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Non-forested plant communities of the northern Oregon Cascades

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By
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Contributors

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Dedication

To Dr. Andrew Moldenke of Oregon State University: entomologist, ecologist, and educator, who has encouraged all who encounter him to delight in the natural world and its many species, including our own.

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Purpose

This guide describes the principal non-forested plant communities of the Cascade Range in northwestern Oregon. It reflects the compilation and analysis of plant community and associated environmental data from seven distinct projects conducted by USFS and University researchers over a period of 33 years (1966 to 1999; see Methods). Descriptions emphasize the species composition (including the primary or characteristic species) and environmental contexts in which these communities occur. The guide is not intended as an exhaustive list of non-forested types, but includes the most common—those likely to be of interest to resource managers, botanists, wildlife biologists, and recreationists. These non-forested ecosystems support much of the local and regional diversity of plants and animals found on federal lands in this region. Our goal is to provide simple descriptions of community types that occur repeatedly across the landscape and of the physical environments (elevations, landforms, and topographic settings) with which they are associated.

The non-forested types in this guide represent relatively stable communities dominated by graminoids (grasses, sedges and rushes), forbs, or shrubs. They occupy diverse environmental settings, from wetland basins to dry ridge tops, at lower (montane) to higher (subalpine and alpine) elevations in the Western and High Cascades. The persistence of these communities in an otherwise forested landscape is often indicative of environmental or edaphic conditions that limit tree establishment, although some may originate, or be maintained, by disturbance (e.g., fire, grazing, or snow movement).

This work on non-forested types complements earlier descriptions of forested communities (Hemstrom et al. 1982, 1987; Halverson et al. 1986; Diaz et al. 1997; McCain and Diaz 2002) and wetlands (Christy 2004) in northwestern Oregon.

Study Area

Geographic scope

The study area extends more than 150 miles (240 km) north to south. It includes the Willamette and Mt. Hood National Forests (NFs), and the portion of the Deschutes NF within the Mt. Jefferson and Three Sisters Wilderness Areas (Fig. 1).

Geologic and geomorphic settings

We briefly describe the physical setting of the study area. Additional descriptions of the geology, soils, and climate can be found in Franklin and Dyrness (1998) and Orr et al. (1992). The Oregon Cascade Range consists of two geologic or physiographic provinces: the older Western Cascades and the more recent High Cascades (Franklin and Dyrness 1988) (Fig. 2).

The Western Cascades are of Oligocene to middle Pliocene age and consist of basalt and andesite flows intermixed with pyroclastic tuffs and breccias. A long history of glacial and stream erosion has resulted in a highly dissected topography with deeply incised valleys and steeply sloped ridges. Ridge systems extend to ~5000 ft (1500 m) elevation, with an occasional peak reaching 6000 ft (1800 m). These ridge systems often support extensive mosaics of forest and meadow.

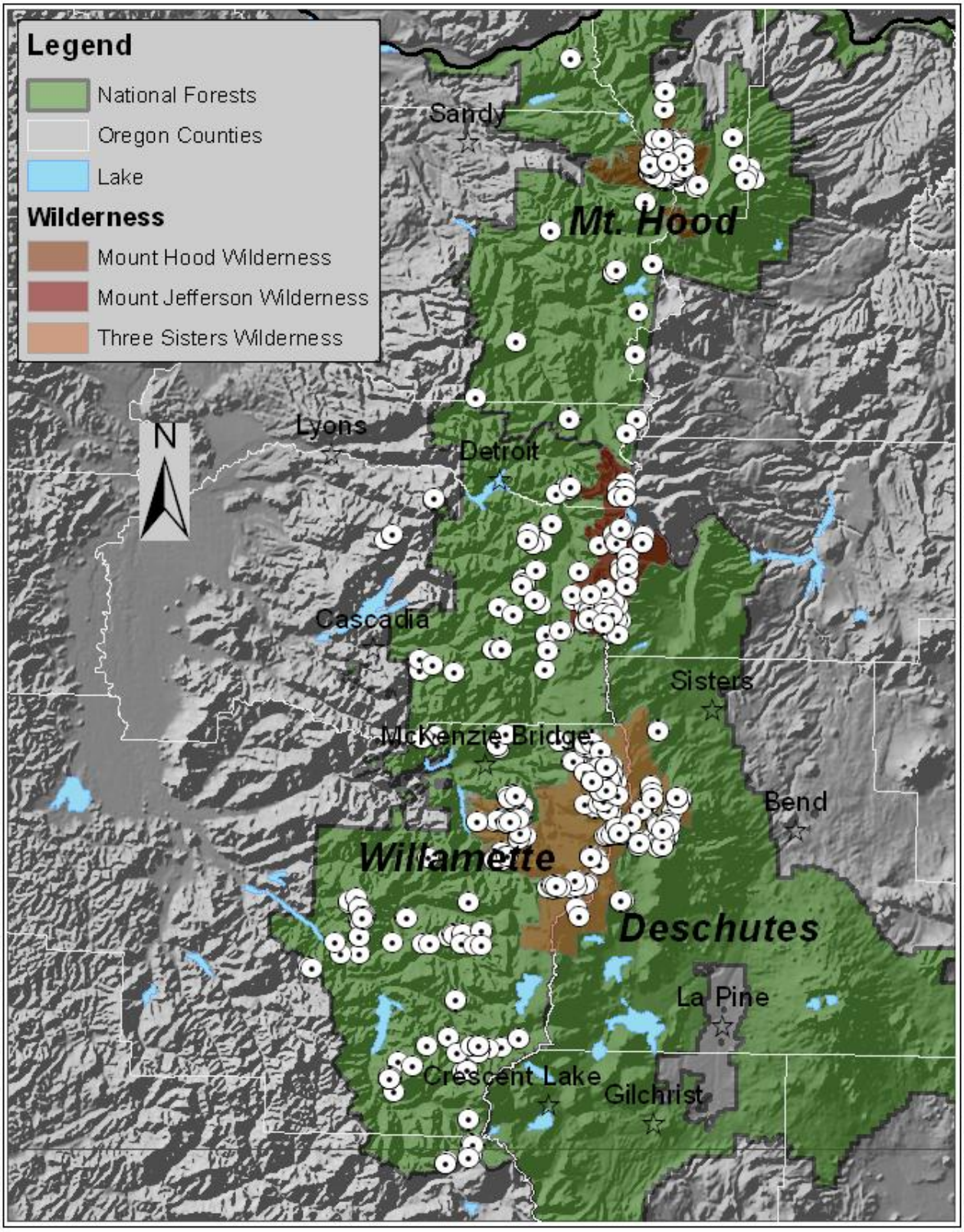


Figure 1. The study area and locations of all plots.

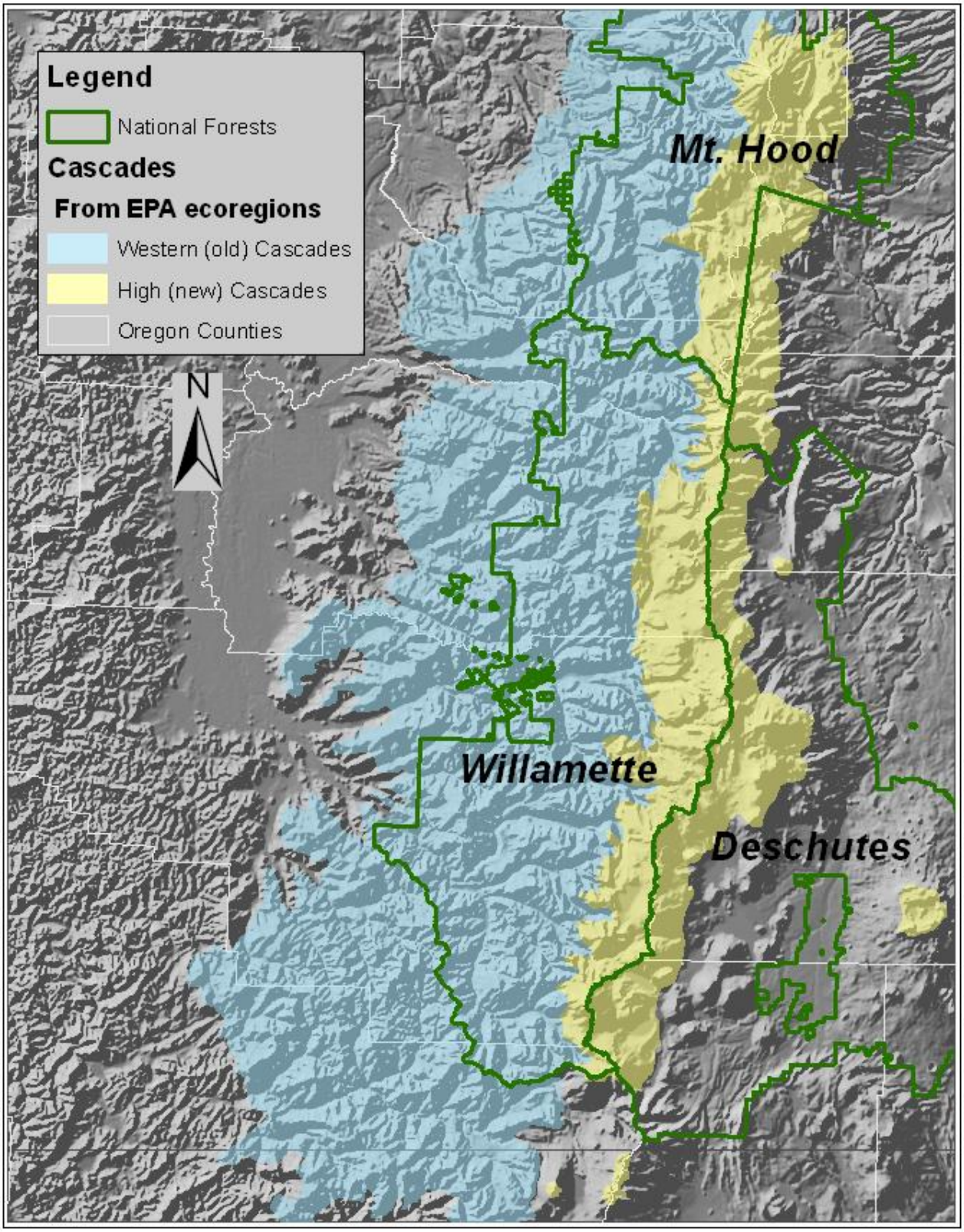


Figure 2. The older Western Cascades and the more recent High Cascades.

