences of both seepage and basin swamps, but many are found on mineral soils, often with only a thin veneer of organic surface layers. Riparian stands occur on a diversity of soil textures—generally the more confined and/or steep the gradient, the coarser the soil texture. Windthrow creates canopy gaps and pit-mound topography in these communities, which increases microsite diversity. Downed trees, root wads, and mounds provide suitable substrates for tree and shrub species that are not able to establish on saturated soils. On extremely wet sites, *Tsuga* spp., along with most shrubs, are often confined to higher microsites such as root wads, rotten logs, and root buttresses. Hollows created by windthrow are often dominated by species tolerant of saturated soil conditions. Fires are uncommon in these moist, topographically sheltered forests (Kittel, 2014e).

Vegetation Description: *Abies amabilis*, *Tsuga heterophylla*, *Tsuga mertensiana*, or *Thuja plicata* may dominate. Younger stands often have a significant component of *Alnus rubra*. *Abies lasiocarpa* may be prominent to codominant at high elevations. *Callitropsis nootkatensis* may dominate in cold and/or avalanche-impacted sites, along with *Alnus viridis* ssp. *sinuata*, *Acer circinatum*, *Oplopanax horridus*, *Rubus spectabilis*, *Ribes bracteosum,* and *R. lacustre*. In riparian settings, herbaceous species include *Heracleum maximum*, *Athyrium filix-femina*, *Galium triflorum*, *Stachys chamissonis* var. *cooleyae*, *Tolmiea menziesii*, *Polystichum munitum*, *Tiarella trifoliata*, *Clintonia uniflora*, *Viola glabella*, *Petasites frigidus*, *Gymnocarpium dryopteris*, *Corydalis scouleri*, *Viola glabella*, *Arnica latifolia*, and *Oxalis oregana* among many others. *Vaccinium ovalifolium* and *Vaccinium membranaceum* may be frequent above bankfull depth in riparian zones (Diaz & Mellen, 1996). In swamps, *Lysichiton americanus* often dominates water-filled depressions that may be created by windthrow. *Athyrium filix-femina*, *Struthiopteris* (= *Blechnum*) *spicant*, *Adiantum pedatum*, *Petasites frigidus*, *Dryopteris expansa*, *Stachys chamissonis* var. *cooleyae*, *Tolmiea menziesii*, *Viola glabella*, *Tiarella trifoliata*, *Polystichum munitum*, *Galium triflorum*, *Montia sibirica*, and *Urtica dioica* are other common herbaceous species found in these swamps.

Classification Comments: In Washington, Rocky Mountain forested wetlands are divided between G505 (swamps) and G506 (riparian), but Vancouverian montane, forested swamps and riparian communities are lumped into a single group and alliance, as the floristics between the ecological templates are much less distinct than in the Rocky Mountain wetlands. This alliance has similarities with Tsuga mertensiana - Tsuga heterophylla - Callitropsis nootkatensis Forest & Woodland Alliance (A3724), which occurs in the Coastal Mountains of British Columbia and

Alaska, with strict coastal indicators such as *Maianthemum dilatatum*, *Nephrophyllidium crista-galli*, and *Calamagrostis nutkaensis*, etc. The exact differentiation between these two alliances is somewhat unclear and A3724 was not represented in WNHP's statewide data set. Additional analysis with more northerly data is needed to fully verify the distinction between these alliances.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
ABIAMA-TSUHET/OPLHOR	Abies amabilis - Tsuga heterophylla / Oplopanax horridus Swamp Forest	CEGL000004	Confirmed	A-121
ABIAMA/RUBSPE-VACALA	Abies amabilis / Rubus spectabilis - Vaccinium alaskaense Riparian Forest	CWWA000200	Confirmed	A-122
CALNOO/OPLHOR	Callitropsis nootkatensis / Oplopanax horridus Swamp Forest	CEGL000349	Confirmed	A-123
TSUMER-ABIAMA/CALLEP	Tsuga mertensiana - Abies amabilis / Caltha leptosepala ssp. howellii Swamp Forest	CEGL000501	Confirmed	A-124

Picea sitchensis - Tsuga heterophylla - Alnus rubra Riparian Forest Alliance

Sitka Spruce - Western Hemlock - Red Alder Riparian Forest Alliance



EL Code: A3746

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Lowland Riparian Forest

Range: Occurs at low elevations along the Pacific Coast from Oregon to Alaska.

Plots: OLYM (8), Other (1)

Environmental Description: [Adapted from Kittel (2014f)] These are late-seral riparian communities of streambanks, floodplains, valley floors or terraces with coarse well-drained alluvial soils. These communities generally develop in infrequently flooded areas with elevated water tables.

Vegetation Description: [Adapted from Kittel (2014f)] This alliance is dominated by conifer trees such as *Abies grandis*, *Picea sitchensis*, *Pseudotsuga menziesii*, *Thuja plicata*, and/or *Tsuga heterophylla*. Deciduous trees may also be present to codominant and include *Alnus rubra* or *Acer macrophyllum*. *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*) is usually absent, or no greater than 5% cover. The understory contains riparian wet soil-dependent understory species and includes *Polystichum munitum*, *Rubus spectabilis*, *Scirpus microcarpus*, and others.

Classification Comments: These communities likely develop along a successional arc from stands of *Populus balsamifera* ssp. *trichocarpa - Alnus rubra - Fraxinus latifolia* Riparian Forest Alliance (A4428). Some reviewers have argued that these stands belong in upland alliances. Many of the plots in the map training data set are from moist microsites, but not true riparian settings.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
PICSIT-(ALNRUB)/RUBSPE/POLMUN	Picea sitchensis - (Alnus rubra) / Rubus spectabilis / Polystichum munitum Riparian Forest	CEGL007297	Confirmed	A-125

Photo Credit: Joe Rocchio

Populus balsamifera ssp. *trichocarpa - Alnus rubra - Fraxinus latifolia* Riparian Forest Alliance

Black Cottonwood - Red Alder - Oregon Ash Riparian Forest Alliance



EL Code: A4428

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Lowland Riparian Forest

Range: Occurs throughout western Oregon, Washington, and British Columbia, and along the eastern base of the Cascades south of Lake Chelan. Most occurrences are found below the *Abies amabilis* forest zone.

Plots: MORA (11), NOCA (43), OLYM (93), Other (104)

Environmental Description: Occurs on low-elevation (sea level to 900 m) alluvial floodplains or lower terraces of rivers and streams, as well as in headwater riparian settings that do not experience overbank flooding. Complex geomorphic and biotic components and processes maintain the long-term integrity of these riparian areas (Gregory et al., 1991). Overbank flooding and the succession that occurs after major flooding events are the major natural processes. Infrequent, high-powered floods determine large geomorphic patterns that persist on the landscape for hundreds to thousands of years (Hubert et al., 2004). Floods of intermediate frequency and power produce floodplain landforms that persist for tens to hundreds of years as well as reset succession to early seral vegetation types (Hubert et al., 2004). Beaver activity is an important driver of hydrological change and subsequent development of a diversity of habitat patches along these unconfined reaches of perennial streams. Soil textures are diverse, depending on gradient, flood frequency, and flood intensity. Seasonal and episodic flooding erodes and/or deposits sediment, resulting in complex patterns of soil development that subsequently have strong influences on the distribution of riparian vegetation (Gregory et al., 1991; Poff et al., 1997). Headwater forests are linear in character, occurring along small, confined, mainly Rosgen type A streams ("v" cross-section channels typical of first order streams). They are not typically subject to seasonal overbank flooding. Narrow and steep drainages typical of these headwater riparian areas have minimal to no floodplain development. Beavers are not a major component of these confined streams. These confined streams typically have shallow soils of diverse textures, but minimal alluvium—they transport water downstream rapidly through step-pool channels armored by boulders, bedrock, and large woody debris (Hubert et al., 2004; LANDFIRE, 2007a).

Vegetation Description: Riparian forests are the most floristically diverse type of vegetation in the Pacific coastal region (Kantor et al., 2001). These communities are spatially heterogeneous with a multitude of vegetation patches occurring within the same riparian zone, each adapted to specific flooding regimes or seral stages (Kantor et al., 2001). Mid- to late-seral patches are typically dominated by deciduous trees, though conifers often codominate and tend to increase in the absence of major disturbance. Given long enough periods without flooding, these communities likely develop into conifer-dominated stands. A multi-layered, dense shrub layer is usually present. Dominant species of mid- to late-seral patches are typically deciduous trees (i.e., *Acer macrophyllum*, *Alnus rubra*, *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*), and *Fraxinus latifolia*), but conifers (i.e., *Abies grandis*, *Pseudotsuga menziesii*, *Picea sitchensis*, and *Thuja plicata*) may codominate. In floodplain forests and woodlands, dominant species in the tall shrub layer include *Salix sitchensis*, *Salix lucida* ssp. *lasiandra*, *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*), and *Rubus spectabilis*. *Symphoricarpos albus* is common in a shorter shrub layer. Frequent dominant herbs include *Athyrium filix-femina*, *Oxalis oregana*, *Urtica dioica*, *Equisetum hyemale*, *Carex obnupta*, *Carex leptopoda* (=*C. deweyana*), *Claytonia sibirica*, and *Circaea alpina*. *Rubus spectabilis* and *Oplopanax horridus* are frequently dominant in the shrub layer of headwater riparian forests and woodlands, over a diverse herb layer (including *Athyrium filix-femina*, *Oxalis oregana*, *Urtica dioica*, and *Carex leptopoda* (=*C. deweyana*)).

Classification Comments: This alliance represents a merger of *Fraxinus latifolia - Populus balsamifera* ssp. *trichocarpa - Alnus* spp. Riparian Forest Alliance (A3743) and *Acer macrophyllum - Alnus rubra* Riparian Forest Alliance (A3745). As formerly described, A3743 represented riparian deciduous forests with dominant or codominant *Fraxinus latifolia* and/or *Populus trichocarpa*. A3745 represented riparian deciduous forests without dominant or codominant *Fraxinus latifolia* and/or *Populus trichocarpa*. Meanwhile, both alliances could have dominant or codominant *Acer macrophyllum* and/or *Alnus rubra*. Both alliances occurred on streamside sites with frequent flooding, as well as on higher, drier riparian terraces.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
ACEMAC/OXAORE	Acer macrophyllum / Oxalis oregana Riparian Forest	CWWA000205	Confirmed	A-126
ACEMAC/POLMUN-TOLMEN	Acer macrophyllum / Polystichum munitum - Tolmiea menziesii Riparian Forest	CWWA000206	Confirmed	A-127
ACEMAC/RUBSPE	Acer macrophyllum / Rubus spectabilis Riparian Forest	CEGL000561	Confirmed	A-128
ALNRUB/ACECIR/CLASIB	Alnus rubra / Acer circinatum / Claytonia sibirica Riparian Forest	CEGL003298	Confirmed	A-129
ALNRUB/ELYGLA	Alnus rubra / Elymus glaucus Riparian Forest	CEGL003398	Confirmed	A-130
ALNRUB/OPLHOR-RUBSPE	Alnus rubra / Oplopanax horridus - Rubus spectabilis Riparian Forest	CEGL003399	Confirmed	A-131
ALNRUB/OXAORE	Alnus rubra / Oxalis (oregana, trilliifolia) Riparian Forest	CEGL003400	Confirmed	A-132
ALNRUB/RUBPAR	Alnus rubra / Rubus parviflorus Riparian Forest	CEGL003402	Probable	A-133
ALNRUB/RUBSPE	Alnus rubra / Rubus spectabilis Riparian Forest	CEGL000639	Confirmed	A-134
ALNRUB/STACHA-TOLMEN	Alnus rubra / Stachys chamissonis var. cooleyae - Tolmiea menziesii Riparian Forest	CEGL003403	Confirmed	A-135
POPBAL-ACEMAC/SYMALB	Populus balsamifera ssp. trichocarpa - Acer macrophyllum / Symphoricarpos albus Riparian Forest	CEGL003363	Confirmed	n/a
POPBAL-ALNRUB/RUBSPE	Populus balsamifera ssp. trichocarpa - Alnus rubra / Rubus spectabilis Riparian Forest	CEGL003407	Confirmed	A-136
POPBAL-PICSIT-(ACEMAC)/OXAORE	Populus balsamifera ssp. trichocarpa - Picea sitchensis - (Acer macrophyllum) / Oxalis oregana Riparian Forest	CEGL003418	Confirmed	A-137
POPBAL/CORSER/CAROBN	Populus balsamifera ssp. trichocarpa / Cornus sericea / Carex obnupta Riparian Forest	CEGL002844	Confirmed	A-138

Photo Credit: Joe Rocchio

Alnus rubra - Acer macrophyllum - Alnus viridis Lower Montane Riparian & Swamp Forest Alliance

Red Alder - Bigleaf Maple - Sitka Alder Riparian & Swamp Forest Alliance



EL Code: A4430

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Lowland Riparian Forest

Range: Documented in the Washington Cascades. This alliance may also occur in Oregon and British Columbia.

Plots: MORA (1), NOCA (3), Other (20)

Environmental Description: Occurs on well-drained, moderate to steep slopes, toeslopes, and riparian terraces from 400 to 1150 m. Repeated natural mass-wasting (in toeslope and headwater riparian settings) and alluvial deposition (in perennial riparian settings) is apparent. Mass-wasting disturbance events occur with sufficient frequency to maintain these early-seral deciduous stands (Kittel, 2014g). Soil textures are variable—generally, the more confined and/or steep the gradient, the coarser the soil texture. Water sources include groundwater seepage (toeslopes) or variably frequent overbank flooding.

Vegetation Description: These communities are dominated by deciduous *Alnus rubra* (more frequent in perennial riparian settings) and/or *Acer macrophyllum* (more frequent in headwater riparian settings). Deciduous trees are dense and always clearly dominant, though *Pseudotsuga menziesii*, *Abies grandis*, *Tsuga heterophylla*, and/or *Thuja plicata* are sometimes prominent. The tall shrub layer is often well-developed and may be dominated by *Alnus viridis* ssp. *sinuata*, *Acer circinatum*, *Holodiscus discolor*, *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*), *Oplopanax horridus*. A shorter shrub layer of *Rubus nutkanus* (= *parviflorus*), and/or *Symphoricarpos albus* is often present. Depending on shrub density, the herb layer may be well-developed, with *Circaea alpina*, *Maianthemum stellatum*, *Athyrium filix-femina*, *Maianthemum racemosum*, *Viola glabella*, and *Polystichum munitum* most frequent.

Classification Comments: This alliance includes non-*Alnus rhombifolia* and non-interior *Alnus rubra* associations that were formerly in the *Populus tremuloides - Alnus rubra* Swamp Forest Alliance (A3768, G507). Unlike A4429, stands in this association typically lack interior/Rocky Mountain species such as *Acer glabrum* var. *douglasii*, *Aconitum columbianum*, *Asarum caudatum*, *Physocarpus capitatus*, etc. With additional plot data, this alliance might be further divided into headwater riparian types (dominated by *Acer macrophyllum*, plus *Alnus rubra* / *Oplopanax horridus* / *Athyrium filix-femina* CWWA000303) and perennial riparian communities (the remaining *Alnus rubra* associations). However, when tree cover is removed from analysis, these two categories were not floristically distinguishable. As it is, this alliance contains both headwater and perennial riparian systems, with *Acer macrophyllum*-dominated associations (n = 9) restricted to headwater settings. WNHP originally planned to leave this alliance in G507, rather than moving it to G851. It is true that these communities do occur in the mountains, but they average only 2500 feet in elevation (just above 1800-2000 feet, the cutoff that WNHP generally uses for "lowland" vs "montane" in Washington). These communities ordinate apart from lower elevation *Acer macrophyllum-Alnus rubra* communities in G851, G853, and G796, but there are insufficient indicator species with which to split A4430 apart from G851.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
ACEMAC/MAISTE	Acer macrophyllum / Maianthemum stellatum Riparian Forest	CWWA000440	Confirmed	A-139
ALNRUB/ACECIR	Alnus rubra / Acer circinatum Riparian Forest	CWWA000298	Probable	n/a
ALNRUB/ACHTRI	Alnus rubra / Achlys triphylla Riparian Forest	CWWA000299	Probable	n/a
ALNRUB/ALNVIR	Alnus rubra / Alnus viridis ssp. sinuata Riparian Forest	CWWA000301	Confirmed	A-140

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
ALNRUB/OPLHOR/ATHFIL	Alnus rubra / Oplopanax horridus / Athyrium filix-femina Riparian Forest	CWWA000303	Probable	n/a

Alnus rubra - Fraxinus latifolia / *Lysichiton americanus* Swamp Woodland Alliance

Red Alder - Oregon Ash / American Skunk-cabbage Swamp Woodland Alliance



EL Code: A3753

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Maritime Swamp Forest

Range: Occurs in low-elevation areas of western Washington, British Columbia, Oregon, and the northern California coast.

Plots: MORA (2), NOCA (4), OLYM (5), Other (50)

Environmental Description: Occurs from sea level to 1100 m (more frequent in the lowlands) in poorly drained basins and flats with stagnant or slowly moving surface water, or on slopes with saturated soils resulting from groundwater discharge. Overbank flooding is not a significant driver in these systems. Sites are poorly drained and usually have highly decomposed organic soils (e.g., muck) or mineral soils rich in organic matter. Windthrow creates canopy gaps and pit-mound topography, which increases microsite diversity. These swamps are generally more nutrient rich than conifer-dominated swamps. Fire is rare in these swamps but may occur in very rare events when stand-replacing fires occur in adjacent uplands.

Vegetation Description: These swamps are dominated by *Alnus rubra* and/or *Fraxinus latifolia*, both of which are capable of growing on saturated or seasonally flooded soils. Other trees that may be present include an array of conifers (*Tsuga heterophylla*, *Thuja plicata*, *Abies amabilis*, *etc.*), and *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*). Shrub species include *Oplopanax horridus*, *Salix sitchensis*, *Acer circinatum*, *Vaccinium ovalifolium*, *Rubus spectabilis*, *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*), *Rubus nutkanus* (= *parviflorus*), *Ribes bracteosum*, *Physocarpus capitatus*, *Gaultheria shallon*, *Frangula purshiana*, *Malus fusca*, and *Spiraea douglasii*. Herbaceous species *Lysichiton americanus* and *Carex obnupta* often dominate depressions that may be created by windthrow. *Athyrium filix-femina*, *Struthiopteris* (= *Blechnum*) *spicant*, *Adiantum pedatum*, *Petasites frigidus*, *Dryopteris expansa*, *Stachys chamissonis* var. *cooleyae*, *Tolmiea menziesii*, *Viola glabella*, *Tiarella trifoliata*, *Polystichum munitum*, *Maianthemum dilatatum*, *Galium triflorum*, *Montia sibirica*, and *Urtica dioica* are other common herbaceous species found in these swamps.

Classification Comments: The primary distinction between this alliance and the Tsuga heterophylla - Picea sitchensis / Lysichiton americanus Swamp Forest Alliance (A4285) is early successional deciduous (A3753) v. late-successional coniferous dominance (A4285).

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
ALNRUB/ATHFIL-LYSAME	Alnus rubra / Athyrium filix-femina - Lysichiton americanus Swamp Forest	CEGL003388	Confirmed	A-141
ALNRUB/CAROBN	Alnus rubra / Carex obnupta Swamp Forest	CWWA000438	Probable	n/a
ALNRUB/GLYSTR	Alnus rubra / Glyceria striata Riparian Woodland	CWWA000207	Confirmed	A-142
ALNRUB/RUBSPE/CAROBN-LYSAME	Alnus rubra / Rubus spectabilis / Carex obnupta - Lysichiton americanus Swamp Forest	CEGL003389	Confirmed	A-143
ALNRUB/RUBSPE/CHRGLE	Alnus rubra / Rubus spectabilis / Chrysosplenium glechomifolium Riparian Forest	CWWA000208	Probable	A-144

Tsuga heterophylla - Picea sitchensis / *Lysichiton americanus* Swamp Forest Alliance

Western Hemlock - Sitka Spruce / American Skunk-cabbage Swamp Forest Alliance



EL Code: A4285

Macrogroup: Vancouverian Flooded & Swamp Forest

Group: North-Central Pacific Maritime Swamp Forest

Range: Occurs in low-elevation areas of western Washington, British Columbia, and Oregon.

Plots: MORA (6), NOCA (2), OLYM (15), Other (99)

Environmental Description: This alliance encompasses coniferous forest communities of low-elevation seepage and basin swamps. Elevations range from sea level to 1150 m (mean = 200 m). Basin swamps occur in glacial depressions, river valleys, or around the edges of lakes and marshes. Stands are saturated or seasonally flooded, with surface water slowly moving through the site or sitting in stagnant pools. In seasonally flooded sites, surface water is present for extended periods, especially early in the growing season, but absent by the end of the season in most years. The water table often remains near the surface when surface water is absent. Seepage swamps develop where persistent groundwater discharge or subirrigation occurs on sloping sites, such as on toeslopes above depressional wetlands. Accumulation of organic matter (muck, or less commonly woody peat) can be significant in occurrences of both seepage and basin swamps, but many are found on mineral soils, often with only a thin veneer of organic surface layers. Windthrow creates canopy gaps and pit-mound topography in these communities, which increases microsite diversity. Downed trees, root wads, and mounds provide suitable substrates for tree and shrub species that are not able to establish on saturated soils. On extremely wet sites, *Tsuga heterophylla*, along with most shrubs, are often confined to higher microsites such as root wads, rotten logs, and root buttresses. Hollows created by windthrow are often dominated by species tolerant of saturated soil conditions. Fires are extremely uncommon.

Vegetation Description: These swamps are dominated by one or more of *Tsuga heterophylla*, *Picea sitchensis*, and/or *Thuja plicata*. Younger stands may be codominated by *Alnus rubra* and mid-seral stands often retain a significant component of *Alnus rubra* in the understory. Shrub species include *Oplopanax horridus*, *Salix sitchensis*, *Acer circinatum*, *Vaccinium ovalifolium*, *Rubus spectabilis*, *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*), *Rubus nutkanus* (= *parviflorus*), *Ribes bracteosum*, *Physocarpus capitatus*, *Gaultheria shallon*, and *Spiraea douglasii*. *Rubus spectabilis* and *Gaultheria shallon* frequently dominate. *Lysichiton americanus* and/or *Carex obnupta* often dominate water-filled depressions that may be created by windthrow. *Athyrium filix-femina*, *Struthiopteris* (= *Blechnum*) *spicant*, *Adiantum pedatum*, *Petasites frigidus*, *Dryopteris expansa*, *Stachys chamissonis* var. *cooleyae*, *Tolmiea menziesii*, *Viola glabella*, *Tiarella trifoliata*, *Polystichum munitum*, *Galium triflorum*, *Montia sibirica*, and *Urtica dioica* are other common herbaceous species found in these swamps. Patches of shade-tolerant *Sphagnum* species (*S. girgensohnii*, *S. fimbriatum*, *S. palustre*, etc.) may be sporadic around tree bases, as small lawns or carpets in low-lying areas, or on downed wood.

Classification Comments: The primary distinction between this alliance and the *Alnus rubra - Fraxinus latifolia* / *Lysichiton americanus* Swamp Woodland Alliance (A3753) is early successional deciduous v. late-successional coniferous dominance. *Tsuga* (*mertensiana*, *heterophylla*) - *Abies amabilis* Riparian & Swamp Forest Alliance (A3766) is similar, but occurs at higher elevations, typically with dominant or codominant *Abies amabilis*.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
PICSIT-ALNRUB/LYSAME-CHRGLE	Picea sitchensis - Alnus rubra / Lysichiton americanus - Chrysosplenium glechomifolium Swamp Forest	CWWA000233	Probable	n/a
PICSIT-TSUHET-(ALNRUB)/OPLHOR/POLMUN	Picea sitchensis - Tsuga heterophylla - (Alnus rubra) / Oplopanax horridus / Polystichum munitum Swamp Forest	CEGL005529	Probable	A-145

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
PICSIT/RUBSPE/CAROBN-LYSAME	Picea sitchensis / Rubus spectabilis / Carex obnupta - Lysichiton americanus Swamp Forest	CEGL000400	Confirmed	A-146
TSUHET-(PSEMEN)/OPLHOR/POLMUN	Tsuga heterophylla - (Pseudotsuga menziesii) / Oplopanax horridus / Polystichum munitum Swamp Forest	CEGL000497	Confirmed	A-148
TSUHET-(THUPLI-ALNRUB)/LYSAME-ATHFIL	Tsuga heterophylla - (Thuja plicata, Alnus rubra) / Lysichiton americanus - Athyrium filix-femina Swamp Forest	CEGL007322	Confirmed	A-147
TSUHET-THUPLI/VACOVAL-GAUSHA/LYSAME	Tsuga heterophylla - Thuja plicata / Vaccinium ovalifolium - Gaultheria shallon / Lysichiton americanus Swamp Forest	CEGL003226	Confirmed	A-149

Photo Credit: Joe Rocchio

Alnus rubra / *Dactylis glomerata* Ruderal Flooded Forest Alliance [Provisional]

Red Alder / Orchardgrass Ruderal Flooded Forest Alliance [Provisional]



EL Code: ANEW001

Macrogroup: Vancouverian Ruderal Flooded & Swamp Forest [Provisional]

Group: Vancouverian Ruderal Flooded & Swamp Forest [Provisional]

Range: Documented at low elevations in western Washington.

Plots: OLYM (5)

Environmental Description: Documented from sea level to 300 m, in areas that have experienced significant anthropogenic disturbance (including plowing (Rocchio et al., 2012)). Stands occur along streams or rivers, on riparian terraces, or on sites that otherwise have elevated soil moisture for at least a significant portion of the growing season (such as seeps).

Vegetation Description: This ruderal alliance has a tree canopy dominated by (native) *Alnus rubra* and may have other native species present, such as *Pseudotsuga menziesii*, *Picea sitchensis*, *Acer macrophyllum*, and/or *Thuja plicata*. Shrub cover is variable, but *Salix spp*. and/or *Rubus spectabilis* are sometimes prominent. The characteristic feature is the dominance of nonnative pasture grasses such as *Dactylis glomerata*, *Poa pratensis*, *Agrostis* spp., etc.

Classification Comments: This ruderal alliance was not prioritized during WNHP's review of wetland groups and alliances.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
ALNRUB Nonnative	Alnus rubra / Nonnative Grasses Ruderal Flooded Forest	Not Tracked	Confirmed	n/a

Photo Credit: Joe Rocchio

***Ledum groenlandicum - Kalmia microphylla - Rhynchospora alba* Shrub & Open Bog Alliance**

Bog Labrador-tea - Alpine Laurel - White Beaksedge Shrub & Open Bog Alliance



EL Code: A4409

Macrogroup: North Pacific Bog & Fen

Group: North Pacific Acidic Open Bog & Fen

Range: Occurs along the coast of North America from Oregon to British Columbia. In Washington, this alliance is most common within the Puget lowlands, especially in areas previously affected by continental glaciation, as well as on the outer coast and southwest coastal area in areas affected by both continental and alpine glaciation.

Plots: OLYM (4), Other (147)

Environmental Description: This alliance usually occurs below 450 m elevation, with an annual precipitation range of 89 to 280 cm (Western Regional Climate Center, 2016). This alliance includes bogs (flat and raised) and "transitional" bogs (transitional between bogs and fens) that form in glacial scours, kettles, isolated oxbows, old lake beds, and around pond/lake shorelines (Kulzer et al., 2001). Soil and water chemistry are important factors in the development and structure of peatland ecosystems. Factors such as pH, mineral concentration, available nutrients, and cation exchange capacity influence the vegetation types and their productivity. The pH of these systems is very acidic (commonly near 4.0) and low in nutrients. Fire is relatively rare in these communities, although Native Americans were known to use fire in coastal peatlands of the Olympic peninsula to maintain and encourage growth of beneficial plants (Anderson, 2009). Fire scars on snags have been observed in many of these peatlands. Some of these fires may have been a result of purposeful burning of upland areas subsequent to logging. Given the saturated nature of the underlying peat, fire would presumably only occur during very dry years when vegetation and the upper peat surface were relatively dry. In true bogs, peat has accumulated deep and high enough so that the rooting zone is above the influence of minerotrophic groundwater, limiting hydrological sources to precipitation (i.e., ombrotrophy). Transitional bogs occupy areas where ombrotrophic peat is deep enough to support abundant cover of Ericaceous shrubs and oligotrophic *Sphagnum* species (species occurring in very acidic conditions) but shallow enough that some species are able to root deep enough to access minerotrophic groundwater. Both types are permanently saturated, although water levels fluctuate in response to seasonal patterns of precipitation. Sites are very wet at the surface in winter and late spring and become progressively drier through summer into early fall. However, even in these dry months, underlying peat is almost always very moist to saturated. Bogs and transitional bogs often intermix with other wetland types (such as fens, shrub or forested swamps, and marshes) in the same wetland because of variation in development or succession. However, bogs and transitional bogs can also be hydrologically isolated from other wetland types. Substrates are composed of at least 40 inches of organic material, typically in the form of relatively undecomposed peat (i.e., hemic to fibric peat). The accumulation of undecomposed or slightly decomposed organic matter contributed by *Sphagnum* spp. (and *Carex* spp., in transitional bogs) is the primary ecological driver of these communities.

Vegetation Description: Flat bogs in the Puget lowlands are commonly dominated by *Rhododendron* (= *Ledum*) *groenlandicum* and *Kalmia microphylla* over a continuous lawn or hummocks of various *Sphagnum* species. In the driest bogs and/or those recently disturbed, *R. groenlandicum and Kalmia* can be quite dense and tall (near to or > than 1 m) to the extent that they exclude other species, even *Sphagnum*, from growing underneath their canopy. In relatively wet areas, *R. groenlandicum and Kalmia* are typically well spaced and exhibit a short-statured stunted growth form (often < 50 cm high). *Sphagnum fuscum* and *S. capillifolium* are common hummock forming species in Puget lowland bogs. *Pleurozium schreberi* is also common on top of hummocks. *S. rubellum* may also be present in the most oligotrophic positions (small hummocks or lawns). *Sphagnum angustifolium* is a common peat moss in hollows while *S. miyabeanum* and *S. mendocinum* are common in pools or very wet hollows. *Vaccinium oxycoccos* and *Drosera rotundifolia* are often common on hummocks. Reindeer lichen (*Cladina* spp.) can be abundant, sometimes to the extent that it outcompetes *Sphagnum* species. *Pteridium aquilinum* is common in many bogs, sometimes forming dense stands, which may indicate recent disturbance such as fire. *Gaultheria shallon* can be abundant, typically in a much more reduced, short-statured form than commonly observed in upland environments. Soaks and wet hollows are often dominated by *Eriophorum chamissonis*, *Dulichium arundinaceum*, and/or *Rhynchospora alba*. *Lysichiton americanus* sometimes forms "wells" or deep holes. Sporadic cover of trees (usually *Pinus contorta* var. *contorta* and *Tsuga heterophylla*) may be present. *Spiraea douglasii*, *Malus fusca*, *Populus*

tremuloides, *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*) and *Salix* spp. are common species that occur in laggs (i.e., non-bog vegetation commonly ringing flat bogs). Coastal flat bogs have unique floristic and ecological characteristics relative to Puget lowland flat bogs—they receive much more rainfall, are exposed to summer fog, support a few coastally restricted species, and occur primarily on alpine (rather than continental) glacial deposits and landforms. In Washington, species such as *Myrica gale*, *Sanguisorba officinalis*, *Empetrum nigrum*, *Xerophyllum tenax*, and numerous rare plants are primarily restricted to coastal peatlands, including flat bogs. However, *Empetrum nigrum* and *Xerophyllum tenax* are also found in upland habitats; the former is in dry alpine sites while the latter is found in lowland prairie and, more commonly, montane upland forests. Transitional bogs have a mix of acid-loving shrubs and continuous-to-patchy *Sphagnum* cover (though typically > than 40% cover), often with small ponds and pools interspersed. Topography within transitional bogs is relatively flat but 20-50 cm tall hummocks formed by *Sphagnum* spp. are common. Sedges are common due to groundwater being relatively close to the surface. When present, trees are typically represented by relatively short, stunted, bonsai-like growth forms with rounded tops. Often these trees are of small diameter and stature, but exhibit the furrowed bark of advanced years. Occasional tall individuals with pointed leader may occur in transitional bogs. Shrubs are relatively short (< 1m and often closer to 50 cm) and open enough to allow enough sunlight for significant ground cover of *Sphagnum* and expected feather mosses (e.g. *Pleurozium schreberi*).

Classification Comments: This alliance includes ombrotrophic shrub bogs and extremely poor fens of the Pacific Northwest, in G284. Extremely poor to poor fens of California and southern Oregon are included in the Ledum glandulosum - Darlingtonia californica Shrub & Open Fen Alliance (A4410).

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
ERICHA/SPHAGN	Eriophorum chamissonis / Sphagnum spp. Bog & Acidic Fen	CEGL003333	Probable	n/a
KALMIC-VACOXY/CAR(LIV,OBN)/SPHAGN	Kalmia microphylla - Vaccinium oxycoccos / Carex (livida, obnupta) / Sphagnum spp. Shrub Bog	CWWA000223	Confirmed	n/a
KALMIC-VACOXY/EMPNIG/SPHAGN	Kalmia microphylla - Vaccinium oxycoccos / Empetrum nigrum / Sphagnum spp. Shrub Bog	CWWA000256	Confirmed	n/a
KALMIC-VACOXY/SPHAGN	Kalmia microphylla - Vaccinium oxycoccos / Sphagnum spp. Shrub Bog	CWWA000224	Probable	n/a
LEDGRO-KALMIC/SPHAGN	Ledum groenlandicum - Kalmia microphylla / Sphagnum spp. Shrub Bog	CEGL003414	Probable	A-183
RHYALB-(VACOXY)/SPHAGN	Rhynchospora alba - (Vaccinium oxycoccos) / Sphagnum spp. Fen	CEGL003338	Probable	n/a

Photo Credit: Joe Rocchio

Myrica gale - *Carex utriculata* - *Sphagnum* spp. Acidic Shrub & Open Fen Alliance

Sweetgale - Northwest Territory Sedge - Peatmoss species Acidic Shrub & Open Fen Alliance



EL Code: A4411

Macrogroup: North Pacific Bog & Fen

Group: North Pacific Acidic Open Bog & Fen

Range: Primarily occurs in Washington and British Columbia, in areas previously affected by continental glaciation.