The High Cascades are much younger, of middle Pliocene to Quaternary age, formed from volcanic flows and ejecta that have created a landscape of gently rolling uplands and plateaus punctuated by distinct volcanic peaks (composite or strato-volcanoes) that include Mt. Hood, Mt. Jefferson, and the Three Sisters. Much of this area is covered by deposits of ash, cinder, and pumice that vary in depth as a function of distance and direction from the sources of these eruptions. Pumice and cinder fields, outwash plains, and lava fields represent severe environments for plant growth.

Alpine glaciation has been an important erosional process, creating broad U-shaped valleys, cirques, and lake basins, as well as depositional features that include glacial moraines, till, and outwash plains.

Climate

The climate is maritime, characterized by cool, wet winters and warm, dry summers. Temperature and precipitation vary markedly with elevation and topography, reflecting strong orographic effects (Franklin and Dyrness 1988) (Figs. 3 and 4). Precipitation is highly seasonal with <10% falling during the growing season. Most precipitation falls as snow, with accumulations exceeding 4 m above 3330 ft (1000 m). Snowpack in the subalpine and alpine zones can persist into mid- to late-summer depending on annual snowfall and topographic shading, and thus has a major influence on vegetation composition.

Soils

Soils vary significantly among non-forested types, reflecting age and genesis, climate, elevation, topography, and vegetation (Franklin and Dyrness 1988). Soils in the Western Cascades Province derive from either pyroclastic parent materials (tuffs or breccias) or basic igneous rock (basalts or andesites). The former give rise to deep, fine textured, poorly drained soils on gentler slopes—soils that are subject to mass movement—and to less well developed, stonier clay loams on steeper slopes. The latter weather more slowly and give rise to more well-drained, coarser textured soils. On steeper slopes soils are often poorly developed and, at higher elevations, often incorporate significant amounts of volcanic ash and pumice.

Soils in the High Cascade Province are generally immature, having developed in relatively recent volcanic or glacial deposits (Franklin and Dyrness 1988). Soils that derive from the latter typically show greater profile development, although compacted till can limit rooting depth. High Cascade soils can be infertile with a low clay content, base saturation, and cation exchange capacity. Ash soils often exhibit low bulk densities and high porosity, allowing rapid infiltration of moisture. Pumice layers are coarser and retain little moisture and few nutrients.

Disturbance

Historically, grazing and fire have been the principal forms of disturbance in non-forested habitats of the Cascade Range. Grazing by sheep occurred as early as 1870, peaked between 1901 and 1909, and remained widespread into the 1940s (Kuhns 1917, Ingram 1922, Rakestraw and Rakestraw 1991). By comparison, cattle grazing was limited, largely restricted to lower elevations and gentler slopes. Before the Forest Service administered grazing allotments in 1898, unrestricted access resulted in significant damage to vegetation and soils in some areas (Fig. 5) (Coville 1898, Kuhns 1917, Ingram 1922, Elliot

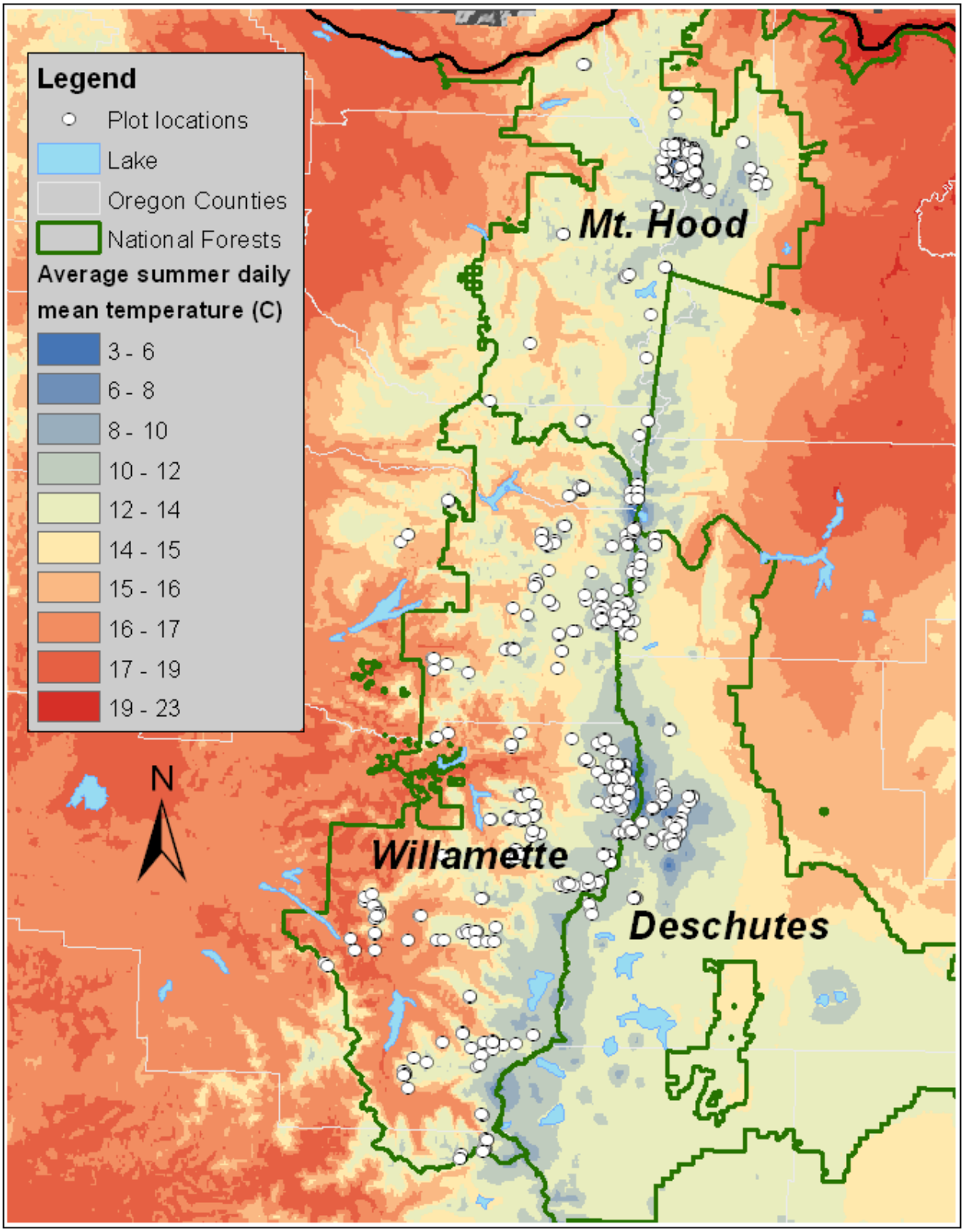


Figure 3. Temperature gradients in the study area. Climate date are from The Climate Source (2010).

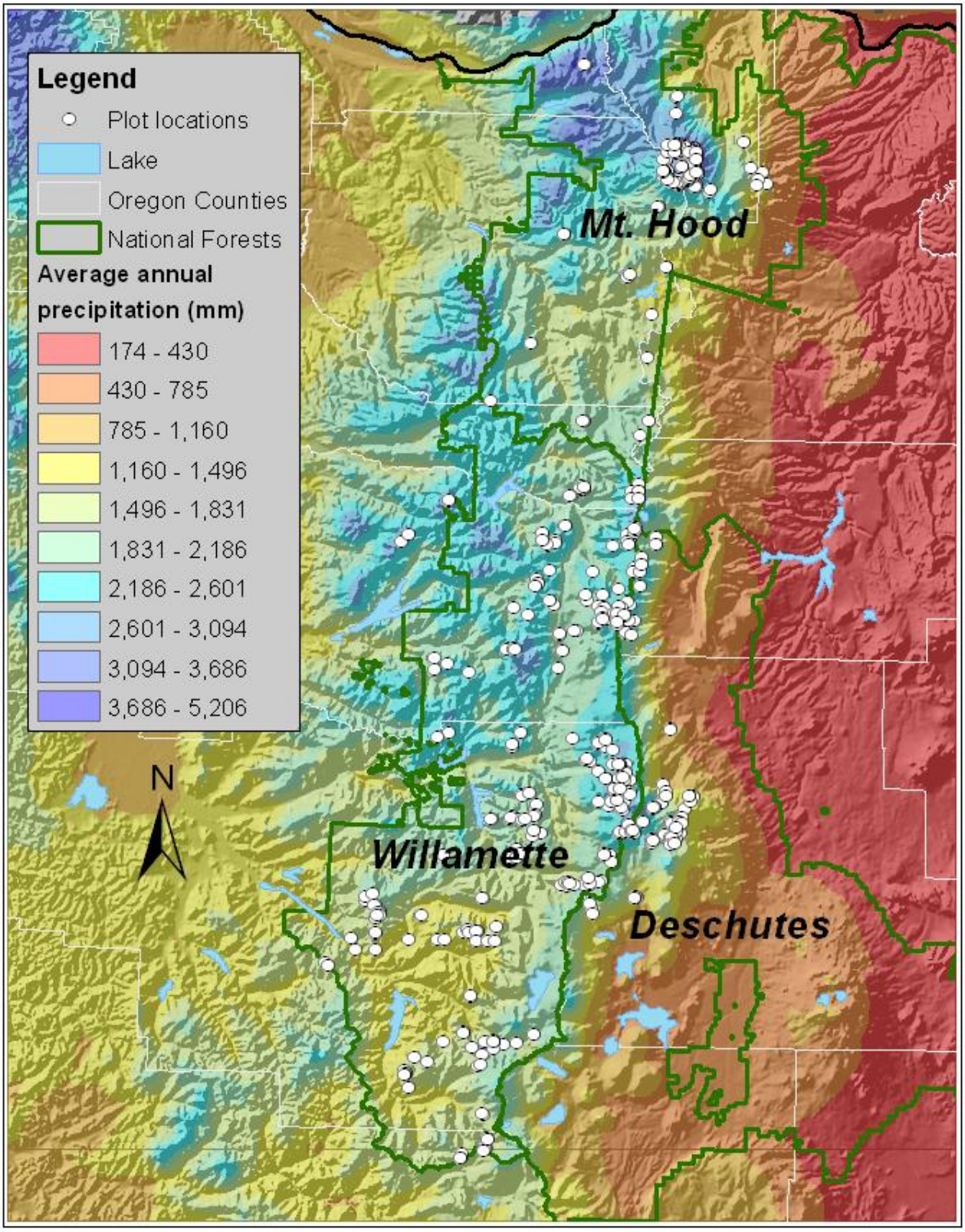


Figure 4. Precipitation gradients in the study area. Climate date are from The Climate Source (2010).