Plots: NOCA (1), OLYM (1), Other (194)

Environmental Description: These are low-elevation poor fens and "transitional" poor fens. These communities mostly occur under 450 m elevation, with an annual precipitation range of 89 to 280 cm (Western Regional Climate Center, 2016). Water chemistry in poor fens is highly acidic, with pH averaging 4.8 (3.8 to 6.1, n=10) in WNHP sampling, with low cation concentrations. Fens can form along lake/pond shorelines and along very slow moving streams, in confined basins, or in areas of groundwater discharge. Basin fens can form in depressions where surface water and/or upwelling groundwater provide continual saturation of the substrate within which dominant plants are rooted. Sloping fens occur on or at the base of slopes where groundwater discharges due to a break in the topography or a change in geology or in valley bottoms where alluvial groundwater supports peat formation. Often bogs and fens are intermixed in the same wetland because of variation in development or succession. Additionally, other wetland types can surround or occur adjacent to fens. However, fens can also be hydrologically isolated from other wetland types. Topography is typically flat but some sites have 20-50 cm tall hummocks formed by *Sphagnum* spp. Fire is relatively rare in these communities, although Native Americans were known to use fire in coastal peatlands of the Olympic peninsula to maintain and encourage growth of beneficial plants (Anderson, 2009). Fire scars are frequently observed on snags in many peatlands. Some of these fires may have been a result of purposeful burning of upland areas subsequent to logging. Given the saturated nature of the underlying peat, fire would presumably only occur during very dry years when vegetation and the upper peat surface were relatively dry. Fens are limited to those areas where surface and groundwater occur within the rooting zone of plants (Wheeler & Proctor, 2000). Sites are permanently saturated. While water levels may fluctuate somewhat with seasonal patterns of precipitation, groundwater water discharge typically remains stable. Fens often intermix with transitional bogs, shrub or forested swamps, and marshes in the same wetland because of variation in development or succession. However, fens may also be hydrologically isolated from other wetland types. By definition, fens have at least 40 cm of organic soils. Organic soil forms where the rate of plant growth exceeds the rate of decomposition of litter. Both saturated soils and cool temperatures slow decomposition to the point that productivity exceeds decomposition, resulting in an accumulation of organic matter (i.e. peat). The relative degree of decomposition of organic soil layers is distinguished as being either fibric (peat), hemic, or sapric (muck). Most peatlands have hemic to fibric peat. The accumulation of undecomposed or slightly decomposed organic matter contributed by *Sphagnum* (poor fens and bogs) or sedges, shrubs, and/or brown mosses (fens) is the primary ecological driver distinguishing peatlands from other wetland types.

Vegetation Description: Vegetation is usually a mix of acid-loving ericaceous shrubs, deciduous shrubs, open sedge lawns, and *Sphagnum* moss, often with small ponds and pools interspersed. When present in fens, trees are typically represented by relatively short, stunted growth forms, though not to the degree seen in bogs. Dominant shrubs include *Rhododendron* (= *Ledum*) groenlandicum, *Spiraea douglasii,* and/or *Myrica gale*. Since poor fens are slightly more minerotrophic and/or slightly less acidic than bogs, they characteristically support higher cover of sedges including *Carex aquatilis* var. *dives*, *C. utriculata*, *C. exsiccata*, *C. leptalea*, and *C. cusickii* along with a higher diversity of forbs such as *Menyanthes trifoliata*, *Comarum palustre*, *Lycopus uniflorus*, etc.

Classification Comments: Relative to other lowland peatland alliances, A4411 is distinguished by moderate constancy and cover of *Spiraea douglasii* and *Myrica gale*. Hydrology and bryophytes are the best indicators, but these are often difficult to distinguish in the field.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
CALCAN Pacific	Calamagrostis canadensis Pacific Coast Fen	CWWA000442	Probable	n/a
CAR(LIV,UTR)/SPHAGN	Carex (livida, utriculata) / Sphagnum spp. Fen	CEGL003423	Probable	n/a
CAREXS Fen	Carex exsiccata Fen	CWWA000259	Confirmed	n/a
JUNSUP-(CARLIV-RHYALB)	Juncus supiniformis - (Carex livida, Rhynchospora alba) Fen	CWWA000201	Probable	n/a
LEDGRO-MYRGAL/SPHAGN	Ledum groenlandicum - Myrica gale / Sphagnum spp. Shrub Bog	CEGL003335	Probable	n/a
MYRGAL-SPIDOU/SPHAGN	Myrica gale - Spiraea douglasii / Sphagnum spp. Fen	CEGL003420	Probable	n/a
MYRGAL/CAR(AQUD,UTR)	Myrica gale / Carex (aquatilis var. dives, utriculata) Fen	CEGL003376	Probable	n/a
MYRGAL/LYSAME	Myrica gale / Lysichiton americanus Shrub Swamp	CWWA000109	Probable	n/a
MYRGAL/SANOFF/SPHAGN	Myrica gale / Sanguisorba officinalis / Sphagnum spp. Fen	CEGL003419	Probable	n/a
SPIDOU/CARAQUD	Spiraea douglasii / Carex aquatilis var. dives Fen	CEGL003415	Confirmed	n/a

Photo Credit: Joe Rocchio

Kalmia microphylla - Caltha leptosepala - Sphagnum spp. Montane Acidic Shrub & Open Fen Alliance

Alpine Laurel - White Marsh-marigold - Peatmoss species Montane Acidic Shrub & Open Fen Alliance



EL Code: A4412

Macrogroup: North Pacific Bog & Fen

Group: North Pacific Acidic Open Bog & Fen

Range: These communities are scattered in the Olympic and Cascade Mountains, but never very abundant except in the area southwest of Mount Adams.

Plots: MORA (1), NOCA (2), Other (36)

Environmental Description: Most poor fens occur under 450 m elevation, but communities within this alliance are found in montane and subalpine areas up to 1700 m. Water chemistry in montane poor fens is acidic, with pH averaging 4.9 (4.1 to 5.8, n=7) in WNHP sampling, with low cation concentrations. Fens are limited to those areas where surface and groundwater occur within the rooting zone of plants (Wheeler & Proctor, 2000). Montane peatlands (all of which are fens) are primarily supported by groundwater discharge or occur along lake or pond shorelines. Soils are permanently saturated. Other wetland types can surround or occur adjacent to fens. However, fens can also be hydrologically isolated from other wetland types. Topography is typically flat or gently sloping. Fire is relatively rare in these communities. By definition, fens have at least 40 cm of organic soils. Organic soil forms where the rate of plant growth exceeds the rate of decomposition of litter. Both saturated soils and cool temperatures slow decomposition to the point that productivity exceeds decomposition, resulting in an accumulation of organic matter (i.e. peat). The relative degree of decomposition of organic soil layers is distinguished as being either fibric (peat), hemic, or sapric (muck). Most peatlands have hemic to fibric peat. The accumulation of undecomposed or slightly decomposed organic matter contributed by *Sphagnum* (poor fens and bogs) or sedges, shrubs, and/or brown mosses (fens) is the primary ecological driver distinguishing peatlands from other wetland types.

Vegetation Description: Vegetation is usually a mix of acid-loving shrubs, open sedge lawns, and *Sphagnum* moss, often with small ponds and pools interspersed. When present in fens, trees are represented by relatively short, stunted growth forms, though not to the degree seen in bogs. Species such as *Carex utriculata*, *C. cusickii*, *C. limosa*, *C. luzulina*, *C. exsiccata*, *C. scopulorum* ssp. *bracteosa*, *Trichophorum caespitosum*, *Pedicularis groenlandica*, *Kalmia microphylla*, *Eriophorum angustifolium*, *Alnus viridis* subsp. *sinuata*, *A. incana*, *Vaccinium uliginosum*, *Triantha occidentalis* (= *glutinosa*), *Lysimachia* (= *Trientalis*) *eruopaea*, and *Betula glandulosa* are common.

Classification Comments: This alliance is differentiated from other peatlands of western Washington by high elevation species such as *Caltha biflora*, *Pedicularis groenlandica*, and *Eriophorum angustifolium spp. angustifolium*.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
CARUTR Pacific	Carex utriculata Pacific Coast Fen	CWWA000428	Confirmed	n/a
ERIANG/SPHAGN	Eriophorum angustifolium ssp. angustifolium / Sphagnum spp. Fen	CWWA000016	Confirmed	n/a
KALMIC/CAREX-CALLEP/SPHAGN	Kalmia microphylla / Carex spp. - Caltha leptosepala ssp. howellii / Sphagnum spp. Fen	CWWA000225	Probable	n/a

Photo Credit: Joe Rocchio

Carex aquatilis var. *dives* - *Carex cusickii* Intermediate Fen Alliance

Sitka Sedge - Cusick's Sedge Intermediate Fen Alliance



EL Code: A4405

Macrogroup: North Pacific Bog & Fen

Group: North Pacific Circumneutral to Alkaline Open Fen

Range: Occurs from Oregon to southern Alaska. In Washington, this alliance occurs in the Puget Lowlands, outer coast, Olympic Mountains, and the Cascade Range.

Plots: MORA (8), NOCA (10), Other (13), Other (107)

Environmental Description: This alliance encompasses lowland to montane intermediate fens, ranging in elevation from sea level to 2000 m. Intermediate fens, as their name suggest, are intermediate between acidic poor fens and alkaline/calcareous rich fens. Water chemistry is slightly acidic to circumneutral, with pH averaging 5.9 (5.2 to 6.7, n=12)[1] in WNHP sampling. Fens can form along lake/pond shorelines and along very slow moving streams, in confined basins, or in areas of groundwater discharge. Basin fens can form in depressions where surface water and/or upwelling groundwater provide continual saturation of the substrate within which dominant plants are rooted. Sloping fens occur on or at the base of slopes where groundwater discharges due to a break in the topography or a change in geology or in valley bottoms where alluvial groundwater supports peat formation. Montane peatlands (all of which are fens) are primarily supported by groundwater discharge, or occur along lake or pond shorelines. Other wetland types can surround or occur adjacent to fens. However, fens can also be hydrologically isolated from other wetland types. Topography is typically flat, or gently sloping. Fire is relatively rare in these communities. By definition, fens have at least 40 cm of organic soils. Organic soil forms where the rate of plant growth exceeds the rate of decomposition of litter. Both saturated soils and cool temperatures slow decomposition to the point that productivity exceeds decomposition, resulting in an accumulation of organic matter (i.e. peat). The relative degree of decomposition of organic soil layers is distinguished as being either fibric (peat), hemic, or sapric (muck). Most peatlands have hemic to fibric peat. The accumulation of undecomposed or slightly decomposed organic matter contributed by *Sphagnum* (poor fens and bogs) or sedges, shrubs, and/or brown mosses (fens) is the primary ecological driver distinguishing peatlands from other wetland types.

Vegetation Description: When present in fens, trees are represented by relatively short, stunted growth forms, though not to the degree seen in bogs. Vegetation is characterized by scattered shrubs over herbaceous species, particular sedges and other graminoids, often with small ponds and pools interspersed. Brown mosses tend to dominat, but minerotrophic *Sphagnum* species may be present. A variety of sedges can dominate the herbaceous layer, such as *Carex aquatilis* var. *dives*, *C. utriculata*, and *C. cusickii* along with a high diversity of forbs such as *Menyanthes trifoliata* and *Equisetum fluviatile*. *Agrostis scabra*, *Galium trifidum*, *Juncus ensifolius*, *Platanthera dilatata*, and *Lysimachia* (= *Trientalis*) *europaea* can be good indicators in lowland intermediate fens, as well. Montane versions often have *Betula glandulosa*, *Alnus viridis* ssp. *sinuata*, *Salix commutata*, and/or *S. sitchensis* dominating the scattered, open shrub layer. Common herbaceous species in montane intermediate fens include *Caltha leptosepala* ssp. *howellii*, *Eleocharis quinqueflora*, *Carex utriculata*, *C. cusickii*, *C. aquatilis* var. *dives*, *C. scopulorum*, *Deschampsia caespitosa*, *Trichophorum caespitosum*, and/or *Vaccinium uliginosum*. *Agrostis scabra*, *Equisetum fluviatile*, *Calamagrostis canadensis*, *Carex echinata* ssp. *echinata*, *Glyceria striata*, *Dodecatheon jeffreyi*, *Juncus ensifolius*, *Pedicularis groenlandica*, *Salix planifolia*, and *Viola palustris* are good indicators for montane intermediate fens, as well.

Classification Comments:

[1] Extreme values may have resulted from varying meter quality

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
BETGLA/CARAQUD	Betula glandulosa / Carex aquatilis var. dives Shrub Fen	CWWA000209	Probable	n/a
CAR(AQUD,NIG,UTR)-CALLEP	Carex (aquatilis var. dives, nigricans, utriculata) - Caltha leptosepala ssp. howellii Fen	CWWA000169	Confirmed	A-184
CARAQUD-CARUTR	Carex aquatilis var. dives - Carex utriculata Fen	CWWA000057	Probable	n/a
CARAQUD-COMPAL	Carex aquatilis var. dives - Comarum palustre Fen	CEGL003433	Confirmed	n/a
CARAQUD	Carex aquatilis var. dives Fen	CEGL001826	Confirmed	n/a
TRICAE	Trichophorum caespitosum Pacific Fen	CEGL002679	Confirmed	n/a
VACULI/CARAQUD	Vaccinium uliginosum / Carex aquatilis var. dives Shrub Fen	CEGL001249	Probable	n/a

Pinus contorta - Tsuga heterophylla / *Ledum groenlandicum* / *Sphagnum capillifolium* Bog Woodland Alliance

Lodgepole Pine - Western Hemlock / Bog Labrador-tea / Northern Peatmoss Bog Woodland Alliance



EL Code: A4407

Macrogroup: North Pacific Bog & Fen

Group: North Pacific Maritime Wooded Bog & Poor Fen

Range: This alliance is apparently restricted to western Washington and British Columbia, in areas previously affected by continental glaciation. In Washington, this alliance is most common in the Puget Lowlands.

Plots: Other (41)

Environmental Description: These communities mostly occur under 450 m elevation, with an annual precipitation range of 89 to 280 cm (Western Regional Climate Center, 2016). Bogs (ombrogenous peatlands) generally form in glacial scours, kettles, isolated oxbows, old lakebeds, and around pond/lake shorelines. This alliance also contains poor treed fens, a type of acidic peatland with more influence of minerotrophic groundwater. Fens can form along lake/pond shorelines and along very slow moving streams, in confined basins, or in areas of groundwater discharge. Basin fens can form in depressions where surface water and/or upwelling groundwater provide continual saturation of the substrate within which dominant plants are rooted. Sloping fens occur on or at the base of slopes where groundwater discharges due to a break in the topography or a change in geology or in valley bottoms where alluvial groundwater supports peat formation. Often bogs and fens are intermixed in the same wetland because of variation in development or succession. WNHP's sampling has shown that pH of these bog woodlands ranges from 3.8 to 4.1. Nutrients are presumably low. Fire is relatively rare in these communities, although Native Americans were known to use fire in coastal peatlands of the Olympic peninsula to maintain and encourage growth of beneficial plants (Anderson, 2009). WNHP staff have observed fire scars on snags in many peatlands. Some of these fires may have been a result of purposeful burning of upland areas subsequent to logging. Given the saturated nature of the underlying peat, fire would presumably only occur during very dry years when vegetation and the upper peat surface were relatively dry. The water source is primarily precipitation, but groundwater discharge and/or surface flow does occur into these woodlands. Groundwater is typically close enough to the surface that some species are able to root into the groundwater table. These groundwater-affected sites are typically classified as treed fens. The hydroperiod is permanently saturated, although water levels fluctuate in response to seasonal patterns of precipitation. Thus, bog woodlands are very wet at the surface in winter and late spring and often become progressively drier through summer into early fall. However, even in these dry months, underlying peat is almost always very moist to saturated. Substrates are composed of at least 40 inches of organic material, typically in the form of relatively undecomposed peat (i.e., hemic to fibric peat). The accumulation of undecomposed or slightly decomposed organic matter contributed by *Sphagnum* spp., and to a much lesser extent *Carex* spp. and woody species, is the primary ecological driver of bog woodlands. Peat cores from many western Washington peatlands show that succession, climatic changes, fire, or other disturbances often results in a mix of types of peat deposits over the course of a peatland's history (Rigg, 1958).

Vegetation Description: Vegetation of this alliance is usually a mix of a conifer-dominated overstory, acid-loving shrubs, and open *Sphagnum* lawns, often with small ponds and pools interspersed. Sedges are prominent in the treed fen variation of this alliance. Bog woodlands in the Puget Lowlands are commonly dominated by a canopy of one or more of the following tree species: *Tsuga heterophylla*, *Thuja plicata*, *Pinus monticola*, and *Pinus contorta* var. *contorta*. Common understory shrubs include *Rhododendron* (= *Ledum*) *groenlandicum*, *Vaccinium oxycoccos*, and *Kalmia microphylla*. *Gaultheria shallon* can be abundant, typically in a much more reduced, short-statured form than commonly observed in upland environments. *Spiraea douglasii* may be scattered in poor treed fens. In the driest bog woodlands and/or those recently disturbed, *R. groenlandicum and Kalmia* can be quite dense and tall (near to or > than 1 m) to the extent that they exclude other species, even *Sphagnum*, from growing underneath their canopy. In relatively wet areas such as basin bogs, *R. groenlandicum and Kalmia* are typically well spaced and exhibit a short-statured stunted growth form (often < 50 cm high). In poor treed fens, where a minerotrophic water table is near the surface, *Carex utriculata*, *C. obnupta*, and *C. aquatilis* var. *dives* can be prominent to codominant. In sites trending toward true bog (ombrogenous) the herbaceous layer is typically depauperate and sparse. *Pteridium aquilinum* is common in many bog woodlands, sometimes forming dense stands, which may

indicate recent disturbance such as fire. Soaks and wet hollows are often dominated by *Eriophorum chamissonis*, *Dulichium arundinaceum*, and/or *Rhynchospora alba*. *Lysichiton americanus* is sometimes found forming "wells" or deep holes that these plants appear to inhabit for decades, if not longer (Turesson, 1916; Osvald, 1933). *Sphagnum fuscum* and *S. capillifolium* are common hummock forming species in Puget lowland bog woodlands. *Pleurozium schreberi* is typically very common on top of hummocks. *S. rubellum* may also be present in the most oligotrophic hummocks or lawns. *Sphagnum angustifolium* and *S. pacificum* are a common peat moss in hollows while *S. miyabeanum* and *S. mendocinum* are common in pools or very wet hollows. *Sphagnum* abundance and diversity is strongly affected by shading from overstory species. On top of the driest hummocks reindeer lichen (*Cladina* spp.) can be abundant, sometimes to the extent that it outcompetes *Sphagnum* species.