1946, Rakestraw and Rakestraw 1991). Between 1920 and 1938, deteriorating range conditions and increasing conflict with recreational use led to the closure of many allotments (Elliot 1946).

Figure 5. 1916 photo of Ollalie Meadow, Willamette NF (from Kuhns 1917). See also Miller and Halpern (1998) describing the post-grazing tree invasion history of Ollalie Meadow.

Forage species were seeded as early as 1909 for domestic livestock (Kuhns 1917). In more recent decades, seeding has been used to enhance elk and deer forage in the montane zone. With increasing importation of sheep products after World War II, domestic demand was reduced and grazing declined significantly. Nevertheless, legacies of grazing are still evident across the landscape. These include soil erosion and compaction, introduction of non-native species, and most notably, conifer encroachment. Once sheep were removed from meadows, disturbed soils and vegetation were highly susceptible to tree establishment. Dendro-chronological studies of tree-invaded meadows in the montane zone indicate a tight correlation between the onset of invasion and the timing of closure of grazing allotments (Vale 1981, Miller 1995, Miller and Halpern 1998).

In addition to grazing, natural and anthropogenic fires likely contributed to the maintenance—and perhaps origin—of some meadow types, particularly those on steep, south-facing slopes in the montane zone. However, direct evidence of fire is limited (Burke 1979). Native Americans used fire to maintain the open condition of lowland grasslands in western Oregon (Johannessen et al. 1971); whether there was similar use of fire in mountain settings remains poorly understood (Burke 1979). Following European settlement, burning occurred in association with road construction, sheep grazing, and camping, however, the intentional or unintentional use of fire is not well documented (Burke 1979, Boyd 1999). Conversely, fire exclusion policies over the past century have been very effective in the larger Cascade landscape (Burke 1979, Weisberg and Swanson 2003), allowing conifers to establish in meadows that had previously burned.

Methods

Data sources

Seven data sets were combined to develop this classification (Table 1). Although some of these data have been used in earlier reports, the current compilation allows for a more comprehensive assessment of non-forested types and how they are distributed across the broader Cascade landscape.
Among the seven data sets, two focus on wetland types: a USFS project on the Mt. Hood NF (Nancy Molina, unpublished data; Table 1 [column 1]), and an Oregon Natural Heritage Program-NW Oregon

Ecology Group project conducted on the Mt. Hood and Willamette NFs and on Salem BLM lands (Christy 2004; Cindy McCain, unpublished data; Table 1 [column 2]). Two additional USFS data sets represent non-forested communities on the Mt. Hood NF (mainly subalpine and alpine types; Nancy Molina, unpublished data; Table 1 [column 3]) and Willamette NF (data previously included in Hemstrom et al. 1987; Table 1 [column 4]).

Two data sets are from the Three Sisters Wilderness Area. The first is summarized in Halpern et al. (1984) (Table 1 [column 5]). The second has not been reported (Fred Hall, unpublished data; Table 1 [column 6]). A third data set is from The Mt. Jefferson Wilderness Area (Lenny Volland, unpublished data; Table 1 [column 7]). Most of these wilderness plots lie west of the Cascade crest (Willamette NF), but a small number are from the east side (Deschutes NF), including several along the boundary of the Warm Springs Reservation.

Given the diversity of data sources and differing objectives of these studies, the distribution and intensity of sampling are uneven across the combined study areas (Fig. 1). For example, non-forested communities in the area adjacent to Diamond Peak are not sampled, and lower elevations in the northern and eastern portions of the Mt. Hood NF are under-represented. Sampling in the Willamette NF is concentrated in the Three Sisters and Mt. Jefferson Wilderness Areas.

In addition, the extent and specificity of environmental data vary among data sets, particularly for soils. In each of the studies, however, plots were selected to represent relatively undisturbed (unmanaged) conditions, although in some locations, past influences of fire, fire exclusion, grazing, or recreational use were unknown or unavoidable.

Table 1. The seven data sets used in the current classification including the numbers and geographic distributions of sample plots.

	Mt. Hood NF wetland types [1]	NW Oregon Ecology Group wetland types [2]	Mt. Hood NF non-forested types [3]	Willamette NF non-forested types [4]	Three Sisters Wilderness [5]	Three Sisters Wilderness [6]	Mt. Jefferson Wilderness [7]
Mt. Hood NF	36		357				
Willamette NF		13		97	99	22	45
Deschutes NF					28	34	1
Salem BLM		1					
Warm Springs Reservation							1

Data sources: [1]N. Molina, unpublished data; [2]Christy (2004) and C. McCain, unpublished data; [3]N. Molina, unpublished data; [4]Hemstrom et al. (1987); [5]Halpern et al. (1984); [6]F. Hall, unpublished data; [7]L. Volland, unpublished data

Sampling

Sampling was conducted using the relevé or reconnaissance plot method (Poore 1955, Franklin 1971). Plots were typically circular in shape but of varying size, and were selected subjectively to represent a relatively homogeneous unit of vegetation. Plots with >10% cover of trees were excluded from the analyses. Within each plot, all vascular plant species were recorded and their relative abundance estimated as a vertical projection of canopy cover (%). However, for a small number of plots (n=18)

from the Mt. Jefferson Wilderness (Lenny Volland, unpublished data), cover was derived indirectly using site-specific regression equations that relate cover to other measures of abundance.

In addition to species abundance, the following environmental correlates were recorded for each plot: elevation, aspect, slope, and one or more categorical descriptors of landform (e.g., basin, slope, bench, or plateau), topographic position (e.g., lower slope, mid-slope, upper slope, or ridge top), and microtopography (e.g., flat, convex, or concave). Subsequently, we calculated a topographic moisture index (TM; Jan Henderson, personal communication) for each plot, incorporating the effects of landform (slope shape, position, and steepness) on the delivery and retention of soil moisture. TM can range from 1 (driest possible microsite) to 9 (standing open water). We also used PRISM (Daly et al. 2008) to estimate seasonal and annual measures of temperature and precipitation for each plot. These included mean annual temperature, mean summer (June-August) temperature, mean summer minimum (and maximum) temperatures, total annual precipitation, and mean summer precipitation.

Soil pits were dug in some but not all plots (sampling intensity varied by study) and the following information was recorded: depth to bedrock, soil texture, presence and depth of horizons, rooting depth, and depth to water table. Additional notes included type and extent of disturbance (e.g., tunneling or mounding by gophers, and evidence of erosional or depositional events).

Analytical methods

Two complementary approaches, classification and ordination, were used (1) to group sample plots by community type (species' assemblages that repeat across the landscape) and (2) to arrange these groups along gradients in species composition reflecting responses to one or more (often complex) environmental gradients.

Prior to analyses the following taxa were excluded: tree species, moss species (except *Sphagnum*, which was treated at the generic level), and other vascular plants not identified to species.

We used two-way indicator species analysis (TWINSPAN; Hill et al. 1975) as the method for classifying plots, and non-metric multidimensional scaling (NMS; Kruskal 1964) as the method of ordination. The full set of plots was used in an initial, exploratory classification. The results of this analysis indicated clear, floristic separation of most plots into montane or subalpine/alpine environments. Separate analyses were then conducted for each grouping to facilitate a more refined interpretation of plant community-environment relationships. Plots not easily assigned to a group were re-analyzed within the context of both groups to determine which group provided a better floristic fit.

From an initial pool of 1001 plots, 143 were dropped if they had significant tree cover (including low-growing *Juniperus communis*) or fewer than two species. An additional 125 plots were dropped if dominant taxa were not identified to species, if non-natives appeared to affect native composition, if plots were not easily classified, or if a distinct community type was identified but had limited replication (<3 plots).

TWINSPAN was implemented in PC-ORD ver. 4.25 (McCune and Mefford 2006). Cover data were square-root transformed and pseudo-species cut levels (Hill et al. 1975) were set at 0, 2, 5, 10, and 20%. NMS was also implemented in PC-ORD using the "slow and thorough" autopilot setting and the following options: Bray-Curtis as the distance measure, 500 maximum iterations (250 runs with real

and randomized data), a random start, and an instability criterion of 0.0000001 (McCune and Grace 2002). Rare species (present in <5 plots) were dropped prior to each ordination, yielding a montane data set of 258 plots and 222 species and a subalpine/alpine data set of 475 plots and 124 species. "Secondary" matrices, used to assess relationships with environment, included the following plot characteristics: elevation, slope, "adjusted" aspect (expressed as degree of "southwestness"), topographic moisture index (TM), and the six temperature or precipitation variables noted previously.