Classification Comments: *Pinus contorta - Tsuga heterophylla* / *Ledum groenlandicum* / *Carex livida* Coastal Bog Woodland Alliance (A4408) is very similar, but with outer coastal indicators such as *Carex echinata var. phyllomanica*, *C. obnupta*, *Sanguisorba officinalis*, *Myrica gale*, and *Gentiana sceptrum*. One approach to distinguishing peatland types is based on water source (Wheeler & Proctor, 2000). In this approach, fens are limited to those areas where surface and groundwater occurs within the rooting zone of plants. Bogs are limited to those areas where peat has accumulated deep and high enough so that the rooting zone is above the influence of minerotrophic groundwater, limiting hydrological sources to precipitation (i.e., ombrotrophy). Treed fens and treed bogs are not statistically distinguishable based on floristics, however. Thus, acidic treed fens and treed bogs are lumped here as 'bog woodlands'.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
PINCON/LEDGRO/SPHAGN	Pinus contorta var. contorta / Ledum groenlandicum / Sphagnum spp. Treed Bog	CEGL003337	Probable	A-185
TSUHET-(THUPLI)/LEDGRO/SPHAGN	Tsuga heterophylla - (Thuja plicata) / Ledum groenlandicum / Sphagnum spp. Treed Bog	CEGL003339	Probable	A-186

Photo Credit: Joe Rocchio

***Pinus contorta - Tsuga heterophylla* / *Ledum groenlandicum* / *Carex livida* Coastal Bog Woodland Alliance**

Lodgepole Pine - Western Hemlock / Bog Labrador-tea / Livid Sedge Coastal Bog Woodland Alliance



EL Code: A4408

Macrogroup: North Pacific Bog & Fen

Group: North Pacific Maritime Wooded Bog & Poor Fen

Range: This alliance is apparently restricted to western Washington and British Columbia. In Washington, this alliance primarily occurs on the Olympic peninsula and southwest coastal area, mostly in areas previously affected by alpine glaciation.

Plots: OLYM (14), Other (64)

Environmental Description: These communities mostly occur under 450 m elevation, with an annual precipitation range of 89 to 280 cm (Western Regional Climate Center, 2016). Coastal peatlands are ecologically distinct from the Puget lowland peatlands—they receive much more rainfall, are exposed to summer fog, support coastally restricted species, and occur primarily on alpine (rather than continental) glacial deposits and landforms. Most coastal peatlands appear to occur on fine-texture glacial outwash deposits that, along with groundwater discharge and copious rainfall of the region, results in abundant peat development. Bogs (ombrogenous peatlands) generally form in glacial scours, kettles, isolated oxbows, old lakebeds, and around pond/lake shorelines. This alliance also contains poor treed fens, a type of acidic peatland with more influence of minerotrophic groundwater. Fens can form along lake/pond shorelines and along very slow moving streams, in confined basins, or in areas of groundwater discharge. Basin fens can form in depressions where surface water and/or upwelling groundwater provide continual saturation of the substrate within which dominant plants are rooted. Sloping fens occur on or at the base of slopes where groundwater discharges due to a break in the topography or a change in geology or in valley bottoms where alluvial groundwater supports peat formation. Often bogs and fens are intermixed in the same wetland because of variation in development or succession. WNHP's sampling has shown that pH of bog woodlands ranges from 3.8 to 4.1. Nutrients are presumably low. Fire is relatively rare in these communities, although Native Americans were known to use fire in coastal peatlands of the Olympic peninsula to maintain and encourage growth of beneficial plants (Anderson, 2009). WNHP staff have observed fire scars on snags in many peatlands. Some of these fires may have been a result of purposeful burning of upland areas subsequent to logging. Given the saturated nature of the underlying peat, fire would presumably only occur during very dry years when vegetation and the upper peat surface were relatively dry. The water source is primarily precipitation, but groundwater discharge and/or surface flow does occur into these woodlands. Groundwater is typically close enough to the surface that some species are able to root into the groundwater table. These groundwater-affected sites are typically classified as treed fens. The hydroperiod is permanently saturated, although water levels fluctuate in response to seasonal patterns of precipitation. Thus, bog woodlands are very wet at the surface in winter and late spring and often become progressively drier through summer into early fall. However, even in these dry months, underlying peat is almost always very moist to saturated. Substrates are composed of at least 40 inches of organic material, typically in the form of relatively undecomposed peat (i.e., hemic to fibric peat). The accumulation of undecomposed or slightly decomposed organic matter contributed by *Sphagnum* spp., and to a much lesser extent *Carex* spp. and woody species, is the primary ecological driver of bog woodlands. Peat cores from many western Washington peatlands show that succession, climatic changes, fire, or other disturbances often results in a mix of types of peat deposits over the course of a peatland's history (Rigg, 1958).

Vegetation Description Vegetation of this alliance is usually a mix of a conifer-dominated overstory, acid-loving shrubs, and open *Sphagnum* lawns, often with small ponds and pools interspersed. *Tsuga heterophylla*, *Thuja plicata*, *Pinus monticola*, and/or *Pinus contorta* var. *contorta* form an open canopy in these bog woodlands and *Picea sitchensis* may be present. Trees are usually represented by relatively short, stunted, bonsai-like growth forms with rounded tops. Often these trees are of small diameter and stature, but exhibit the furrowed bark of advanced years. Many species found in boreal continental bogs, such as *Rhododendron* (= *Ledum*) *groenlandicum*, *Myrica gale*, *Vaccinium oxycoccos*, and *Drosera rotundifolia* are common. However, the presence of Pacific coastal species, including *Pinus contorta* var. *contorta*, *Tsuga heterophylla*, *Thuja plicata*, *Gaultheria shallon*, *Spiraea douglasii*, *Sphagnum pacificum*, *Sphagnum henryense*, and *Sphagnum mendocinum*, provide a unique floristic character to these communities. In these same peatlands, shrubs are typically less than 50 cm and open enough

to allow for a nearly continuous ground cover of *Sphagnum* and expected feather mosses (e.g. *Pleurozium schreberi*). *Rhododendron* (= *Ledum*) *groenlandicum* and *Kalmia microphylla* often dominates over a continuous lawn or hummocks of various *Sphagnum* species. In the driest bogs and/or those recently disturbed, *R. groenlandicum and Kalmia* can be quite dense and tall (near to or > than 1 m) to the extent that they exclude other species, even *Sphagnum*, from growing underneath their canopy. In relatively wet areas such as basin bogs, *R. groenlandicum and Kalmia* are typically well spaced and exhibit a short-statured stunted growth form (often < 50 cm high). *Pleurozium schreberi* is also common on top of hummocks. *S*. *rubellum* may also be present in the most oligotrophic hummocks or lawns. *Sphagnum angustifolium* is a common peat moss in hollows while *S*. *miyabeanum* and *S*. *mendocinum* are common in pools or very wet hollows. *Vaccinium oxycoccos* and *Drosera rotundifolia* are often common on hummocks. On top of the driest hummocks reindeer lichen (*Cladina* spp.) can be abundant, sometimes to the extent that it outcompetes *Sphagnum* species. *Pteridium aquilinum* is common in many bogs, sometimes forming dense stands, which may indicate recent disturbance or fire. *Gaultheria shallon* can be abundant, typically in a much more reduced, short-statured form than commonly observed in upland environments. Soaks and wet hollows are often dominated by *Eriophorum chamissonis*, *Dulichium arundinaceum*, and/or *Rhynchospora alba*. *Lysichiton americanus* is sometimes found forming "wells" in bogs, deep holes that these plants appear to inhabit for decades, if not longer (Turesson, 1916; Osvald, 1933). Since poor fens are slightly more minerotrophic and/or slightly less acidic than bogs, they can support a variety of *Carex* including *C*. *aquatilis* var. *dives*, *C*. *utriculata*, *C*. *exsiccata*, *C*. *leptalea*, *C*. *cusickii* along with a higher diversity of forbs such as *Menyanthes trifoliata*, *Comarum palustre*, *Lycopus uniflorus*, etc. In Washington, species such as *Myrica gale*, *Sanguisorba officinalis*, *Empetrum nigrum*, *Xerophyllum tenax*, and numerous rare plants are primarily restricted to coastal peatlands. However, *Empetrum nigrum* and *Xerophyllum tenax* are also found in upland habitats; the former in dry alpine sites while the latter is found in lowland prairie and, more commonly, montane upland forests. *R. groenlandicum and Kalmia* are dominant shrubs and they are typically well-spaced and exhibit a short-statured stunted growth form (< 50 cm high) in these coastal peatlands. *Sphagnum papillosum* is very abundant in coastal fens while *S*. *fuscum* and *S*. *rubellum* are abundant in the most oligotrophic sites.

Classification Comments: *Pinus contorta - Tsuga heterophylla* / *Ledum groenlandicum* / *Sphagnum capillifolium* Bog Woodland Alliance (A4407) is very similar, but without outer coastal indicators such as *Carex echinata*, *C*. *obnupta*, *Sanguisorba officinalis*, *Myrica gale*, and *Gentiana sceptrum*. One approach to distinguishing peatland types is based on water source (Wheeler & Proctor, 2000). In this approach, fens are limited to those areas where surface and groundwater occurs within the rooting zone of plants. Bogs are limited to those areas where peat has accumulated deep and high enough so that the rooting zone is above the influence of minerotrophic groundwater, limiting hydrological sources to precipitation (i.e., ombrotrophy). Treed fens and treed bogs are not statistically distinguishable based on floristics, however. Thus, acidic treed fens and treed bogs are lumped here as 'bog woodlands'.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
THUPLI-TSUHET/LYSAME/SPHAGN	Thuja plicata - Tsuga heterophylla / Lysichiton americanus / Sphagnum spp. Treed Fen	CEGL001787	Confirmed	A-187
TSUHET-(THUPLI)/LEDGRO/CAR(OBN,UTR)/SPHAGN	Tsuga heterophylla - (Thuja plicata) / Ledum groenlandicum / Carex (obnupta, utriculata) / Sphagnum spp. Treed Bog	CWWA000253	Confirmed	n/a

Carex lasiocarpa - Carex livida - Dulichium arundinaceum Acidic Graminoid Fen Alliance

Woolly-fruit Sedge - Livid Sedge - Threeway Sedge Acidic Graminoid Fen Alliance



EL Code: A3437

Macrogroup: North American Boreal & Subboreal Bog & Acidic Fen

Group: Rocky Mountain Acidic Fen

Range: This alliance occurs in interior mountain ranges of British Columbia, Alberta, Colorado, Wyoming, Montana, Idaho, Utah, and eastern Washington (possibly as far west as eastern NOCA).

Plots: Other (4)

Environmental Description: [Adapted from Kittel (2014h)] As currently defined, these are acidic fens (pH < 5.5) occurring in basins, along glacial kettle ponds, and lake margins on deep organic soils. Elevations range from 1400 to 2900 m (900 to 1550 m in WA). Soils are usually histosols with thick build-up of partially decomposed sedges. Sites are often flooded into the growing season with water tables remaining within the root zone. The wettest communities are organic mats floating on water or muck. Slightly drier sites have organic mats overlying saturated mineral layers, with large rocks that may protrude into shrubby hummocks.

Vegetation Description: [Adapted from Kittel (2014h)] As currently defined, rhizomatous sedges *Carex aquatilis*, *Carex canescens*, *Carex lasiocarpa*, *Carex livida*, *Carex utriculata*, and/or *Trichophorum cespitosum* typically dominate. Forbs can be up to 40% cover, including *Potentilla* (=*Argentina*) *anserina*, *Carex muricata*, *Comarum palustre*, *Equisetum arvense*, *Gentiana calycosa*, *Packera streptanthifolia* (= *Senecio cymbalarioides*), *Spiranthes romanzoffiana*, *Swertia perennis*, and/or *Symphyotrichum spathulatum* (= *Aster occidentalis*). Mosses, including *Sphagnum* spp., may be prominent in a ground layer. Small hummocks usually support stunted low shrubs, including *Vaccinium uliginosum*. The association likely to occur at NOCA is dominated by *Dulichium arundinaceum*, usually in nutrient-poor lakeshore settings.

Classification Comments: Because this alliance was not documented in the map training data and INR did not propose any association-level changes within it, A3437 was not prioritized for WNHP's review of wetland groups and alliances. However, future reassessment is recommended. Many of the species listed in the alliance name are limited to calcareous fens in certain portions of the Rocky Mountains (e.g, *Carex livida*, in Colorado) or occur across the entire fen gradient (i.e., *Carex lasiocarpa*). *Sphagnum* spp. should be considered as an addition to the alliance name. While not represented in the current range for this alliance, it seems likely that these fens also occur in California and Oregon. Only a single association is thought to be probable in the parks.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
DULARU Shore	Dulichium arundinaceum Shore Fen*	CEGL001831	Probable	n/a

*Photo is of Carex utriculata / Sphagnum spp. Fen — Photo Credit: Joe Rocchio

Carex limosa - Carex buxbaumii - Triglochin maritima Alkaline Graminoid Fen Alliance

Mud Sedge - Buxbaum's Sedge - Seaside Arrow-grass Alkaline Graminoid Fen Alliance



EL Code: A3435

Macrogroup: North American Boreal & Subboreal Alkaline Fen

Group: Rocky Mountain Alkaline Fen

Range: Occurs in interior mountain ranges of New Mexico, Colorado, Utah, Wyoming, Idaho, Montana, eastern Washington (as far west as eastern NOCA) and likely occurs in British Columbia and Alberta.

Plots: MORA (2), OLYM (1), Other (112)

Environmental Description: [Adapted from Kittel (2014i)] As currently defined, these neutral to alkaline herbaceous fens occur from 2400 to 3900 m elevation (750 to 225m in Washington) in elevation in narrow to broad mountain valleys, with smooth to concave surface topography. Soils are commonly histosols consisting of deep, fibric peat and are persistently saturated with standing water in the spring. These saturated conditions slow plant decomposition and promote organic matter accumulation.

Vegetation Description: [Adapted from Kittel (2014i)] As currently described, occurrences of this alliance are typically dominated by one or more of *Carex buxbaumii*, *C. cusickii*, *C. limosa*, and/or *C. saxatilis*, along with associates graminoids such as *C. aquatilis* var. *aquatilis*, *C. canescens*, *C. lasiocarpa*, *C. livida*, *C. utriculata*, and *Deschampsia cespitosa*. Forbs are often present and can have high cover, but stands are usually dominated by graminoids. Forbs *Caltha leptosepala*, *Drosera linearis*, *Ligusticum tenuifolium*, *Menyanthes trifoliata*, *Pedicularis groenlandica*, and *Trichophorum cespitosum*. *Scheuchzeria palustris* may be present. *Sphagnum* spp. or other moss genera typically form a dense ground layer.

Classification Comments: Because this alliance is extremely uncommon in the NCCN park units and INR did not propose any association-level changes within it, A3435 was not prioritized for WNHP's review of wetland groups and alliances. WNHP has data suggesting a circumneutral alliance could be separated from an extremely fen alliance. Rocky Mountain extremely rich fens types are not known from NCCN parks. Future reassessment of the alliances in the Rocky Mountain Alkaline Fen Group is recommended.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
CARCUS	Carex cusickii Fen	CEGL000230	Probable	n/a
CARSAX	Carex saxatilis Fen	CEGL001769	Confirmed	n/a
CARSCOP	Carex scopulorum var. prionophylla Fen	CWWA000331	Confirmed	n/a
ELEQUI	Eleocharis quinqueflora Fen	CEGL001836	Probable	n/a

Photo Credit: Joe Rocchio

Alnus viridis - Acer circinatum - Salix sitchensis Montane Wet Shrubland Alliance

Green Alder - Vine Maple - Sitka Willow Montane Wet Shrubland Alliance



EL Code: A4418

Macrogroup: Vancouverian Lowland Wet Shrubland, Wet Meadow & Marsh

Group: Vancouverian Wet Shrubland

Range: Occurs in mountainous areas of western Oregon, Washington, British Columbia, and southern Alaska.