Classification and ordination results

A subjective assessment of the TWINSPAN analyses yielded a total of 59 communities or phases (floristic variant of a community type). These included 26 from the montane zone and 33 from the subalpine and alpine zones. Montane types typically occur as small to large openings or along ridge systems within a larger matrix of coniferous forest. Subalpine and alpine types characterize parkland settings (where trees occur scattered in "islands" or "stringers") or more severe environments in which trees take krummholz (stunted, prostrate) form or are completely absent. Although we refer to these zones for ease of grouping community types, some types are more accurately described as transitional (e.g., montane/subalpine or subalpine/alpine). In this guide, assignments to zonal groupings reflect the most common occurrence, although individual plots may deviate.

Figures 6 and 7 (montane and subalpine/alpine types, respectively) combine the results of NMS and TWINSPAN to illustrate floristic relationships among plant communities and their distributions with respect to environment. Given the large number of plots, community or phase locations in NMS space are presented as "centroids" or average scores of plots along the two ordination axes (NMS1 and NMS2); standard error bars illustrate variability along each axis. The nature and strength of community (or phase) relationships with environmental variables are represented by the orientation and length of vectors (arrows) relative to the ordination axes. Vectors are shown only if the correlation coefficient between plot scores and environmental variables exceeds 0.3.

Montane types (Fig. 6) are distributed primarily along a gradient of soil moisture availability as influenced by topographic position and slope. NMS1 shows a strong positive correlation with topographic moisture index (TM; r = 0.71) and a strong negative correlation with slope (r = -0.66). From left to right along NMS1, communities range from those of steep upper-slope or ridge-top positions with shallow or rocky soils, to those with persistent or seasonally wet soils in hydric basins or flats. NMS2, which accounts for less compositional variation, shows a negative correlation with elevation (r = -0.41) and a positive correlation with mean summer temperature (r = 0.32).

Subalpine and alpine types (Fig. 7) are arrayed along a complex set of landform and climatic gradients that influence temperature, snowlie, and soil moisture availability. NMS1 is negatively correlated with slope (r =-0.35) and positively correlated with soil moisture availability (TM; r = 0.50). NMS2 is positively correlated with elevation (r = 0.47) and negatively correlated with mean summer temperature (r = -0.34). From left to right along NMS1, communities range from alpine types on steeper slopes with limited soil moisture availability during the growing season to those of subalpine basins and flats, characterized by deeper accumulations of snow and poorer drainage. Along NMS2, communities range from those of warmer well-drained subalpine slopes to cooler types associated with late snowlie and reduced drainage.

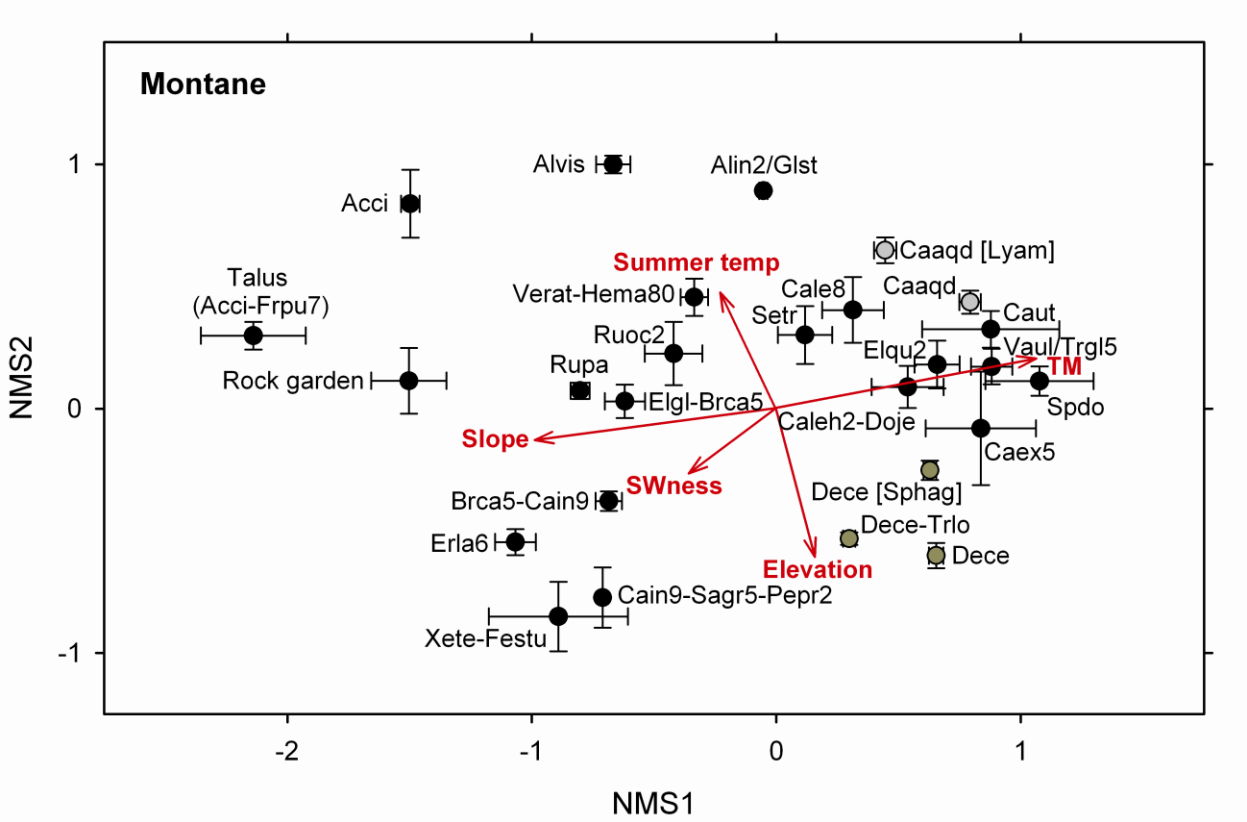


Figure 6. NMS ordination of montane plots illustrating the distribution of community types or phases (phase names in brackets) and their relationships to key environmental factors (vectors). Community or phase locations represent the means of plots within a type; error bars are ±1 SE. The projected length of an environmental vector along an axis is indicative of its correlation with that axis. Only those variables for which correlation coefficients exceeded 0.3 are shown. TM is topographic moisture index; SWness is adjusted aspect (degree of southwestness). Phases of the same community type share the same symbol color. Full community type or phase names are: ACCI=*Acer circinatum*; ALIN2/GLST=*Alnus incana/Glyceria striata*; ALVIS=*Alnus viridis* ssp. *sinuata*; BRCA5-CAIN9=*Bromus carinatus-Carex inops*; CAAQD=*Carex aquatilis* var. *dives*; CAAQD [LYAM]=*Carex aquatilis* var. *dives* [*Lysichiton americanus* phase]; CAEX5=*Carex exsiccata*; CAIN9-SAGR5-PEPR2=*Carex inops-Sanicula graveolens-Penstemon procerus*; CALE8=*Carex lenticularis*; CALEH2-DOJE=*Caltha leptosepala* ssp. *howellii-Dodecatheon jeffreyi*; CAUT=*Carex utriculata*; DECE=*Deschampsia cespitosa*; DECE-TRLO= *Deschampsia cespitosa-Trifolium longipes*; DECE [Sphag]=*Deschampsia cespitosa* [*Sphagnum* phase]; ELGL-BRCA5=*Elymus glaucus-Bromus carinatus*; ELQU2=*Eleocharis quinqueflora*; ERLA6=*Eriophyllum lanatum*; ROCK GARDEN=Rock garden; RUOC2=*Rudbeckia occidentalis*; RUPA=*Rubus parviflorus*; SETR=*Senecio triangularis*; SPDO=*Spiraea douglasii*; VAUL/TRGL5=*Vaccinium uliginosum/Triantha glutinosa*; TALUS (ACCI-FRPU7)=TALUS (*Acer circinatum-Frangula purshiana*); VERAT-HEMA80=*Veratrum-Heracleum maximum*; XETE-FEVI=*Xerophyllum tenax-Festuca viridula.*

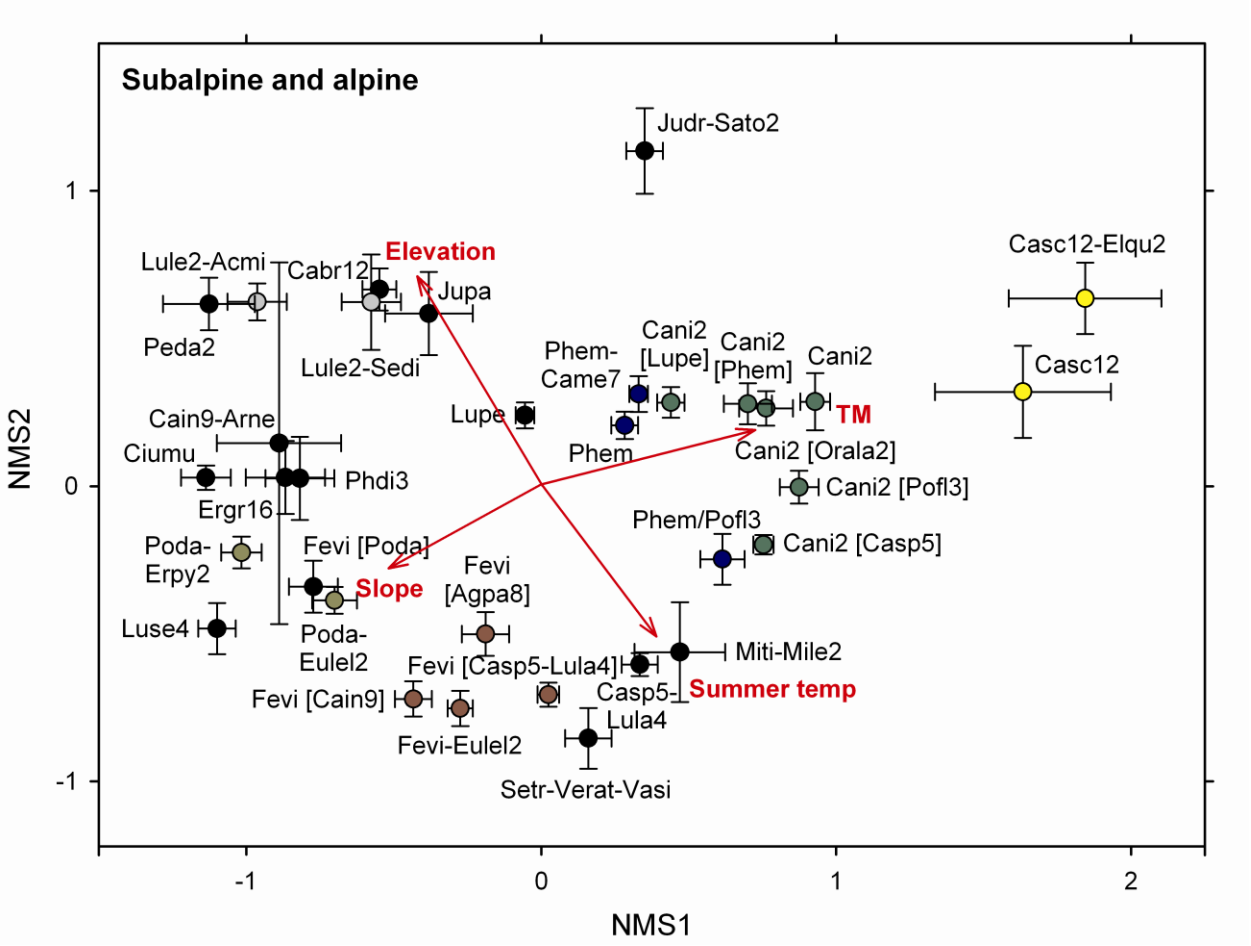


Figure 7. NMS ordination of subalpine and alpine plots illustrating the distribution of community types or phases (phase names in brackets) and their relationships to key environmental factors (vectors). See Fig. 6 for other details. Full community type or phase names are: **Subalpine communities**: CAIN9-ARNE=Carex *inops-Arctostaphylos nevadensis*; CANI2=*Carex nigricans;* CANI2 [CASP5]=*Carex nigricans* [*Carex spectabilis* phase]; CANI2 [LUPE]=*Carex nigricans* [*Luetkea pectinata* phase]; CANI2 [ORALA2]=*Carex nigricans* [*Oreostemma alpigenum* var. *alpigenum* phase]; CANI2 [PHEM]=*Carex nigricans* [*Phyllodoce empetriformis* phase]; CANI2 [POFL3]=*Carex nigricans* [*Potentilla flabellifolia* phase]; CASC12=*Carex scopulorum*; CASC12-ELQU2=*Carex scopulorum-Eleocharis quinqueflora*; CASP5-LULA4=*Carex spectabilis-Lupinus latifolius*; FEVI [AGPA8]=*Festuca viridula* [*Agrostis pallens* phase]; FEVI [CAIN9]=*Festuca viridula* [*Carex inops* phase]; FEVI [CASP5-LULA4]=*Festuca viridula* [Carex *spectabilis-Lupinus latifolius* phase]; FEVI [EULE2]=*Festuca viridula* [*Eucephalus ledophyllus* var. *ledophyllus* phase]; FEVI [PODA]=*Festuca viridula* [*Polygonum davisiae* phase]; LUPE=*Luetkea pectinata*; LUSE4=*Lupinus sericeus*; PHEM=*Phyllodoce empetriformis*; PHEM/POFL3=*Phyllodoce empetriformis/Potentilla flabellifolia*; PHEM-CAME7=*Phyllodoce empetriformis-Cassiope mertensiana*; PODA-ERPY2=*Polygonum davisiae-Eriogonum pyrolaefolium*; PODA-EULEL2=*Polygonum davisiae-Eucephalus ledophyllus* var. *ledophyllus*; SETR-VERAT-VASI=*Senecio triangularis-Veratrum-Valeriana sitchensis.* **Alpine communities**: CABR12=*Carex breweri*; CIUMU=*Cistanthe umbellate* var. *umbellata*; ERGR16=*Ericameria greenei*; JUDR-SATO2=*Juncus drummondii-Saxifraga tolmiei*; JUPA=*Juncus parryi*; LULE2-ACMI=*Lupinus lepidus-Achillea millefolium*; LULE2-SEDI=*Lupinus lepidus-Sedum divergens*; MITI-MILE2=*Mimulus tilingii-Mimulus lewisii*; PEDA2=*Penstemon davidsonii*; PHDI3=*Phlox diffusa.*

Community descriptions

Each community type (or phase) defined by the classification is described in this guide. Community names include both scientific and common plant names, as well as USDA PLANTS codes (USDA-NRCS 1999; http://plants.usda.gov/java/). Common names are from local sources (mainly Pojar and MacKinnon 1994); scientific nomenclature is consistent with USDA PLANTS (USDA-NRCS 1999; http://plants.usda.gov/java/). An ecoclass code is also assigned to each community type, to uniquely identify the types for the Pacific Northwest Region of the USDA Forest Service. A complete list of plant associations, plant association groups (subseries), series, and their ecoclass codes, can be found on the Ecoshare website (http://ecoshare.info/products/code-sets/).

For each community type or phase we include a map showing plot locations; an environmental table reporting the number of plots for which environmental data were collected; the mean and range of environmental characteristics (elevation, slope, aspect, slope position, and shape); and short narratives about the physical environment and soils.

Each community description also includes a species constancy table, with the most common species arranged in descending order of constancy (% of plots within which the species was observed). Abundance values include mean cover (average cover among all plots) and characteristic cover (mean cover for the plots in which the species was observed). Community types that are similar in composition are also noted.

For most community types, photos are included to illustrate the typical landscape context, and where possible, a soil profile. Photos are of sample plots used in the analyses and were scanned from slides (the oldest dating to the mid-1960s); as a consequence, the color quality and resolution of some images may be compromised.

Additional descriptions may include other noteworthy observations from field sheets and brief discussions of similar community types described in the literature. These are primarily communities described from studies in Oregon, but also include similar types in Washington, California and British Columbia. We do not attempt to update the nomenclature used in earlier reports.

Appendices that follow the community descriptions include the following:

- a cross walk of former and current plant names (Appendix A)
- an artificial key to the non-forested communities (Appendix B)
- line drawings and brief descriptions of the characteristic or common species (Appendix C)
- a short glossary of geomorphic, soil, and vegetation terms (Appendix D)
- extended constancy tables for each community type or phase, listing the constancy and cover of species present in at least 10% of plots (Appendix E)
- descriptions (with photos) of the effects of soil erosion on the distribution of some of the high Cascade communities in the Three Sisters Wilderness Area (Appendix F).

Terminology used in soil descriptions

Here, we provide a brief discussion of the terminology used in the soil descriptions, which emphasize the presence, depth, and texture of soil horizons. Soil horizons, denoted by capital letters (typically, O, A, B, and C), are visually distinct layers that differ in texture, organic matter content, and soluble

constituents. O describes the top layer, consisting of relatively un-decomposed organic matter. The A (surface) layer consists of mineral soil with the greatest concentration of organic matter. The B (subsoil) layer consists of mineral soil in which there may be an accumulation of clay, iron or aluminum oxides, or organic leachates. The C (parent rock) horizon is defined by a lack of weathering and contains larger rock fragments.

Texture refers to the particle-size distribution of soils and plays an important role in moisture and nutrient retention. From smallest to largest, particles include clay, silt, sand, gravel, cobble, and boulder. Clayey soils are very fine textured, with high moisture-holding capacity but low porosity. They become anaerobic relatively easily and when dry, are often hard and/or cracked. Silty soils are relatively fine textured and have high moisture- and nutrient-holding capacity. Sandy soils are coarser (gritty), dry, and poor in fertility. Loamy soils have silts, sands, and clay, with relatively good drainage, moisture- and nutrient-holding capacity. Gravels, cobbles, and boulders are indicative of alluvial or glacial processes. Soils with higher proportions of coarse sediments generally indicate excessive drainage and droughty summer conditions. Alternatively, in exposed alpine environments, fine soil particles may be selectively eroded by the combined actions of ice, water, and wind, leaving a coarser surface horizon or erosion pavement. Conversely, where bedrock lies near the surface, drainage can be poor, evidenced by mottling or gleying—signs of fluctuating or persistent anaerobic conditions. Similarly, where landform or local topography result in continuous pooling of water, hydric conditions can arise. Under anaerobic conditions, reduced rates of decomposition can result in the accumulation of organic matter (H layer).