Plots: MORA (43), NOCA (68), OLYM (34), Other (84)

Environmental Description: Occurs in perennial and headwater riparian shrublands and seepage swamps up to 1950 m. Slopes are often quite steep (up to 50°, mean = 10°). Sites include steep-sided and often v-shaped canyons (mostly Rosgen A and B channels), unconfined stream channels, and headwater draws with diverse substrates. Headwater stands and seepage swamps receive water via subirrigation from discharging groundwater, with surface flow only occurring along with major precipitation events. Perennial riparian communities receive periodic overbank flooding. Hydroperiods are seasonal to permanent—most soils remain moist to saturated with nutrient-rich water year round (Diaz & Mellen, 1996). Confined streams typically have shallow soils with minimal alluvium—they transport water downstream rapidly through step-pool channels armored by boulders, bedrock, and large woody debris (Hubert et al., 2004; LANDFIRE, 2007a). Along perennial, unconfined streams, seasonal and episodic flooding results in a mosaic of fine and coarse deposits, typical of a dynamic, low-gradient alluvial system.

Vegetation Description: Tall shrubs dominate these early- to mid-seral communities, before broadleaf and coniferous trees attain dominance. Cover of understory herbs is inversely related to the cover of shrubs and the flooding frequency. Major shrub species include *Rubus spectabilis*, *Alnus viridis* ssp. *sinuata*, *Acer circinatum*, *Rubus nutkanus*, *Oplopanax horridus*, *Sambucus racemosa*, *Ribes bracteosum*, and *Ribes lacustre*. Herbs can be diverse, with *Athyrium filix-femina* ssp. *cyclosorum*, *Pteridium aquilinum* ssp. *pubescens*, *Gymnocarpium dryopteris*, *Viola glabella*, *Veratrum viride*, *Streptopus lanceolatus*, *Maianthemum stellatum*, *Claytonia sibirica*, *Maianthemum racemosum* ssp. *amplexicaule*, *Dicentra formosa* ssp. *formosa*, *Galium triflorum*, *Tolmiea menziesii*, and *Tiarella trifoliata* most differential relative to other alliances in G322.

Classification Comments: These occur at higher elevations and on steeper slopes than other alliances in G322. This alliance is similar to the *Alnus viridis* ssp. *sinuata* Riparian Shrubland Alliance (A4416), which primarily occurs in the East Cascades and further east, but A4418 is differentiated by Vancouverian and/or moist indicators such as *Acer circinatum*, *Rubus spectabilis*, *Athyrium filix-femina*, *Sambucus racemosa*, and *Oplopanax horridus*. *Ribes lacustre*, *Thalictrum occidentale*, and *Abies lasiocarpa* are differential for A4416.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
ACECIR/(PTEAQU)	Acer circinatum / (Pteridium aquilinum) Wet Shrubland	CWWA000204	Confirmed	A-188
ACECIR/ATHFIL-TOLMEN	Acer circinatum / Athyrium filix-femina - Tolmiea menziesii Shrub Swamp	CEGL003291	Confirmed	A-189
ALNVIR-RUBSPE-(OPLHOR)	Alnus viridis ssp. sinuata - Rubus spectabilis - (Oplopanax horridus) Wet Shrubland	CWWA000045	Confirmed	A-190
ALNVIR-ACECIR	Alnus viridis ssp. sinuata / Acer circinatum Shrub Swamp	CEGL001155	Confirmed	A-191
CORSER Pacific	Cornus sericea Pacific Shrub Swamp	CEGL005301	Confirmed	A-192
OPLHOR Pacific	Oplopanax horridus Pacific Coast Wet Shrubland	CWWA000114	Confirmed	A-193

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
RIBBRA-RUBSPE	Ribes bracteosum - Rubus spectabilis Wet Shrubland	CWWA000135	Confirmed	A-194
SALSIT/EQUARV-PETFRI	Salix sitchensis / Equisetum arvense - Petasites frigidus Wet Shrubland	CEGL003296	Confirmed	A-195
SALSIT	Salix sitchensis Wet Shrubland	CEGL002896	Confirmed	A-196

Spiraea douglasii - Malus fusca - Salix sitchensis Lowland Wet Shrubland Alliance

Rose Spirea - Oregon Crabapple - Sitka Willow Lowland Wet Shrubland Alliance



EL Code: A4419

Macrogroup: Vancouverian Lowland Wet Shrubland, Wet Meadow & Marsh

Group: Vancouverian Wet Shrubland

Range: Occurs throughout the lowlands of western Washington and extends throughout the Maritime Pacific Northwest, from Cook Inlet and Prince William Sound, Alaska, to the southern coast of Oregon.

Plots: NOCA (11), OLYM (1), Other (85)

Environmental Description: This alliance encompasses low-elevation shrublands found in depressions, around bogs (i.e., laggs), interdunal wetlands, and freshwater tidal wetlands, as well as perennial riparian areas. Elevations range from sea level to 1300 m, but average only 200 m. Soils are typically nutrient-rich and range from muck to mineral. Water sources typically consist of groundwater, surface flow, or streams and creeks that generate overbank flooding. Some interdunal shrublands perch on iron-cemented duripans and groundwater may be charged with iron, with pH ranges from 5.0-6.3 and low conductivity. Lagg shrublands have hydrological and hydrochemical qualities that are intermediate between bogs and surrounding minerotrophic wetlands or upland terrain. These qualities can also change rapidly over short distances within the lagg, as the water source in such settings is a mix of acidic bog water in different proportions with mineral-rich ground water from adjacent areas (Paradis et al., 2015). The hydroperiod in this alliance ranges from seasonally to permanently flooded, with surface water slowly moving through the site or sitting in stagnant pools. In seasonally flooded sites, surface water is present for extended periods, especially early in the growing season, but absent by the end of the season in most years. The water table often remains near the surface when surface water is absent. These shrublands occur in a mosaic with marshes or forested swamps. Occurrences on lake edges may be perennially abraded by waves (Kunze, 1994b). Development of shrub swamps near the fringes of lakes and ponds is dictated largely by shoreline gradient, along with fluctuation of water levels. Relatively flat or gently sloping shorelines support much larger systems than steeply sloping shorelines. Freshwater tidal occurrences are found along tidally influenced portions of rivers when heavier saltwater "wedges" push under fresh water. Fresh water then backs up in rivers and sloughs, spilling over onto adjacent floodplains. Overflow water typically has salt concentrations of less than 0.5 parts per thousand (ppt) (Kunze, 1994b). Interdunal shrublands are found in small depressions between coastal dunes, as well as extensive deflation plains, behind stabilized foredunes. As wind blows inland, it erodes the sand in the lee of the foredunes down to the level of the water table.

Vegetation Description: These swamps are dominated by one or more of *Salix* spp., *Spiraea douglasii*, *Malus fusca*, *Myrica gale*, or *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*). *Spiraea douglasii* is a common dominant shrub in lowland shrub swamps, especially in sites that have experienced human-induced disturbance. These stands are often very dense and have few associated herbaceous species. *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*) and *Salix* spp. are common around beaver ponds and along slow-moving surface water tracts. *Myrica gale* is a common species in coastal shrub swamps. Understory species of these communities are variable depending on the dominant shrubs and overall shrub cover. *Carex obnupta*, *C. cusickii*, *C. exsiccata*, *C. utriculata*, *Torreyochloa pallida* var. *pauciflora*, and *Glyceria striata* are common graminoids while *Lysichiton americanus*, *Oenanthe sarmentosa,* and *Urtica dioica* are common forbs. Numerous other herbaceous species may be present. Interdunal wetlands frequently have *Argentina egedii*, *Juncus lesueurii*, *J. falcatus* ssp. *sitchensis*, and/or *J. nevadensis*. Lagg shrublands frequently contain species that are more common in the neighboring bog or fen, such as *Rhododendron* (= *Ledum*) *groenlandicum*.

Classification Comments: These shrublands have generally greater sedge cover and occur at lower elevations with lower slopes than the *Alnus viridis - Acer circinatum - Salix sitchensis* Montane Wet Shrubland Alliance (A4418). Freshwater tidal swamps may deserve their own alliance, as they are ecologically distinct, but there was insufficient floristic signal in the data set used in this project (environmental data was relatively coarse). Similarly, interdunal shrublands may justify their own alliance, but these shrublands had minimal representation in our data set.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
CORSER-SALIX-SPIDOU	Cornus sericea - Salix spp. - Spiraea douglasii Wet Shrubland	CWWA000249	Probable	n/a
MALFUS	Malus fusca Shrub Swamp	CEGL003385	Probable	n/a
MYRGAL/BOYINT-CAROBN	Myrica gale / Boykinia intermedia - Carex obnupta Shrub Swamp	CEGL003336	Probable	n/a
SAL(HOO,LUC,SIT)	Salix (hookeriana, lucida ssp. lasiandra, sitchensis) Wet Shrubland [Provisional]	CWWA000167	Probable	n/a
SALHOO-(MALFUS)/CAROBN-LYSAME	Salix hookeriana - (Malus fusca) / Carex obnupta - Lysichiton americanus Wet Shrubland	CEGL003432	Probable	n/a
SALIX-SPIDOU/CAR(AQUD,OBN,UTR)	Salix spp. - Spiraea douglasii / Carex (aquatilis var. dives, obnupta, utriculata) Wet Shrubland	CWWA000199	Confirmed	A-197
SPIDOU	Spiraea douglasii Wet Shrubland	CEGL001129	Confirmed	n/a

Photo Credit: Joe Rocchio

Petasites frigidus - *Stachys chamissonis* var. *cooleyae* Streamside Marsh Alliance

Arctic Sweet-colt's-foot - Cooley's Hedge-nettle Streamside Marsh Alliance



EL Code: A4413

Macrogroup: Vancouverian Lowland Wet Shrubland, Wet Meadow & Marsh

Group: Vancouverian Freshwater Wet Meadow & Marsh

Range: Occurs throughout western Washington, including the West Cascade foothills, southwest Pacific Coast, the Olympic Peninsula, and the Puget Trough. These communities are also found in the lowlands of western Oregon and southwestern British Columbia.

Plots: Other (11)

Environmental Description: Associations in this alliance are typically narrow emergent herbaceous marshes found along low-elevation streams and rivers. They are separate from—but frequently shaded by—neighboring forest/shrub communities. Marsh development along riparian areas is driven by the magnitude and frequency of flooding, valley and substrate type, and beaver activity. Seasonal and episodic floods scour depressions in the floodplain, create side channels and sloughs, and force channel migration that can result in oxbows. Marsh vegetation establishes in those landforms that are semi-permanently or permanently inundated. Hydroperiods are semi-permanently to permanently flooded in most of these marshes, though water may fluctuate significantly with the season in some streams. Communities in narrower, v-shaped drainages may receive no flooding at all. Oxygenated water flow prevents peat accumulation and keeps nutrient availability high (MacKenzie & Moran, 2004). Soils are muck or mineral, and water is rich with nutrients. These marshes are typically found in a mosaic with other wetland types.

Vegetation Description: Marshes within this subgroup are dominated by emergent herbaceous species, particularly graminoids, while trees, shrubs, and bryophytes are typically absent or sparse (MacKenzie & Moran, 2004; Crawford et al., 2009). Dominant graminoids include species such as *Carex interrupta*, *Scirpus microcarpus*, and *Paspalum distichum*. Forbs such as *Petasites frigidus* and *Stachys chamissonis* var. *cooleyae* (=*S. ciliata*) may also dominate. Many different species are found in these marshes. However, high nutrient levels favor highly competitive species, resulting in relatively low diversity of plant species in any given location (MacKenzie & Moran, 2004).

Classification Comments: This alliance includes types that receive significant flooding and scouring, such as *Deschampsia caespitosa - Artemisia lindleyana* Wet Meadow (CEGL003425), which is found on seasonally flooded gravel and cobble bars along a single 5-miles stretch of the Columbia River. Associations that receive relatively infrequent flooding and/or little scouring are also included in this alliance.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
PETFRI	Petasites frigidus Marsh	CWWA000116	Probable	n/a

Photo Credit: Joe Rocchio

Carex obnupta - Carex exsiccata - Typha latifolia Basin Marsh & Wet Meadow Alliance

Slough Sedge - Western Inflated Sedge - Broadleaf Cattail Basin Marsh & Wet Meadow Alliance



EL Code: A4414

Macrogroup: Vancouverian Lowland Wet Shrubland, Wet Meadow & Marsh

Group: Vancouverian Freshwater Wet Meadow & Marsh

Range: Occurs throughout the lowlands of western Washington, including the southwest Pacific Coast, the Olympic Peninsula, and the Puget Trough. These communities are also found in the lowlands of western Oregon and southwestern British Columbia.

Plots: OLYM (3), Other (59)

Environmental Description: This alliance encompasses freshwater emergent herbaceous marshes and wet meadows found in depressions, laggs, and alongside lowland lakes, ponds, and freshwater tidal stretches of coastal rivers. Elevations range from sea level to 900 m (mean = 222m). Development of marshes near the fringes of lakes and ponds is dictated largely by shoreline gradient, along with fluctuation of water levels. Relatively flat or gently sloping shorelines support much larger marsh systems than steeply sloping shorelines. These wetlands are typically found on flat areas or gentle slopes and are usually not subjected to high disturbance events such as flooding. Water sources consist of surface flow or groundwater. Hydroperiods vary from permanently to semi-permanently flooded. In some areas, water levels fluctuate greatly, with dramatic drawdowns that can expose bare soil by late summer. Soils are muck or mineral.

Vegetation Description: Marshes within this subgroup are dominated by emergent herbaceous species, mostly tall graminoids. Trees, shrubs and bryophytes are typically absent or very sparse (MacKenzie & Moran, 2004; Crawford et al., 2009). Common dominants include *Typha latifolia*, *Carex exsiccata*, *Carex obnupta*, *Scirpus microcarpus*, *Schoenoplectus acutus*, *Eleocharis palustris*, *Juncus effusus*, and some forbs. Many different species are found in these marshes. However, high nutrient levels favor highly competitive species, resulting in relatively low diversity of plant species in any given location (MacKenzie & Moran, 2004). Occurrences are typically found in a mosaic with other wetland types. When associated with relatively deep water, this subgroup may co-occur with aquatic vegetation dominated by floating-leaved genera such as *Lemna*, *Potamogeton*, *Polygonum*, *Nuphar*, *Hydrocotyle*, and *Brasenia*.

Classification Comments: This new alliance contains associations from four existing alliances.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
CAROBN	Carex obnupta Wet Meadow	CEGL003313	Confirmed	n/a
ELEPAL Pacific	Eleocharis palustris Pacific Coast Marsh	CWWA000431	Probable	n/a
EQUTEL	Equisetum telmateia Marsh	CWWA000218	Probable	n/a
JUNEFF	Juncus effusus var. brunneus Pacific Coast Wet Meadow	CEGL003317	Probable	n/a
OENSAR	Oenanthe sarmentosa Marsh	CEGL003319	Probable	n/a
RANFLA-JUNNEV-CARLEN	Ranunculus flammula - Juncus nevadensis - Carex lenticularis Marsh	CEGL003426	Probable	n/a
SCIMIC Pacific	Scirpus microcarpus Pacific Coast Marsh	CWWA000420	Confirmed	n/a

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
TYPLAT Pacific	Typha latifolia Pacific Coast Marsh	CWWA000433	Probable	n/a

Photo Credit: Joe Rocchio

Schoenoplectus americanus - Schoenoplectus acutus - Schoenoplectus californicus Marsh Alliance

Chairmaker's Bulrush - Hardstem Bulrush - California Bulrush Marsh Alliance



EL Code: A3895

Macrogroup: Arid West Interior Freshwater Marsh

Group: Arid West Inland Freshwater Emergent Marsh

Range: This geographically broad alliance occurs throughout the western United States and Canada. It may occur at the lowest elevation, eastern margins of NOCA (near Lake Chelan).

Plots: Other (3)

Environmental Description: These communities are usually found below lower treeline, where semi-permanently flooded habitats are found as small patches in matrices with relatively dry landscapes. They are typically surrounded by savanna, shrub steppe, steppe, semi-desert vegetation, or sometimes wet meadows. These marshes may occur in depressions or on the fringes of ponds or lakes. Development of basin marshes near lakes and ponds is dictated by the shoreline gradient and fluctuation of lake or pond water levels. Relatively flat or gently sloping shorelines support much larger marsh systems than steep shorelines. Water sources consist of surface flow or groundwater. The hydroperiod is seasonally or permanently inundated. Water is at or above the surface for most of the growing season, reaching depths of up to 2 m. Water levels may fluctuate in some areas, with dramatic drawdowns exposing bare soil by later summer. Water level fluctuations support the development of different marsh zones (floating, submergent, emergent, etc.), which vary according to the degree of inundation. Water chemistry may be alkaline or semi-alkaline, but can also be highly variable across the same wetland complex. Soils may be mineral or organic, with characteristics that result from long anaerobic periods (e.g., gleyed soils, high organic content, redoximorphic features). If organic soils are present, they are typically well decomposed (sapric or muck).

Vegetation Description: Hydrophytic herbaceous vegetation dominates these wetlands. Dominant species usually form dense monocultures. Common emergent vegetation includes *Scirpus microcarpus*, *Schoenoplectus acutus*, *S. tabernaemontani*, *Typha latifolia*, and *Juncus* spp. Species diversity is often quite low.

Classification Comments: Because this alliance was not documented in the map training data and INR did not propose any association-level changes within it, A3437 was not prioritized for WNHP's review of wetland groups and alliances.

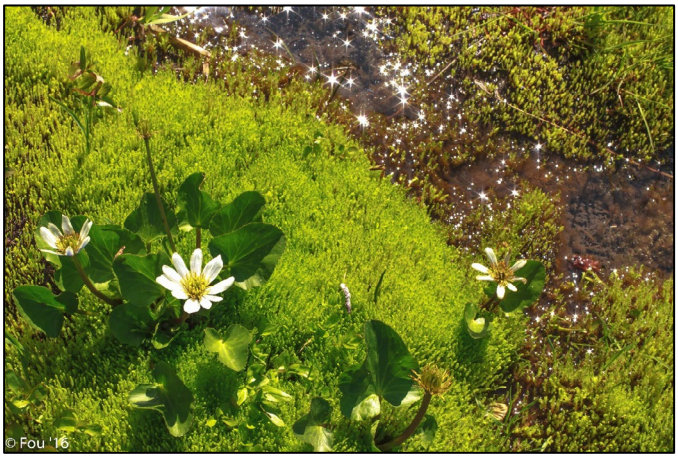
NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
SCHACU	Schoenoplectus acutus Marsh	CEGL001840	Probable	n/a
SCHTAB	Schoenoplectus tabernaemontani Temperate Marsh	CEGL002623	Probable	n/a

Photo Credit: Joe Rocchio

Caltha leptosepala - Rhodiola rhodantha Wet Meadow Alliance

White Marsh-marigold - Red-pod Stonecrop Wet Meadow Alliance



EL Code: A1698

Macrogroup: Western North American Montane Marsh, Wet Meadow & Shrubland

Group: Vancouverian & Rocky Mountain Subalpine & Alpine Snowbed, Wet Meadow & Dwarf-Shrubland

Range: Occurs in the Cascades, Sierra Nevada, and Rocky Mountains of the western United States.

Plots: OLYM (2), Other (16)

Environmental Description: [Adapted from Kittel (2014j)] Occurs in seeps, springs, alongside streams, and in wet meadows with deep winter snow accumulation at elevations from 900 to 2400 m in Washington (2850 to 3800 m rangewide). Stands in Washington have been observed on slopes > 20°, but are more frequent on flat or gently sloping sites with slower water movement. Soils are saturated to the surface for much of the growing season (often subirrigated) and standing water is common. Soils are primarily poorly drained alluvium and range from mineral, thin, and skeletal to loess with high organic matter accumulation (but always < 40 cm). Soil pH ranges from 4.6-7.0 (Johnston, 1987).

Vegetation Description: [Adapted from Kittel (2014j)] These are short-statured herbaceous wetlands that are under snow for much of the year. Wet forbs such as *Caltha leptosepala* dominate. *Micranthes odontoloma*, *Epilobium anagallidifolium*, *Pectiantia* (= *Mitella*) *pentandra*, *Pedicularis groenlandica*, *Bistorta* (= *Polygonum*) *bistortoides*, and/or *Senecio triangularis* are often present to codominant (Kittel, 2014j). Graminoids are generally low in cover, but may include *Carex nigricans*, *Calamagrostis canadensis*, *Carex scopulorum*, and *Phleum alpinum*, among others. *Philonotis fontana* and *Bryum* spp. are common in a well-developed nonvascular layer (Komárková, 1976; Kittel et al., 1999). Dwarf-shrubs *Cassiope mertensiana*, *Phyllodoce empetriformis*, and *Vaccinium deliciosum* are often present.

Classification Comments: These communities have more standing water than the other alliances in G520. In Washington, they also occur at lower elevations (average = 1200 m). If this alliance were restricted to the Pacific Northwest, it would likely fit better in a montane group. This alliance is distinguished from the *Carex aquatilis* var. *dives* - *Carex cusickii* Intermediate Fen Alliance (A4405) by its relatively shallow organic soils and low graminoid cover.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
CALLEP	Caltha leptosepala Wet Meadow	CEGL001954	Confirmed	n/a

Photo Credit: Murray Foubister (https://www.flickr.com/photos/mfoubister/28119964084/)

Kalmia microphylla - Cassiope mertensiana - Dryas drummondii Wet Dwarf-shrubland Alliance

Alpine Laurel - Western Moss-heather - Drummond's Mountain-avens Wet Dwarf-shrubland Alliance



EL Code: A3831

Macrogroup: Western North American Montane Marsh, Wet Meadow & Shrubland

Group: Vancouverian & Rocky Mountain Subalpine & Alpine Snowbed, Wet Meadow & Dwarf-Shrubland

Range: Occurs in mountainous areas throughout the western United States and Canada. In Washington, it occurs in subalpine and alpine areas of the Olympics, Cascades, Okanogan Highlands, and Central Rocky Mountains.

Plots: MORA (2), NOCA (5), Other (9)

Environmental Description: [Adapted from Kittel (2014k)] This alliance occurs in snowbeds (depressions that accumulate deep snow that melts off only late in the growing season). In Washington, elevations range from 1000 to 2000 m. Some stands occur on solifluction lobes, which receive moisture from upslope, subsurface drainage. Soils are cold and usually saturated for most of the growing season, producing high organic matter concentrations (though relatively shallow) and acidic conditions (reported pH values from 5.8 to 6.2). Soils may dry by the end of the growing season. Some stands have hummocky topography, which provides microhabitats with better drainage.

Vegetation Description: In Washington, occurrences of this alliance are dominated or codominated by the dwarf-shrub *Kalmia microphylla* (although mean cover is only 17%). *Carex nigricans* is always codominant. Common associate species in these communities include *Carex illota*, *C. micropoda*, *C. scopulorum*, *Potentilla flabellifolia*, and *Caltha biflora*. Dwarf-shrubs such as *Cassiope mertensiana*, *Phyllodoce empetriformis*, and *Vaccinium deliciosum* are common, particularly on hummocks or other elevated microsites.

Classification Comments: This alliance is differentiated from similar types by dominance of *Kalmia microphylla* in subalpine and alpine settings. *K. microphylla* often grows in such a dwarf form in subalpine areas that it may be difficult to recognize from a distance.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
KALMIC/CARNIG	Kalmia microphylla / Carex nigricans Wet Dwarf-shrubland	CEGL001402	Confirmed	A-198

Carex nigricans - Sibbaldia procumbens - Trollius laxus Wet Meadow Alliance

Black Alpine Sedge - Creeping Sibbaldia - American Globeflower Wet Meadow Alliance



EL Code: A3832

Macrogroup: Western North American Montane Marsh, Wet Meadow & Shrubland

Group: Vancouverian & Rocky Mountain Subalpine & Alpine Snowbed, Wet Meadow & Dwarf-Shrubland

Range: Occurs throughout the Rocky Mountains, Cascade Ranges, and Coastal Mountains of the western United States and Canada.

Plots: MORA (2), NOCA (16), OLYM (13), Other (28)

Environmental Description: [Adapted from Kittel (2014l)] This alliance has a broad environmental range, including meadows with soils that dry fairly early in the growing season and snowbeds that remain moist throughout the growing season. Stands may also occur on streambanks. Most commonly, however, these communities occur in small, gently sloping (average = 8°) depressions below late-melting snow patches. Stands may be snow-free for 3-4 months. Soils are poorly drained and may have some peat development. Reported soil pH levels range from 4.2-5.1. Elevations range from 1250 to 2350 m in Washington.

Vegetation Description: In Washington, *Carex nigricans* characteristically dominates, often forming a dense turf. *Carex spectabilis* may codominate in relatively mesic occurrences. Other species with high constancy in Washington include *Luetkea pectinata*, *Vahlodea atropurpurea*, *Juncus drummondii*, *Potentilla flabellifolia*, *Micranthes tolmiei*, *Juncus mertensianus*, and *Epilobium anagallidifolium*. *Phyllodoce empetriformis* and *Vaccinium deliciosum* are often present in small amounts, but *Kalmia microphylla* is generally absent.

Classification Comments: This alliance is similar to the Kalmia microphylla - Cassiope mertensiana - Dryas drummondii Wet Dwarf-shrubland Alliance (A3831), but typically occurs on sites with better drainage and without significant dwarf-shrub cover. *Carex nigricans* stands associated with seeps and with high cover of mosses (particularly *Philonotis fontana*) likely represent occurrences of CARNIG-(PETFRI)/PHIFON. That association is in the *Mimulus Lewisii - Philonotis fontana* Seep & Streambank Alliance (A4417).

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
CARNIG	Carex nigricans Wet Meadow	CEGL001816	Confirmed	A-199
CARSPE-POTFLA	Carex spectabilis - Potentilla flabellifolia Wet Meadow	CEGL001829	Confirmed	A-200

Photo Credit: Joe Rocchio

Mimulus Lewisii - Philonotis fontana Seep & Streambank Alliance

Great Purple Monkeyflower - Fountain Apple Moss Seep & Streambank Alliance



EL Code: A4417

Macrogroup: Western North American Montane Marsh, Wet Meadow & Shrubland

Group: Vancouverian & Rocky Mountain Subalpine & Alpine Snowbed, Wet Meadow & Dwarf-Shrubland

Range: Currently documented from the Cascades and Olympic Mountains of Washington, but likely occurs in other mountainous areas of the western United States and Canada.

Plots: NOCA (2), OLYM (1), Other (5)

Environmental Description: This alliance encompasses narrow, linear wetland communities of subalpine and alpine seeps and streambanks. These seeps and streams are typically dependent on nearby snowbeds/drifts/fields and are more hydrologically similar than lower elevation seeps and streams. Streambank communities included in this alliance do not experience overbank flooding. Soils are seasonally to permanently saturated. Water may be above the soil surface early in the growing season, but typically drop below the surface by late summer. Soils show typical hydric soil characteristics, including high organic content (though less than 40 cm, often with histic epipedons) and/or low chroma and redoximorphic features. Documented stands occur from 1250 to 1850 m.

Vegetation Description: Forb cover is characteristically high in these communities, particularly *Erythranthe* (= *Mimulus*) *lewisii*, *Potentilla flabellifolia*, *Micranthes* (= *Saxifraga*) *odontoloma*, *Senecio triangularis*, and *Luetkea pectinata*. *Carex nigricans* is usually present and often codominates and *Juncus mertensianus* is another common graminoid. Dwarf-shrubs such as *Cassiope mertensiana*, *Phyllodoce empetriformis*, and *Vaccinium deliciosum* are a common element. A well-developed bryophyte ground layer is frequently present (often dominated by *Philonotis fontana*).

Classification Comments: This alliance does not currently contain any associations recognized in the USNVC (only Washington state types).

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
CARNIG-(PETFRI)/PHIFON	Carex nigricans - (Petasites frigidus var. frigidus) / Philonotis fontana Seep	CWWA000245	Confirmed	n/a
MIMLEW	Mimulus lewisii Wet Meadow	CWWA000365	Confirmed	n/a

Senecio triangularis - Saxifraga spp. - Mimulus spp. Streamside Wet Meadow Alliance

Arrowleaf Ragwort - Saxifrage species - Monkeyflower species Seep & Streambank Alliance



EL Code: A4424

Macrogroup: Western North American Montane Marsh, Wet Meadow & Shrubland

Group: Vancouverian-Rocky Mountain Montane Wet Meadow & Marsh

Range: Found below timberline on montane slopes of the Cascades, Olympic Mountains, Okanogan Highlands, Blue Mountains, Rocky Mountains, and Intermountain regions of the western United States and Canada.

Plots: Other (20)

Environmental Description: These are narrow, montane, freshwater marshes and wet meadows found along streams. They are separate from—but frequently shaded by—neighboring forest/shrub communities. These communities are most common in narrow, v-shaped drainages with little or no flooding, but with persistent hyporheic flow. Soils are muck or mineral. Oxygenated water flow prevents peat accumulation and keeps nutrient availability high (MacKenzie & Moran, 2004). These communities also occur on coarse alluvium.

Vegetation Description: These communities are dominated by forbs, including *Corydalis scouleri*, *Oxalis* (*oregana*, *trillifolia*), and *Erythranthe* (= *Mimulus*) *guttatus*. *Stachys chamissonis* var. *cooleyae* (=*S. ciliata*), *Senecio triangularis*, and numerous other forbs may also be prominent. *Equisetum arvense* is frequently present to codominant, particularly in sites that experience overbank flooding.

Classification Comments: This alliance shares similarities with the *Petasites frigidus* - *Stachys chamissonis* var. *cooleyae* Streamside Marsh Alliance (A4413) but occurs at montane elevations with differential species such as *Corydalis scouleri* and *Senecio triangularis*. These communities are usually too narrow to be captured in most sampling methodologies (particularly those associated with mapping exercises).

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
ADIPED	Adiantum pedatum Seep	CWWA000027	Probable	n/a
CORSCO	Corydalis scouleri Wet Meadow	CEGL001939	Probable	n/a
SAXODO	Saxifraga odontoloma Wet Meadow	CEGL001985	Probable	n/a
SENTRI	Senecio triangularis Wet Meadow	CEGL001987	Probable	n/a

Photo Credit: John Brew (https://www.flickr.com/photos/brewbooks/2787999815/)

Carex utriculata - *Calamagrostis canadensis* Basin Marsh & Wet Meadow Alliance

Northwest Territory Sedge - Bluejoint - Basin Marsh & Wet Meadow Alliance



EL Code: A4425

Macrogroup: Western North American Montane Marsh, Wet Meadow & Shrubland

Group: Vancouverian-Rocky Mountain Montane Wet Meadow & Marsh

Range: Occurs in the Cascades, Olympic Mountains, Okanogan Highlands, Blue Mountains, Rocky Mountains, and other ranges of the western United States and Canada.

Plots: MORA (2), NOCA (9), OLYM (1), Other (142)

Environmental Description: Occurs in depressions, lakesides, flats, and the floodplains of streams and rivers at montane to subalpine elevations (documented up to 2350m in Washington). Development of marshes near the fringes of lakes and ponds is dictated largely by shoreline gradient, along with fluctuation of water levels. Relatively flat or gently sloping shorelines support much larger marsh systems than steeply sloping shorelines. Water sources consist of surface flow, groundwater discharge, or overbank flooding (though with little or no scouring). Hydroperiods vary from permanently to semi-permanently flooded (marshes) to seasonally wet (wet meadows). In marshes, water is at or above the surface for most of the growing season. In some areas, water levels fluctuate greatly, with dramatic drawdowns that can expose bare soil by late summer. Wet meadows in the montane and subalpine zones are associated with seasonally high water tables. Water tables may be above the soil surface early in the growing season, but typically drop below the soil surface by late summer. Soils are muck or mineral and show typical hydric soil characteristics, including high organic content (often with histic epipedons) and/or low chroma and redoximorphic features. Organic soils are always < 40 cm.

Vegetation Description: Marshes within this subgroup are dominated by emergent graminoids, while trees, shrubs, and bryophytes are typically absent or sparse (MacKenzie & Moran, 2004; Crawford et al., 2009). Occurrences are typically found in a mosaic with other wetland types. Dominant graminoids include *Carex exsiccata*, *C. utriculata*, *C. aquatilis* var. *aquatilis*, *C. kelloggii*, *C. pellita*, *C. nigricans*, *Calamagrostis canadensis*, and *Deschampsia caespitosa*. Shrubs are sparse, but may include *Phyllodoce empetriformis*, *Vaccinium* spp., and *Salix* spp. Many different species are found in these marshes. However, high nutrient levels favor highly competitive species, resulting in relatively low diversity of plant species in any given marsh (MacKenzie & Moran, 2004). Wet meadows are typically more diverse.

Classification Comments: This broad alliance contains significant variability in hydroperiod and other environmental variables—it essentially encompasses marshes and wet meadows without measurable slopes and with longer hydroperiods than *Danthonia californica - Deschampsia cespitosa - Camassia quamash* Wet Grassland (A4426). This alliance includes nearly all montane to subalpine associations in Washington dominated by *Carex*, *Eleocharis*, *Calamagrostis*, *Equisetum*, etc. When dominated by *Deschampsia cespitosa*, wet-indicator sedges such as *Carex aquatilis* are codominant (rather than more mesic sedges such as *Carex microptera*). *Elymus glaucus - Carex pellita - Carex feta* Wet Meadow Alliance (A2564) and *Argentina anserina* Wet Meadow Alliance (A2642) do not occur in Washington, but may fit within this concept, as well.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
CALCAN Western	Calamagrostis canadensis Western Wet Meadow	CEGL001559	Probable	n/a
CAREXS Montane	Carex exsiccata Montane Marsh	CWWA000260	Confirmed	n/a
CARLEN	Carex lenticularis var. lipocarpa Marsh	CWWA000011	Confirmed	n/a

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
CARUTR Marsh	Carex utriculata Marsh	CEGL001562	Confirmed	n/a
DESCAE Meadow	Deschampsia caespitosa Wet Meadow	CEGL001599	Probable	n/a
ELEPAL Marsh	Eleocharis palustris Marsh	CEGL001833	Probable	n/a
EQUARV Meadow	Equisetum arvense Wet Meadow	CEGL003314	Probable	n/a
JUNBAL Meadow	Juncus balticus Wet Meadow	CEGL001838	Probable	n/a
LYSAME	Lysichiton americanus Marsh	CEGL003318	Probable	n/a
SCIMIC Marsh	Scirpus microcarpus Marsh	CEGL003322	Probable	n/a

Photo Credit: Joe Rocchio

Heracleum maximum - Carex scopulorum var. *bracteosa - Veratrum viride* Wet Meadow Alliance

Common Cow-parsnip - Mountain Sedge - Green False Hellebore Wet Meadow Alliance



EL Code: A4427

Macrogroup: Western North American Montane Marsh, Wet Meadow & Shrubland

Group: Vancouverian-Rocky Mountain Montane Wet Meadow & Marsh

Range: Occurs in the Cascades, Olympic Mountains, Okanogan Highlands, Rocky Mountains, and other high ranges of the western United States and Canada.