Montane Dry Communities

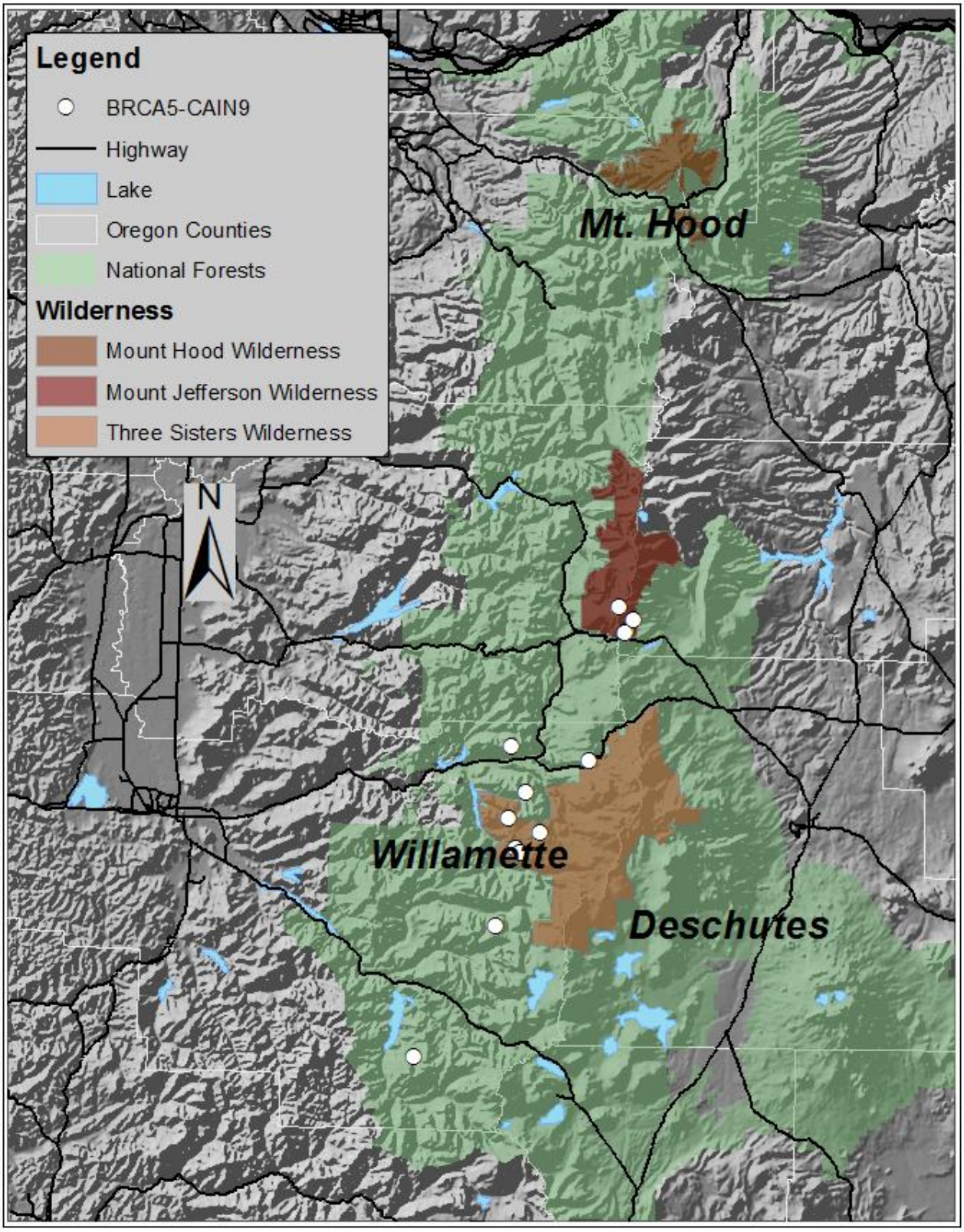
Bromus carinatus-Carex inops (California brome-Long stolon sedge)
BRCA5-CAIN9
Eco-class code: GS4025

BRCA5-CAIN9. Environmental conditions of plots.

Number of plots	13 (13 Willamette NF)
Elevation (ft)	Mean = 5100; Range = 4500-5855
Slope (%)	Mean = 30; Range = 8-62
Aspect (no. of plots)	FLAT = 0; NW = 1; NE = 0; SE = 7; SW = 6
Distribution	Western Cascades (64%), High Cascades (36%)
Slope position	Mainly upper slopes, also ridge to mid-slope
Slope shape	Mainly convex, also undulating/concave

Environmental conditions:

BRCA5-CAIN9 is an upper-montane community that occurs on south-facing, mid to upper slopes in both the Western and High Cascades. Slopes range from gentle to steep, with mainly convex topography. The soils are deep, with few coarse fragments. Cover of bare ground, rock, plus gravel average 24%. Fire and gopher activity can be significant disturbance agents.


Legend
BRCA5-CAIN9
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This graminoid-dominated community is characterized by California brome (BRCA5) and long stolon sedge (CAIN9). Western needlegrass (ACOC3), broadleaf lupine (LULA4), greenleaf fescue (FEVI), blue wildrye (ELGL), and subalpine mariposa lily (CASU2) are present in over 60% of the plots.

Summed plant cover averages 101%.

It is common to find a complex of meadow types on warm exposures in the Western Cascades. These grade from drier or upper-slope positions to moist, lower-slope positions as follows: BRCA5-CAIN9, ELGL-BRCA5, RUPA, and RUOC2. Bracken can also be locally dominant.

Growth form	Mean cover (%)
Forb	48.2
Graminoid	50.0
Shrub	1.2
Tree	1.9

BRCA5-CAIN9. Constancy table. Canopy cover for species in over 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
BRCA5	*Bromus carinatus*	California brome	100.0	16.4	16.4
CAIN9	*Carex inops*	Long stolon sedge	100.0	17.8	17.8
ACOC3	*Achnatherum occidentale*	Western needlegrass	76.9	1.5	1.9
LULA4	*Lupinus latifolius*	Broadleaf lupine	76.9	6.6	8.6
FEVI	*Festuca viridula*	Greenleaf fescue	69.2	5.5	7.9
ELGL	*Elymus glaucus*	Blue wildrye	61.5	3.3	5.4
CASU2	*Calochortus subalpinus*	Subalpine mariposa lily	61.5	0.5	0.9

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
ERAL3	*Erigeron aliceae*	Alice Eastwood's daisy	53.8	10.5	19.6
CIRE	*Cirsium remotifolium*	Fewleaf thistle	53.8	1.0	1.9
PHHE2	*Phacelia heterophylla*	Varileaf phacelia	53.8	0.6	1.2
SYFOF	*Symphyotrichum foliaceum*	Alpine leafybract aster	46.2	2.4	5.2
EULEL2	*Eucephalus ledophyllus*	Cascade aster	46.2	2.2	4.9
RUAC3	*Rumex acetosella*	Sheep sorrel	46.2	1.4	3.0
CAPA14	*Carex pachystachya*	Thick-headed sedge	38.5	0.2	0.6
DEME	*Delphinium menziesii*	Menzies' larkspur	38.5	0.3	0.7
ACMI2	*Achillea millefolium*	Yarrow	30.8	0.5	1.5
AGAU2	*Agoseris aurantiaca*	Orange agoseris	30.8	0.4	1.3
FRAGA	*Fragaria* spp.	Strawberry species	30.8	0.5	1.8
IPAGF	*Ipomopsis aggregata*	Scarlet gilia	30.8	0.7	2.3
LANE3	*Lathyrus nevadensis*	Purple peavine	30.8	1.2	3.8
PHDI3	*Phlox diffusa*	Spreading phlox	30.8	0.0	0.1
PODO4	*Polygonum douglasii*	Douglas' knotweed	30.8	0.2	0.6
POGL9	*Potentilla glandulosa*	Sticky cinquefoil	30.8	1.0	3.3

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 4 (4 Willamette NF plots)

Soils are coarse, with one to two sand or loamy sand A horizons over an AC horizon, above one or more C horizons. Rooting depth averages 23" (15-27"); total depth is greater than 48". Cursory soil information from 9 other plots characterizes the soils as deep sandy loams or silt loams.

Observations from plot notes:

Pocket gopher activity is significant. BRCA5-CAIN9 is often together on the slope with FEVI communities.

Montane Dry Communities

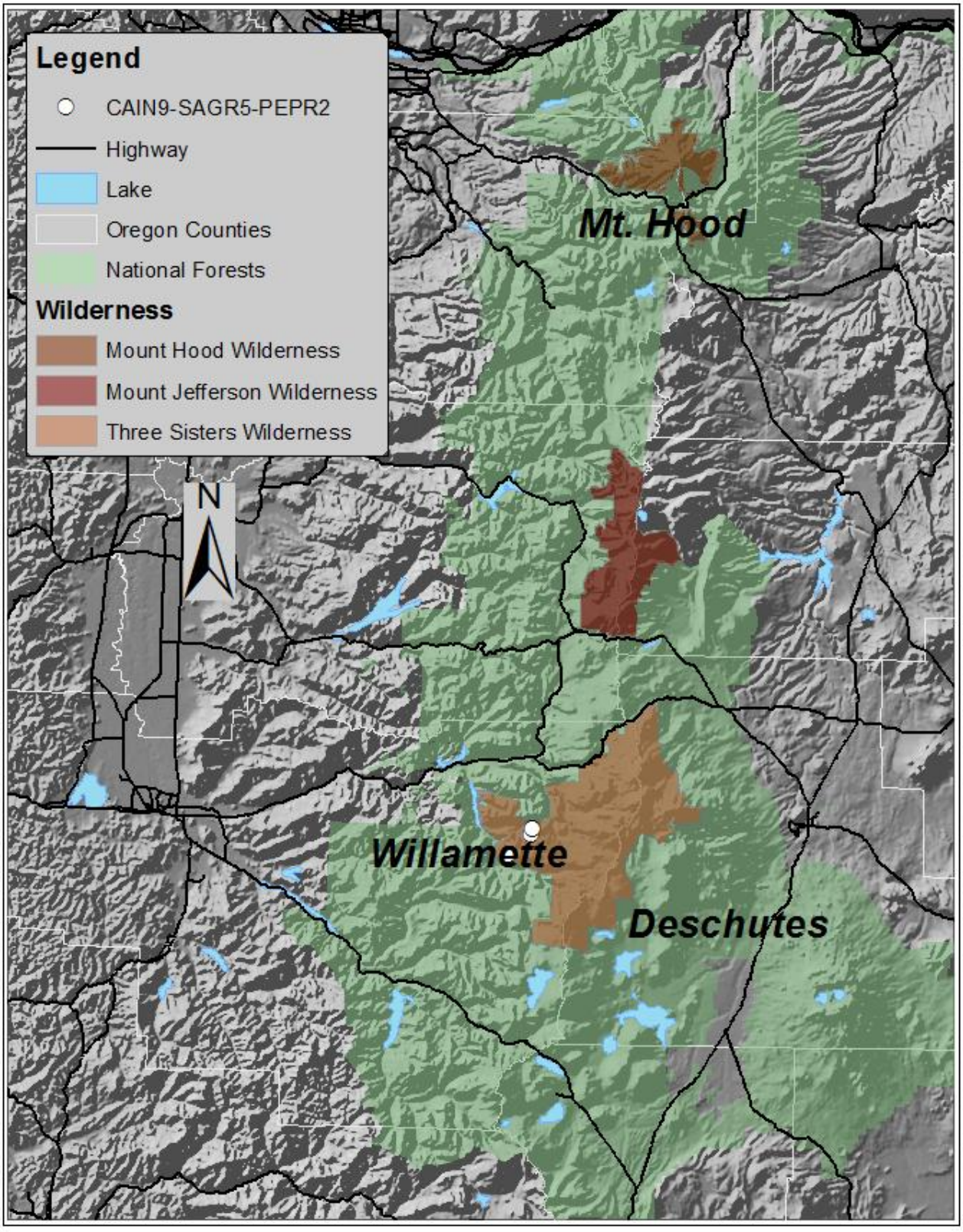
Carex inops-Sanicula graveolens-Penstemon procerus (Long stolon sedge-Sierra sanicle-Small-flowered penstemon)
CAIN9-SAGR5-PEPR2
Eco-class code: GS4023