Plots: NOCA (1), OLYM (16), Other (17)

Environmental Description: This alliance encompasses montane to subalpine sloping wet meadows, often in avalanche runout zones. Elevations range from 1150 to 2250 m in Washington. Hydrology is primarily driven by seepage from upslope snowmelt. Overbank flooding and surface flow are typically not significant water sources, save on the margins, where these stands can transition to streamside marshes and wet meadows. Stands vary from gently sloping to steep (37°).

Vegetation Description: These lush herbaceous communities are dominated by rhizomatous wet meadow sedges (*Carex scopulorum*) and/or diverse forbs (*Heracleum maximum* is the primary dominant in the statewide Washington data set). *Carex scopulorum* meadows are typically gently sloping (average = 3°), while *Heracleum maximum*-dominated stands are steeper (average = 17°). Many of the associated species are more characteristic of mesic meadows (such *Carex spectabilis*, *Arnica latifolia*, *Cirsium edule*, *Thalictrum occidentale*, *Bromus sitchensis*, *Veratrum viride*, *Canadanthus modestus*, and *Lupinus latifolius*).

Classification Comments: These communities contain numerous mesic to dry meadow species and *Heracleum maximum* has a facultative (FAC) wetland indicator status in western mountains (it occurs in both upland and wetland environments at similar frequencies). However, *Heracleum maximum*-dominated communities are traditionally considered to be wetlands (Kovalchik & Clausnitzer, 2004; Hop et al., 2007)

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
HERMAX	Heracleum maximum Wet Meadow	CEGL005857	Confirmed	A-201
SAUAME-HERMAX	Saussurea americana - Heracleum maximum Wet Meadow	CEGL001945	Confirmed	A-202

Salix commutata Wet Shrubland Alliance

Undergreen Willow Wet Shrubland Alliance



EL Code: A1003

Macrogroup: Western North American Montane Marsh, Wet Meadow & Shrubland

Group: Western Montane-Subalpine Riparian & Seep Shrubland

Range: Occurs in subalpine regions of British Columbia, Oregon, Washington, and Idaho, as well as western Montana, the northern edge of California, and possibly Wyoming.

Plots: NOCA (8), OLYM (22), Other (16)

Environmental Description: [Adapted from Kittel (2014m)] Occurs at subalpine elevations (900 to 2100 m in Washington) in narrow to broad riparian zones along upper reaches of streams, in elongated openings in higher elevation forests, and on seepage slopes supported by upslope snowmelt. Glacial basins with broad, flat-bottomed u-shapes occasionally support very large occurrences. Slopes range from flat to 31° in Washington (mean = 10°). Soils are typically very poorly drained and saturated to the surface by flowing groundwater for most or all of the growing season. Accumulation of organic material can be high (some occurrences qualify as shrub carrs).

Vegetation Description: [Adapted from Kittel (2014m)] These are short-statured (< 1.5 m) communities dominated by *Salix commutata* or *Salix barclayi*. The herbaceous layer may be well-developed, depending on shrub-density, and varies from graminoid-dominant (with fen indicators) to forb-dominant (with meadow characteristics). Frequent dominants include *Carex scopulorum*, *Calamagrostis canadensis*, *Carex aquatilis* var. *dives*, and *Valeriana sitchensis*. *Leptarrhena pyrolifolia*, *Equisetum arvense*, *Potentilla flabellifolia*, *Caltha biflora*, *Pedicularis groenlandica*, *Senecio triangularis*, *Parnassia fimbriata*, *Carex kelloggii* var. *kelloggii*, *Carex nigricans*, and/or *Carex spectabilis* are frequently present. Mosses may form a well-developed ground layer. Relative to other alliances in G527, *Salix commutata*, *Phyllodoce empetriformis, Leptarrhena pyrolifolia*, *Potentilla flabellifolia,* and other subalpine species are highly differential.

Classification Comments: These shrublands occur at higher elevations with deeper snowpacks than other alliances in G527. Structurally, they are dominated by shorter-statured shrubs (< 1.5 m tall).

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
SALCOM/SENTRI	Salix commutata / Senecio triangularis Wet Shrubland	CWWA000397	Confirmed	A-203
SALCOM	Salix commutata Wet Shrubland	CWWA000236	Confirmed	A-204

Alnus viridis ssp. *sinuata* Riparian Shrubland Alliance

Sitka Alder Riparian Shrubland Alliance



EL Code: A4416

Macrogroup: Western North American Montane Marsh, Wet Meadow & Shrubland

Group: Western Montane-Subalpine Riparian & Seep Shrubland

Range: Primarily occurs in in dry, cold portions of the East Cascades, as well as the Okanogan Highlands, Blue Mountains, and Central Rocky Mountains. Also found near the Cascade Crest and in the northeastern Olympic Mountains.

Plots: MORA (1), NOCA (22), OLYM (9), Other (94)

Environmental Description: These communities are primarily found in steep-sided and often v-shaped canyons (mostly Rosgen A and B channels), valleys, and headwater draws with diverse substrates. They occur along headwater streambanks and avalanche chutes (that do not receive overbank flooding). Less frequently, they can also occur in perennial riparian settings. Stands may also develop in moist forest openings on steep slopes. Elevations are montane to subalpine (650 to 1950 m). Beavers are of minimal significance, as the elevation and relatively steep topography preclude beaver activity. Slopes vary from flat (in perennial riparian settings) to 47° (mean = 12°). These moist riparian areas experience lower fire frequency compared to adjacent dry, upland forests. Stand replacing fires are rare, but may occur when adjacent uplands experience severe fires (average fire frequency of 100 years (LANDFIRE, 2007b)). Water sources include subirrigation from discharging groundwater and surface flow from major precipitation events. Soils vary, but are typically coarse-textured and well-drained; they may remain seasonally wet, but are rarely saturated year-round or anoxic. Confined streams typically have shallow soils with minimal alluvium—they transport water downstream rapidly through step-pool channels armored by boulders, bedrock, and large woody debris (Hubert et al., 2004; LANDFIRE, 2007b).

Vegetation Description: These communities are characterized by dense shrubs, with scattered trees and a typically sparse herbaceous understory. *Alnus viridis* ssp. *sinuata*, *A. incana*, and *Salix sitchensis* are the most common dominant shrubs. Other community dominants include *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*), *Rhododendron albiflorum*, *Ribes lacustre*, and various willows (*Salix boothii*, *S. scouleriana*, and *Salix sitchensis*). Occasionally, trees such as *Picea engelmannii*, *Abies lasiocarpa*, *Populus trichocarpa* (= *balsamifera* ssp. *trichocarpa*), and *Thuja plicata* may have significant cover in these shrublands. The understory can be depauperate, but species such as *Hydrophyllum fendleri*, *Senecio triangularis*, *Athyrium filix-femina*, and *Gymnocarpium dryopteris* are often present.

Classification Comments: This alliance encompasses most *Alnus viridis* ssp. *sinuata*-dominated stands of the East Cascades and along the Cascade Crest. *Alnus viridis - Acer circinatum - Salix sitchensis* Montane Wet Shrubland Alliance (A4418) is similar, but more common in the West Cascades and Olympics. It is differentiated by Vancouverian and/or moist indicators such as *Acer circinatum*, *Rubus spectabilis*, *Athyrium filix-femina*, *Sambucus racemosa*, and *Oplopanax horridus*. *Ribes lacustre*, *Thalictrum occidentale*, and *Abies lasiocarpa* are differential for A4416.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
ALNVIR-RIBLAC-(CORSER)	Alnus viridis ssp. sinuata - Ribes lacustre - (Cornus sericea) Wet Shrubland	CWWA000306	Confirmed	n/a
ALNVIR Alluvial	Alnus viridis ssp. sinuata / Alluvial Bar Wet Shrubland	CWWA000307	Confirmed	n/a
ALNVIR Mesic	Alnus viridis ssp. sinuata / Mesic Forbs Wet Shrubland	CEGL002633	Confirmed	A-205

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
SALSIT-(ALNINC)/ANGARG	Salix sitchensis - (Alnus incana) / Angelica arguta Wet Shrubland	CWWA000403	Confirmed	A-206
SALSIT/GLYELA	Salix sitchensis / Glyceria elata Wet Shrubland	CWWA000404	Confirmed	n/a

Salix drummondiana - Alnus incana Shrub Carr & Swamp Alliance

Drummond's Willow - Gray Alder Shrub Carr & Swamp Alliance



EL Code: A4420

Macrogroup: Western North American Montane Marsh, Wet Meadow & Shrubland

Group: Western Montane-Subalpine Riparian & Seep Shrubland

Range: These wetlands occur at high elevations along the Rocky Mountain cordillera, from southern New Mexico north into Montana and Idaho, and west into the Intermountain region and the Colorado Plateau. In Washington, they occur at high elevations within dry portions of the East Cascades, throughout the Okanogan Highlands, and in the Blue Mountains and Central Rocky Mountains.

Plots: NOCA (1), Other (119)

Environmental Description: Occurs as small shrub swamps in depressions or around the fringes of ponds and lakes where water tables remain high throughout the growing season. Shrub carrs have characteristics of both fens (hemic peat and stable, satured hydrology) and swamps (vegetation composition and structure). They are typically found on flat areas or gentle slopes and are usually not subjected to high disturbance events such as flooding, though they are often inundated. Elevations range from montane to subalpine (600 to 1900 m). In shrub carrs, the pH is circumneutral, averaging 7.0 (6.6 to 7.5, n=5) in WNHP sampling and less mineral deficient than herbaceous fens. Hydroperiods are saturated or seasonally flooded, with surface water slowly moving through the site or sitting in stagnant pools. In seasonally flooded sites, surface water is present for extended periods, especially early in the growing season, but absent by the end of the season in most years. The water table often remains near the surface when surface water is absent. In basin swamp occurrences, soils vary, but are typically well-developed, fine-textured, and poorly drained, often with histic epipedons, but less than 40 cm of organic matter. Soils typically remain saturated throughout the year, though standing water does not always remain year-round. Shrub carr stands typically have hemic peat. Component associations sometimes occur in very low-gradient riparian settings, as well. When they do, such sites are typically extremely low-gradient Rosgen C or E channels, backwaters, or old beaver ponds.

Vegetation Description: These range from dense, deciduous shrublands with sparse understories to open shrublands with well-developed herbaceous layers, usually dominated by graminoids. Shrublands dominated by *Alnus incana* sometimes reach heights > 10 m (33 ft.) (Fryer, 2011). *Alnus incana*, *Salix drummondiana*, *S. boothii*, *S. geyeriana*, and *Spiraea douglasii* are documented dominant shrubs and several other willow species are possible. Relative to other alliances in G527, *Salix drummondiana*, *Spiraea douglasii*, *Comarum palustre*, *Calamagrostis Canadensis*, *Carex utriculata*, and *Scirpus microcarpus* are differential. Additional common associate herbs include *Equisetum arvense*, *Athyrium filix-femina*, *Carex aquatilis v. aquatilis*, *Carex scopulorum*, and *Glyceria elata*.

Classification Comments: This alliance replaces most of A3769 as observed in Washington.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
ALNINC/SCIMIC	Alnus incana / Scirpus microcarpus Wet Shrubland	CEGL000481	Confirmed	n/a

Alnus incana - *Cornus sericea* Riparian Shrubland Alliance

Gray Alder - Red-osier Dogwood Riparian Shrubland Alliance



EL Code: A4421

Macrogroup: Western North American Montane Marsh, Wet Meadow & Shrubland

Group: Western Montane-Subalpine Riparian & Seep Shrubland

Range: Occurs at high elevations along the Rocky Mountain cordillera, from southern New Mexico north into Montana and Idaho, and west into the Intermountain region and the Colorado Plateau. In Washington, it occurs at high elevations within dry portions of the East Cascades, throughout the Okanogan Highlands, and in the Blue Mountains and Northern Rocky Mountains. At NOCA, it has only been documented in the Stehekin Valley.

Plots: NOCA (2), Other (192)

Environmental Description: These communities are comprised of lower montane to subalpine (400 to 1550 m) riparian shrublands occurring as narrow bands or large expanses of shrubs lining streambanks and alluvial terraces in narrow to wide, low- to moderate-gradient valley bottoms and floodplains. Confined drainages have minimal to no floodplain development, while floodplains in wider, shallow-sloped valley bottoms (i.e. unconfined) are significant (Gregory et al., 1991). Beavers can be important hydrogeomorphic drivers of these systems, primarily along unconfined reaches. The presence of beavers creates a heterogeneous complex of wet meadows, marshes and riparian woodlands and increases species richness on the landscape. Naiman et al. (1986) note that beaver-influenced streams are quite different from beaverless streams, with more numerous zones of open water and vegetation, larger accumulations of detritus and nutrients, more numerous wetland areas, more anaerobic biogeochemical cycles, and in general more disturbance resistance. These moist riparian areas experience lower fire frequency compared to adjacent dry, upland forests. Stand replacing fires are rare, but may occur when adjacent uplands experience severe fires (Fire regime III; average fire frequency of 100 years (LANDFIRE, 2007b)). The primary water source is overbank flooding (with a periodic to seasonal hydroperiod), in addition to persistent hyporheic flow. Some sites may be semi-permanently flooded. Soils vary, but are generally coarser than the *Salix drummondiana* - *Alnus incana* Shrub Carr & Swamp Alliance (A4420). Slopes vary from flat/unmeasurable to as much as 44° (mean = 5°). Stands with greater slopes have sandier or cobble substrates, as floods erode the fine sediment and deposit it downstream (in low gradient riparian communities).

Vegetation Description: These shrublands vary from sparsely vegetated alluvial bars to dense shrublands. The dominant shrubs reflect the wide elevational, geomorphology, and substrate gradients within this alliance. *Alnus incana* and *Cornus* (*occidentalis*, *stolonifera*) (= *sericea*) are the most common dominant shrubs. Stands may also be dominated by *Salix bebbiana*, *Salix boothii*, *Salix sitchensis*, and other shrubs. *Symphoricarpos albus*, *Spiraea douglasii*, and *Rosa* spp. may also be present in these shrublands. Usually, cover of understory species is inversely related to shrub cover. Relative to other alliances in G527, *Maianthemum stellatum*, *Geum macrophyllum*, *Glyceria elata* are differential herbaceous species. Other frequent associates include *Equisetum arvense*, *Viola* spp., *Senecio triangularis*, *Galium triflorum*, *Cinna latifolia*, *Urtica dioca*, *Heracleum maximum*, and *Circaea alpina*.

Classification Comments: This alliance includes shrub-dominated riparian areas. Soils are typically coarser and slopes are generally steeper than stands of the *Alnus viridis* ssp. *sinuata* Riparian Shrubland Alliance (A4416). There is floristic overlap between this alliance and the *Salix drummondiana* - *Alnus incana* Shrub Carr & Swamp Alliance (A4420), which occurs in off-channel settings with longer, relatively stagnant hydroperiods.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
CORSER/ATHFIL	Cornus sericea / Athyrium filix-femina Wet Shrubland	CWWA000336	Confirmed	n/a
SAL(MEL,SIT)	Salix (melanopsis, sitchensis) Cobble Bar Wet Shrubland	CEGL002705	Confirmed	A-207

Lemna minor - Wolffia borealis - Wolffia columbiana Aquatic Vegetation Alliance

Common Duckweed - Northern Watermeal - Columbian Watermeal Aquatic Vegetation Alliance



EL Code: A1747

Macrogroup: Western North American Freshwater Aquatic Vegetation

Group: Western North American Temperate Freshwater Aquatic Vegetation

Range: Occurs throughout the western United States and southwestern Canada.

Plots: n/a

Environmental Description: [Adapted from Kittel (2014n)] Occurs on freshwater surfaces of ditches, slow moving water courses, open water areas within wetlands, and ponds with little or no current, from sea level to 2300 m (usually < 200 m). Water depth is usually less than 4m, but only matters for these floating plants in so much as it is always too shallow for wave formation. Dominant species can tolerate drawdown below the soil surface, but not desiccation.

Vegetation Description: [Adapted from Kittel (2014n)] This alliance consists strictly of communities dominated by floating vascular species, particularly *Lemna minor* (and other *Lemna* spp.), *Wolffia borealis*, and/or *Wolffia columbiana* (a rare species in Washington). Associate species include *Azolla* spp. and *Spirodela* spp., and rooted submerged species may intermingle (e.g. *Potamogeton spp*., *Sagittaria*, *spp*., *Persicaria spp*.). Cover ranges from continuous to open.

Classification Comments: WNHP did not prioritize this alliance during our review of wetland groups and alliances. Alliances in the Western North American Temperate Freshwater Aquatic Vegetation Group (G544) are ecologically similar and are primarily distinguished by dominance of individual species. Consolidation of alliances in this group could be beneficial (e.g. lumping alliances with similar hydrologic regimes), but data is rather sparse for these chronically under-sampled communities.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
LEMMIN	Lemna minor Aquatic Vegetation	CEGL003305	Probable	n/a

Photo Credit: Wikimedia Commons (https://ru.m.wikipedia.org/wiki/%D0%A4%D0%B0%D0%B9%D0%BB:Dam_with_lemna_minor.jpg)

Fontinalis antipyretica Aquatic Vegetation Alliance

Aquatic Moss Aquatic Vegetation Alliance



EL Code: A2628

Macrogroup: Western North American Freshwater Aquatic Vegetation

Group: Western North American Temperate Freshwater Aquatic Vegetation

Range: Widespread in western Washington and northwestern Oregon. It also occurs in western British Columbia.