CAIN9-SAGR5-PEPR2. Environmental conditions of plots.

Number of plots	2 (2 Willamette NF)
Elevation (ft)	Mean = 5500; Range = 5297-5681
Slope (%)	Mean = 37; Range = 1-60
Aspect (no. of plots)	FLAT = 1; NW = 0; NE = 1; SE = 1; SW = 0
Distribution	Western Cascades (100 %)
Slope position	Ridges and upper slopes
Slope shape	Straight or undulating topography

Environmental conditions:

CAIN9-SAGR5-PEPR2 is an upper-montane dry/rock garden community that occurs along steep upper-slope or ridge-top positions. Topography is undulating to straight. Soils have low moisture-holding capacity. Cover of bare ground, rock, plus gravel average 36%. Soils, slope, and topographic position combine to create relatively dry growing conditions.


Legend
CAIN9-SAGR5-PEPR2
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This forb-dominated community is characterized by long stolon sedge (CAIN9), Sierra sanicle (SAGR5), California comandra (COUM), and subalpine mariposa lily (CASU2). Small-flowered penstemon (PEPR2) can dominate the community when it is present. Shrubs include pinemat manzaneta (ARNE), serviceberry (AMAL2), Oregon boxwood (PAMY), and big huckleberry (VAME).

Summed plant cover averages 88%.

Growth form	Mean cover (%)
Forb	59.1
Graminoid	24.8
Shrub	5.7

CAIN9-SAGR5-PEPR2. Constancy table. Canopy cover for species present in both (100%) of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
CAIN9	*Carex inops*	Long stolon sedge	100.0	11.0	11.0
SAGR5	*Sanicula graveolens*	Sierra sanicle	100.0	6.0	6.0
COUM	*Comandra umbellata*	California comandra	100.0	3.0	3.0
CASU2	*Calochortus subalpinus*	Subalpine mariposa lily	100.0	0.6	0.6
ERAL3	*Erigeron aliceae*	Alice Eastwood's daisy	100.0	2.0	2.0
ERUM	*Eriogonum umbellatum*	Sulfur buckwheat	100.0	2.0	2.0
LIGR	*Ligusticum grayi*	Gray's lovage	100.0	1.6	1.6
ERAR15	*Erysimum arenicola*	Perennial sand-dwelling wallflower	100.0	0.6	0.6
MOMA3	*Moehringia macrophylla*	Big-leaved sandwort	100.0	0.6	0.6

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 3 (3 Willamette NF)

No full soil profiles are available. Soils are shallow silty loams to sandy loams. Coarse fragments average 51% (45-60%).

Previously described plant associations:

Johnson (2004) describes rock outcrop communities. He writes that "rock gardens are found on knife edges, rims and ridgetop outcrops. These occur in alpine and subalpine settings in the Blue, Wallowa and Seven Devils Mountains. Rock, gravel, and bedrock averaged 84% on sampled sites. Forbs were the most common plants. Frequently occurring were prickly sandwort, cut-leaved and scabland fleabanes, golden and oval-leaved buckwheats, scarlet and ballhead gilias, cloverleaf phacelia and Payette and shrubby penstemons. Grasses were of low cover (less than 5%)."

Montane Dry Communities

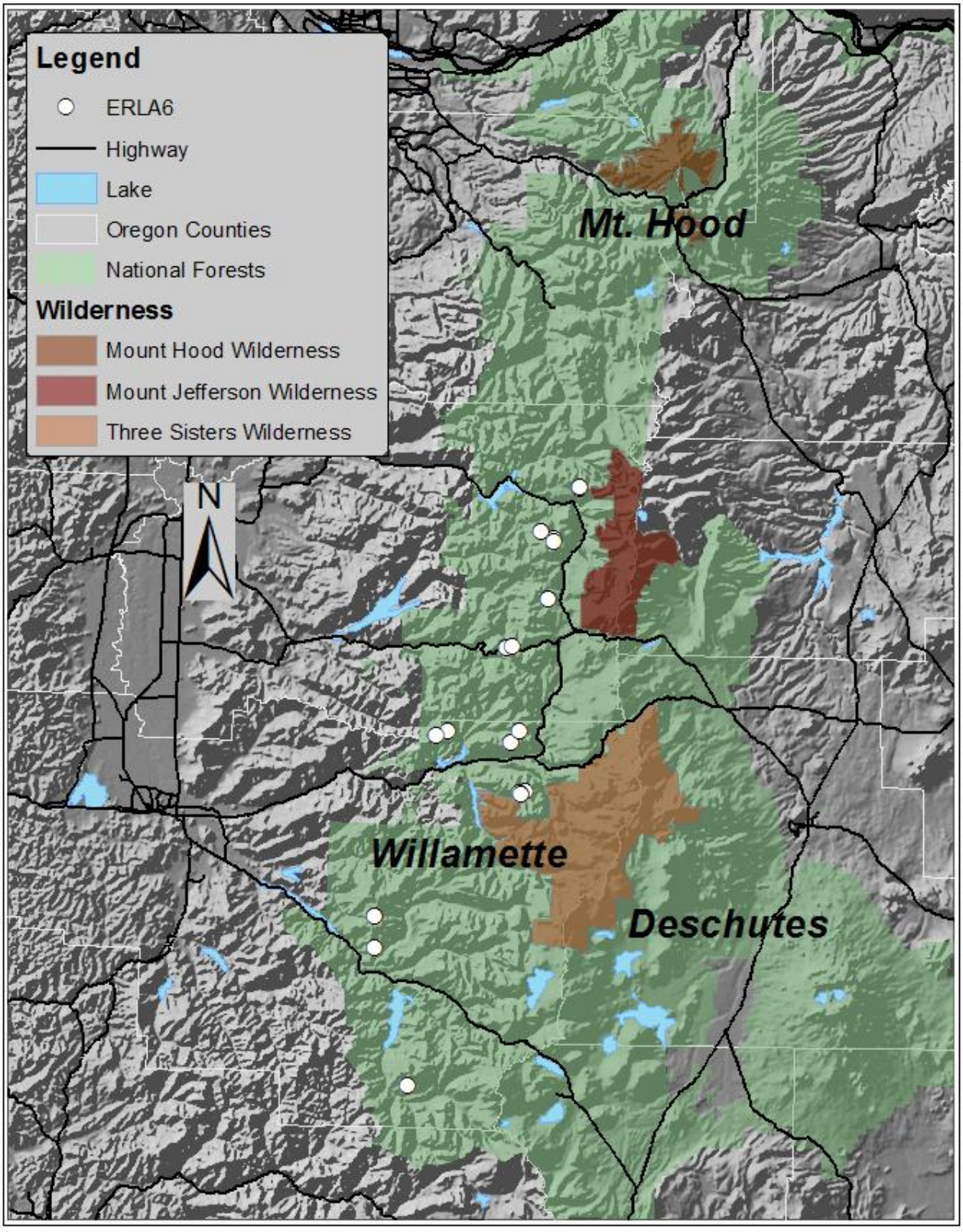
Eriophyllum lanatum (Oregon sunshine)
ERLA6
Eco-class code: FM9912

ERLA6. Environmental conditions of plots.

Number of plots	19 (19 Willamette NF)
Elevation (ft)	Mean = 4700; Range = 3300-5596
Slope (%)	Mean = 52; Range = 0-90
Aspect (no. of plots)	FLAT = 1; NW = 1; NE = 1; SE = 6; SW = 17
Distribution	Western Cascades (85%), High Cascades (15%)
Slope position	Upper slopes, mid-slopes, and ridges
Slope shape	Mainly convex or undulating

Environmental conditions:

ERLA6 is a diverse, montane rock garden community that typically occurs on steep south-facing slopes with shallow, skeletal soils. Cover of bare ground, rock, plus gravel average 40%. Slope, slope position, aspect, and soils severely limit moisture availability.


Legend
ERLA6
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This dry montane type is typified by Oregon sunshine (ERLA2), although this species is not always present. Yarrow (ACMI2), California brome (BRCA5), serviceberry (AMAL2) and Menzies' larkspur (DEME) are found in at least 50% of the plots. Summed plant cover averages 69%.