Plots: n/a

Environmental Description: Occurs in seasonally to perennially flooded pools, ponds, and sloughs with cold, clean freshwater (stands do not appear to benefit from eutrophic conditions) (Christy, 2004a).

Vegetation Description: These are submerged aquatic herbaceous communities dominated by nonvascular *Fontinalis antipyretica* (or other *Fontinalis* spp.), which form extensive submerged beds (Kittel & Reid, 2014a).

Classification Comments: WNHP did not prioritize this alliance during our review of wetland groups and alliances. Alliances in the Western North American Temperate Freshwater Aquatic Vegetation Group (G544) are ecologically similar and are primarily distinguished by dominance of individual species. Consolidation of alliances in this group could be beneficial (e.g. lumping alliances with similar hydrologic regimes), but data is rather sparse for these chronically under-sampled communities.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
FONANT	Fontinalis antipyretica (var. antipyretica, var. oregonensis) Nonvascular Aquatic Vegetation	CEGL003304	Probable	n/a

Hippuris vulgaris - Ruppia spp. - Sparganium spp. Aquatic Vegetation Alliance

Common Mare's-tail - Widgeonweed species - Bur-reed species Aquatic Vegetation Alliance



EL Code: A3893

Macrogroup: Western North American Freshwater Aquatic Vegetation

Group: Western North American Temperate Freshwater Aquatic Vegetation

Range: Documented in California, Oregon, Washington, Oregon, Idaho, Wyoming, Colorado, and British Columbia and likely to occur elsewhere in western North America.

Plots: Other (11)

Environmental Description: [Adapted from Kittel et al. (2014)] This alliance has broad environmental ranges, occurring in seasonally to permanently inundated shallow ponds, with fresh to slightly brackish water, in alkaline marshes, mountain parks/meadows, oxbows, and glacial basins up to 3150 m. Elevations in Washington range from sea level to 2250 m. Extended periods of flooding are required to sustain these communities.

Vegetation Description: One or more of *Hippuris vulgaris*, *Ruppia cirrhosa*, *Ruppia maritima*, *Sparganium angustifolium*, *Sparganium eurycarpum*, and/or *Stuckenia filiformis* dominate these shallow aquatic communities. In Washington, *Lemna minor*, *Eleocharis palustris*, *Cicuta douglasii*, *Bidens cernua*, *Oenanthe sarmentosa*, *Equisetum fluviatile*, *Glyceria borealis*, and/or *Carex utriculata* are sometimes present to prominent.

Classification Comments: WNHP did not prioritize this alliance during our review of wetland groups and alliances. Alliances in the Western North American Temperate Freshwater Aquatic Vegetation Group (G544) are ecologically similar and are primarily distinguished by dominance of individual species. Consolidation of alliances in this group could be beneficial (e.g. lumping alliances with similar hydrologic regimes), but data is rather sparse for these chronically under-sampled communities.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
HIPVUL	Hippuris vulgaris Aquatic Vegetation	CEGL003315	Probable	n/a
SPA(ANG,EME)	Sparganium (angustifolium, emersum) Aquatic Vegetation	CEGL001990	Probable	n/a
SPAEUR	Sparganium eurycarpum Aquatic Vegetation	CEGL003323	Probable	n/a

Photo Credit: Hans Hillewaert (Elliman & New England Wildflower Society, 2016)

Ranunculus aquatilis - Callitriche palustris - Callitriche heterophylla Aquatic Vegetation Alliance

Whitewater Crowfoot - Vernal Water-starwort - Greater Water-starwort Aquatic Vegetation Alliance



EL Code: A3920

Macrogroup: Western North American Freshwater Aquatic Vegetation

Group: Western North American Temperate Freshwater Aquatic Vegetation

Range: Occurs in western North America from California to Alaska.

Plots: Other (1)

Environmental Description: [Adapted from Kittel & Reid (2014b)] Found in freshwater ponds and other slow-moving water bodies (typically poorly oxygenated and nitrogen-rich). Water depths average < 0.5m deep. Soils are organic oozes (sapric histosols), organic rich loams, silt, sandy loams, or sand. Documented elevations range from 150 to 1300 m (though most stands are below 600 m).

Vegetation Description: One or more of *Callitriche heterophylla*, *Callitriche palustris*, *Ranunculus aquatilis*, and/or *Ranunculus lobbii* dominate these (mostly submerged) aquatic stands. Commonly reported associate herbs include *Cicuta douglasii*, *Oenanthe sarmentosa*, *Potamogeton natans*, *Ranunculus flammula*, *Veronica scutellata*, *Carex utriculata*, *Eleocharis palustris*, *Glyceria* sp., and *Torreyochloa pallida* var. *pauciflora*. The single plot in WNHP's statewide data set is dominated by *Ranunculus aquatilis*, with prominent *Eleocharis palustris* and *Carex vesicaria*.

Classification Comments: Kittel & Reid (2014b) note, "While the nominal species are well-documented, populations large enough to be called communities are much less widespread, and generally occur at lower elevations and under more restrictive conditions (for example, only in very slow-moving water)." WNHP did not prioritize this alliance during our review of wetland groups and alliances. Alliances in the Western North American Temperate Freshwater Aquatic Vegetation Group (G544) are ecologically similar and are primarily distinguished by dominance of individual species. Consolidation of alliances in this group could be beneficial (e.g. lumping alliances with similar hydrologic regimes), but data is rather sparse for these chronically under-sampled communities.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
CAL(HET,PAL)	Callitriche (heterophylla, palustris) Aquatic Vegetation	CEGL003301	Probable	n/a
RANAQU	Ranunculus aquatilis Aquatic Vegetation	CEGL003307	Probable	n/a

Photo Credit: Deyan Vasilev (https://commons.wikimedia.org/wiki/File:Ranunculus_aquatilis_IMG_4405.jpg)

Utricularia macrorhiza - Utricularia minor - Utricularia ochroleuca Aquatic Vegetation Alliance

Common Bladderwort - Lesser Bladderwort - Yellowish-white Bladderwort Aquatic Vegetation Alliance



EL Code: A3921

Macrogroup: Western North American Freshwater Aquatic Vegetation

Group: Western North American Temperate Freshwater Aquatic Vegetation

Range: Occurs throughout the western United States and likely western Canada.

Plots: n/a

Environmental Description: Occurs in lakes and ponds that rarely (if ever) dry out, usually at relatively low elevations.

Vegetation Description: *Utricularia macrorhiza* or other *Utricularia* spp. dominate. These are submerged, floating plants that do not root in soil (Kittel, 2014o). Emergent species such as *Carex spp.* may be present on the margins.

Classification Comments: This alliance is poorly documented, particularly its range of environmental conditions. WNHP did not prioritize this alliance during our review of wetland groups and alliances. Alliances in the Western North American Temperate Freshwater Aquatic Vegetation Group (G544) are ecologically similar and are primarily distinguished by dominance of individual species. Consolidation of alliances in this group could be beneficial (e.g. lumping alliances with similar hydrologic regimes), but data is rather sparse for these chronically under-sampled communities.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
UTRMAC	Utricularia macrorhiza Aquatic Vegetation	CEGL003310	Probable	n/a

Photo Credit: Meneerke Bloem
(https://th.wikipedia.org/wiki/%E0%B9%84%E0%B8%9F%E0%B8%A5%E0%B9%8C:Utricularia_aureaRHu1.JPG)

Brasenia schreberi Aquatic Vegetation Alliance

Watershield Aquatic Vegetation Alliance



EL Code: A3922

Macrogroup: Western North American Freshwater Aquatic Vegetation

Group: Western North American Temperate Freshwater Aquatic Vegetation

Range: Documented in western North America from California to British Columbia.

Plots: Other (1)

Environmental Description: [Adapted from Kittel (2014p)] Occurs in shallow ponds, ditches, lake margins, and slow-moving stretches of low-gradient streams.

Vegetation Description: The perennial floating plant *Brasenia schreberi* is typically the single dominant species. *Utricularia* spp., *Leersia oryzoidea*, *Lemna spp*., *Stuckenia pectinata*, and other aquatic species are reported associates (Kittel, 2014p). The single plot in WNHP's statewide data set has *Carex obnupta* and *Dulichium arundinaceum* present.

Classification Comments: WNHP did not prioritize this alliance during our review of wetland groups and alliances. Alliances in the Western North American Temperate Freshwater Aquatic Vegetation Group (G544) are ecologically similar and are primarily distinguished by dominance of individual species. Consolidation of alliances in this group could be beneficial (e.g. lumping alliances with similar hydrologic regimes), but data is rather sparse for these chronically under-sampled communities.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
BRASCH	Brasenia schreberi Western Aquatic Vegetation	CEGL005200	Probable	n/a

Photo Credit: Matthew Beziat (https://www.flickr.com/photos/109690096@N08/36817726803)

Elodea canadensis Aquatic Vegetation Alliance

Canadian Waterweed Aquatic Vegetation Alliance



EL Code: A3924

Macrogroup: Western North American Freshwater Aquatic Vegetation

Group: Western North American Temperate Freshwater Aquatic Vegetation

Range: Documented from Oregon and Washington

Plots: Other (2)

Environmental Description: Restricted to mud/silt substrates submerged by shallow, flowing water. Stands may also occur in areas with freshwater tidal influence (Kunze, 1994b; Kittel, 2014q).

Vegetation Description: These aquatic beds are dominated by *Elodea canadensis*. Washington plot data is minimal, but *Nuphar polysepala*, *Sparganium natans*, and *Potamogeton natans* may be prominent to codominant. *Glyceria borealis* is often present.

Classification Comments: WNHP did not prioritize this alliance during our review of wetland groups and alliances. Alliances in the Western North American Temperate Freshwater Aquatic Vegetation Group (G544) are ecologically similar and are primarily distinguished by dominance of individual species. Consolidation of alliances in this group could be beneficial (e.g. lumping alliances with similar hydrologic regimes), but data is rather sparse for these chronically under-sampled communities.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
ELOCAN	Elodea canadensis Aquatic Vegetation	CEGL003303	Probable	n/a

Photo Credit: Krzysztof Ziarnek (https://commons.wikimedia.org/wiki/File:Elodea_canadensis_kz1.jpg)

Menyanthes trifoliata Aquatic Vegetation Alliance

Buckbean Aquatic Vegetation Alliance



EL Code: A3925

Macrogroup: Western North American Freshwater Aquatic Vegetation

Group: Western North American Temperate Freshwater Aquatic Vegetation

Range: Occurs throughout the western United States and Canada.

Plots: MORA (1), Other (1)

Environmental Description: [Adapted from Kittel (2014b)] Occurs in perennially flooded or saturated depressions, on the edges of ponds and lakes in wide valleys, or occasionally in slackwater areas of low-gradient, slow-moving streams. Sites are submerged through much of the year, but water levels may drop to the soil surface by the end of the growing season. Water depths average 10-35 cm. Soils are silts or organic peats.

Vegetation Description: These aquatic communities are dominated by *Menyanthes trifoliata*. Cover values in stands sampled in Washington vary from 15 to 45%, usually abundant open water in between. Associate herbs include *Carex utriculata*, *Equisetum fluviatile*, *Eriophorum angustifolium*, *Glyceria grandis*, *Juncus articulatus*, *J. ensifolius*, *Potamogeton* spp., and *Nuphar polysepala*.

Classification Comments: WNHP did not prioritize this alliance during our review of wetland groups and alliances. Alliances in the Western North American Temperate Freshwater Aquatic Vegetation Group (G544) are ecologically similar and are primarily distinguished by dominance of individual species. Consolidation of alliances in this group could be beneficial (e.g. lumping alliances with similar hydrologic regimes), but data is rather sparse for these chronically under-sampled communities.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
MENTRI	Menyanthes trifoliata Aquatic Vegetation	CEGL003410	Confirmed	n/a

Nuphar polysepala Western Aquatic Vegetation Alliance

Rocky Mountain Pond-lily Western Aquatic Vegetation Alliance



EL Code: A3926

Macrogroup: Western North American Freshwater Aquatic Vegetation

Group: Western North American Temperate Freshwater Aquatic Vegetation

Range: Occurs throughout the western United States and Canada.

Plots: NOCA (2), Other (15)

Environmental Description: [Adapted from Kittel (2014r)] Occurs in shallow ponds, lakes, slow-moving stretches of rivers, sloughs, or on the margins of deeper waterbodies from sea level to (in Washington) 1550 m. Water depth is usually between 0.5-2m. Stands are permanently to semipermanently flooded. Soils are usually organic Histosols.

Vegetation Description: Floating aquatic herbaceous vegetation is dominated by *Nuphar polysepala*, which frequently forms monocultures, with cover ranging from open to continuous (Kittel, 2014r). In Washington, no other species have greater than 25% constancy in sampled stands. *Sparganium* emersum, *Carex exsiccata*, *Carex utriculata*, *Eleocharis palustris*, *Equisetum fluviatile*, *Potamogeton spp*., *Sparganium natans*, *Typha latifolia*, *Menyanthes trifoliata*, and *Oenanthe sarmentosa* are sometimes (usually on the shallower margins).

Classification Comments: WNHP did not prioritize this alliance during our review of wetland groups and alliances. Alliances in the Western North American Temperate Freshwater Aquatic Vegetation Group (G544) are ecologically similar and are primarily distinguished by dominance of individual species. Consolidation of alliances in this group could be beneficial (e.g. lumping alliances with similar hydrologic regimes), but data is rather sparse for these chronically under-sampled communities.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
NUPPOL	Nuphar polysepala Aquatic Vegetation	CEGL002001	Confirmed	n/a

Potamogeton natans - Polygonum amphibium Aquatic Vegetation Alliance

Floating Pondweed - Water Knotweed Aquatic Vegetation Alliance



EL Code: A3927

Macrogroup: Western North American Freshwater Aquatic Vegetation

Group: Western North American Temperate Freshwater Aquatic Vegetation

Range: Occurs in formerly glaciated areas of the western United States and Canada.

Plots: Other (3)

Environmental Description: [Adapted from Kittel (2014s)] Occurs in permanently inundated, deep water zones of glacial ponds in gentle, rolling, glacial terrain. Water is usually 15 to >100 cm deep and may be moderately brackish (Lesica, 1989). The water is generally nutrient-rich and still, though minimal movement may occur through beaver ponds (Sanderson & Kettler, 1996). Pond bottoms are typically composed of mud, organic mud, or a mix of gravel, mud, and stones (Faber-Langendoen et al., 1997).

Vegetation Description: These herbaceous aquatic bed communities are dominated by one or more of *Myriophyllum spicatum*, *Persicaria* (= *Polygonum*) *amphibium*, *Potamogeton diversifolius*, *Potamogeton foliosus*, *Potamogeton natans*, *Potamogeton richardsonii*, or *Stuckenia filiformis* (Kittel, 2014s). In Washington, associated species include *Glyceria borealis*, *Nuphar polysepala*, *Ranunculus aquatilis*, and *Sparganium emersum*. Emergent species such as *Carex utriculata* may be present on shallower fringes.

Classification Comments: WNHP did not prioritize this alliance during our review of wetland groups and alliances. Alliances in the Western North American Temperate Freshwater Aquatic Vegetation Group (G544) are ecologically similar and are primarily distinguished by dominance of individual species. Consolidation of alliances in this group could be beneficial (e.g. lumping alliances with similar hydrologic regimes), but data is rather sparse for these chronically under-sampled communities.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
POLAMP	Polygonum amphibium Aquatic Vegetation	CEGL002002	Probable	n/a
POTNAT	Potamogeton natans Aquatic Vegetation	CEGL002925	Probable	n/a

Photo Credit: Andrey Zharkikh (https://www.flickr.com/photos/zharkikh/42332083395)

Schoenoplectus subterminalis Aquatic Vegetation Alliance

Swaying Bulrush Aquatic Vegetation Alliance



EL Code: A3929

Macrogroup: Western North American Freshwater Aquatic Vegetation

Group: Western North American Temperate Freshwater Aquatic Vegetation

Range: Documented in Washington, but likely widespread in the western United States.

Plots: Other (3)

Environmental Description: [Adapted from Kittel (2014t)] Occurs in shallow permanent ponds, though frequently with large annual water-level fluctuations. Substrates are muck, fibrous peat, or a mixture of fibrous and sphagnum peat.

Vegetation Description: [Adapted from Kittel (2014t)] Vegetation is submerged (sometimes partially emergent). *Schoenoplectus subterminalis* characteristically dominates. Other species include *Dulichium arundinaceum*, *Nuphar polysepala*, *Torreyochloa pallida* var. *pauciflora*, and *Utricularia macrorhiza*.

Classification Comments: WNHP did not prioritize this alliance during our review of wetland groups and alliances. Alliances in the Western North American Temperate Freshwater Aquatic Vegetation Group (G544) are ecologically similar and are primarily distinguished by dominance of individual species. Consolidation of alliances in this group could be beneficial (e.g. lumping alliances with similar hydrologic regimes), but data is rather sparse for these chronically under-sampled communities.

NCCN Associations:

Abbrev	Name	EL Code	Confirmed / Probable	Section A Page #
SCHSUB	Schoenoplectus subterminalis Aquatic Vegetation	CEGL003309	Probable	n/a

Photo Credit: Joe Rocchio

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