Growth form	Mean cover (%)
Forb	43.2
Graminoid	22.4
Shrub	3.9
Tree	0.3

ERLA6. Constancy table. Canopy cover for species in at least 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
ERLA6	*Eriophyllum lanatum*	Oregon sunshine	78.95	6.84	8.67
ACMI2	*Achillea millefolium*	Yarrow	68.42	4.74	6.93
BRCA5	*Bromus carinatus*	California brome	68.42	3.64	5.32
AMAL2	*Amelanchier alnifolia*	Saskatoon serviceberry	52.63	0.53	1.01
DEME	*Delphinium menziesii*	Menzies' larkspur	42.11	1.16	2.75
AGPA	*Agrostis pallens*	Thin bentgrass	36.84	4.79	13.00
GICA5	*Gilia capitata*	Globe gilia	52.63	3.16	6.01
POGL9	*Potentilla glandulosa*	Sticky cinquefoil	52.63	1.37	2.60

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
ERCO12	*Eriogonum compositum*	Northern buckwheat	47.4	2.1	4.4
LANE3	*Lathyrus nevadensis*	Purple peavine	47.4	0.4	0.9
ELGL	*Elymus glaucus*	Blue wildrye	42.1	2.0	4.8
CASU2	*Calochortus subalpinus*	Subalpine mariposa lily	36.8	0.3	0.9
COPA3	*Collinsia parviflora*	Small-flowered blue-eyed Mary	36.8	0.2	0.6
EPMI	*Epilobium minutum*	Small-flowered willowherb	36.8	0.3	0.9
FEID	*Festuca idahoensis*	Idaho fescue	36.8	7.7	20.9
SAGR5	*Sanicula graveolens*	Sierra sanicle	36.8	0.4	1.1
CAHI9	*Castilleja hispida*	Harsh paintbrush	31.6	0.5	1.5
HODI	*Holodiscus discolor*	Oceanspray	31.6	0.3	1.0
LULA4	*Lupinus latifolius*	Broadleaf lupine	31.6	1.5	4.7
PHHE2	*Phacelia heterophylla*	Varileaf phacelia	31.6	0.3	0.9
SEOR2	*Sedum oregonense*	Creamy stonecrop	31.6	0.8	2.7
ARLU	*Artemisia ludoviciana*	Louisiana sagewort	26.3	0.9	3.4
CAIN9	*Carex inops*	Long stolon sedge	26.3	0.9	3.4
ERUM	*Eriogonum umbellatum*	Sulfur buckwheat	26.3	0.5	1.8
PEPR2	*Penstemon procerus*	Small-flowered penstemon	26.3	0.8	3.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 21 (21 Willamette NF plots)

No full profiles are described, but cursory information is available. Soils are extremely shallow, skeletal silt loams to sandy loams, often as pockets of soil caught in “scab rock.” Total soil depth averages 8” (2-24”).

Observations from plot notes:

Vegetation: The three tree species most commonly noted as growing adjacent to these rock gardens include subalpine fir, Douglas-fir and noble fir.

Previously described plant associations:

The *Eriophyllum lanatum*/*Castilleja hispida*/*Sedum oregonense* Lithosolic Association of the central Western Cascades is described by Hickman (1976), which resembles our "rock garden" type. These communities on lithosolic soil (shallow soils with imperfectly weathered rock fragments) vary from one ridgetop site to the next but are inhabited by the same group of species tolerant of xeric, rocky environments, although in differing proportions.

Montane Dry Communities

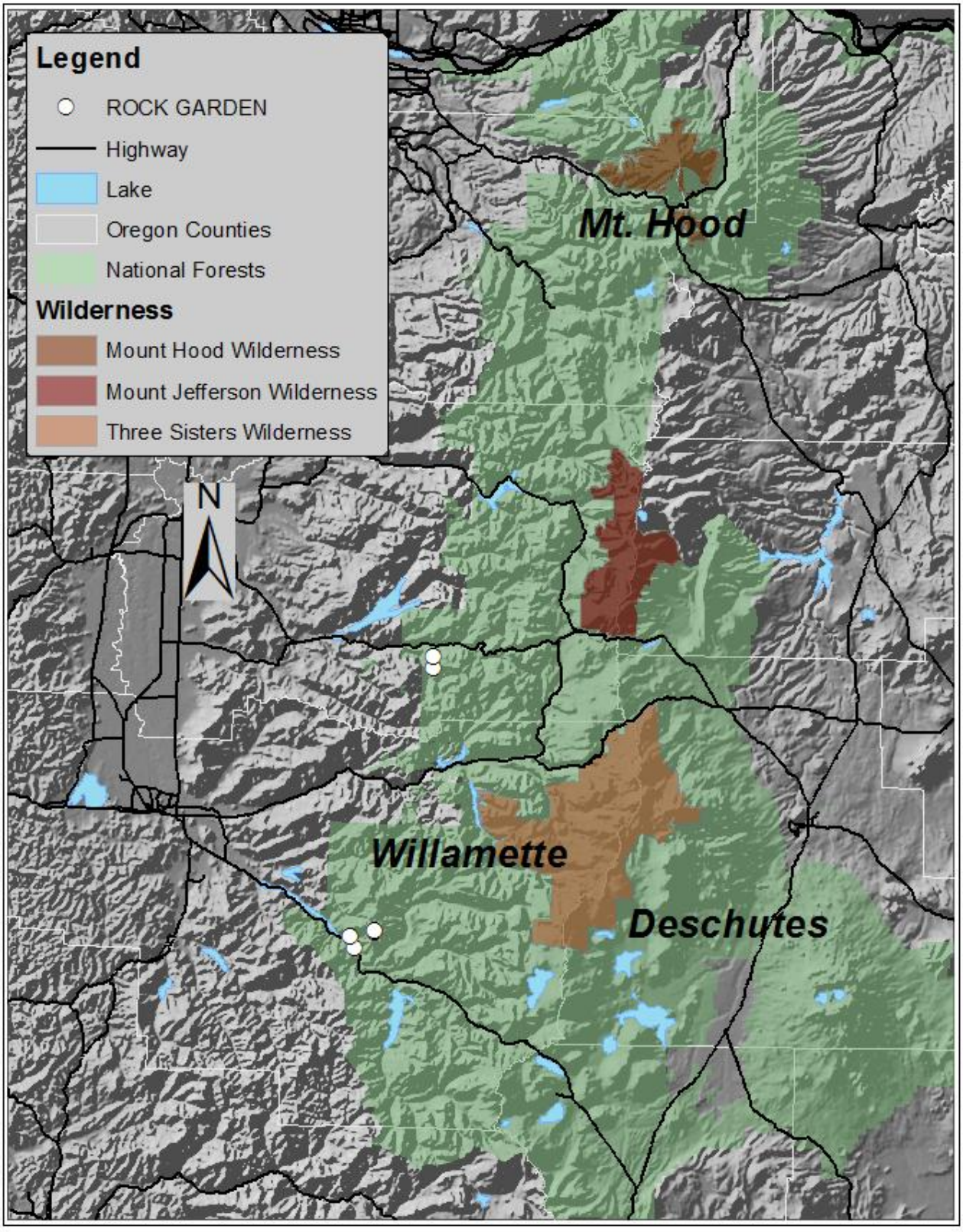
ROCK GARDEN [STEEP, XERIC]
Eco-class code: NRL911

ROCK GARDEN [STEEP, XERIC]. Environmental conditions of plots.

Number of plots	6 (6 Willamette NF)
Elevation (ft)	Mean = 3150; Range = 2124-3760
Slope (%)	Mean = 54; Range = 10-99
Aspect (no. of plots)	FLAT = 0; NW = 0; NE = 0; SE = 3; SW = 3
Distribution	Western Cascades (100%)
Slope position	Upper slopes or ridges
Slope shape	Varied

Environmental conditions:

This montane rock garden community occurs along upper slopes and ridge tops in the Western Cascades. Plots are on warm, southern aspects mainly on steep slopes in rock and boulder fields. Shallow, skeletal soils accumulate in pockets among the rocks. Cover of rock averages 62%. Bare ground and gravel each average less than 1%.


Legend
ROCK GARDEN
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This rock garden community is sparsely vegetated. Wallace's selaginella (SEWA) is typically abundant. Oceanspray (HODI), broad-leaved stonecrop (SESP), Douglas-fir (PSME) and big leaf maple (ACMA3) are generally present. Small-flowered alumroot (HEMI7) is abundant in about 50% of the plots. Summed plant cover averages 56%, twice the plant cover of the similar TALUS community, but less than that of the ERLA6 community, also a montane, rock-garden type. These rocky types are much harsher, hotter, and drier than ACCI or ALVIS communities.

Growth form	Mean cover (%)
Forb	45.0
Graminoid	3.5
Shrub	5.5
Tree	2.3

ROCK GARDEN [STEEP, XERIC]. Constancy table. Canopy cover for species in >33% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
SEWA	*Selaginella wallacei*	Wallace's selaginella	83.3	26.3	31.6
HODI	*Holodiscus discolor*	Oceanspray	66.7	1.3	2.0
SESP	*Sedum spathulifolium*	Broad-leaved stonecrop	66.7	1.3	2.0
PSME	*Pseudotsuga menziesii*	Douglas-fir	66.7	0.8	1.0
ACMA3	*Acer macrophyllum*	Big leaf maple	66.7	0.7	1.0
HEMI7	*Heuchera micrantha*	Small-flowered alumroot	50.0	7.3	14.7

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
FEOC	*Festuca occidentalis*	Western fescue	50.0	1.0	2.0
BRCA5	*Bromus carinatus*	California brome	50.0	0.5	1.0
LOHA	*Lomatium hallii*	Hall's biscuitroot	50.0	0.5	1.0
LOUT	*Lomatium utriculatum*	Spring-gold	50.0	0.5	1.0
POHE3	*Polypodium hesperium*	Western polypody	50.0	0.5	1.0
ROCA6	*Romanzoffia californica*	California mistmaiden	50.0	0.5	1.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

Full profiles are not described, but cursory soils information is available from 2 Willamette NF plots. Plot notes record shallow pockets of soil, mainly 5-6” deep.

Montane Dry Communities

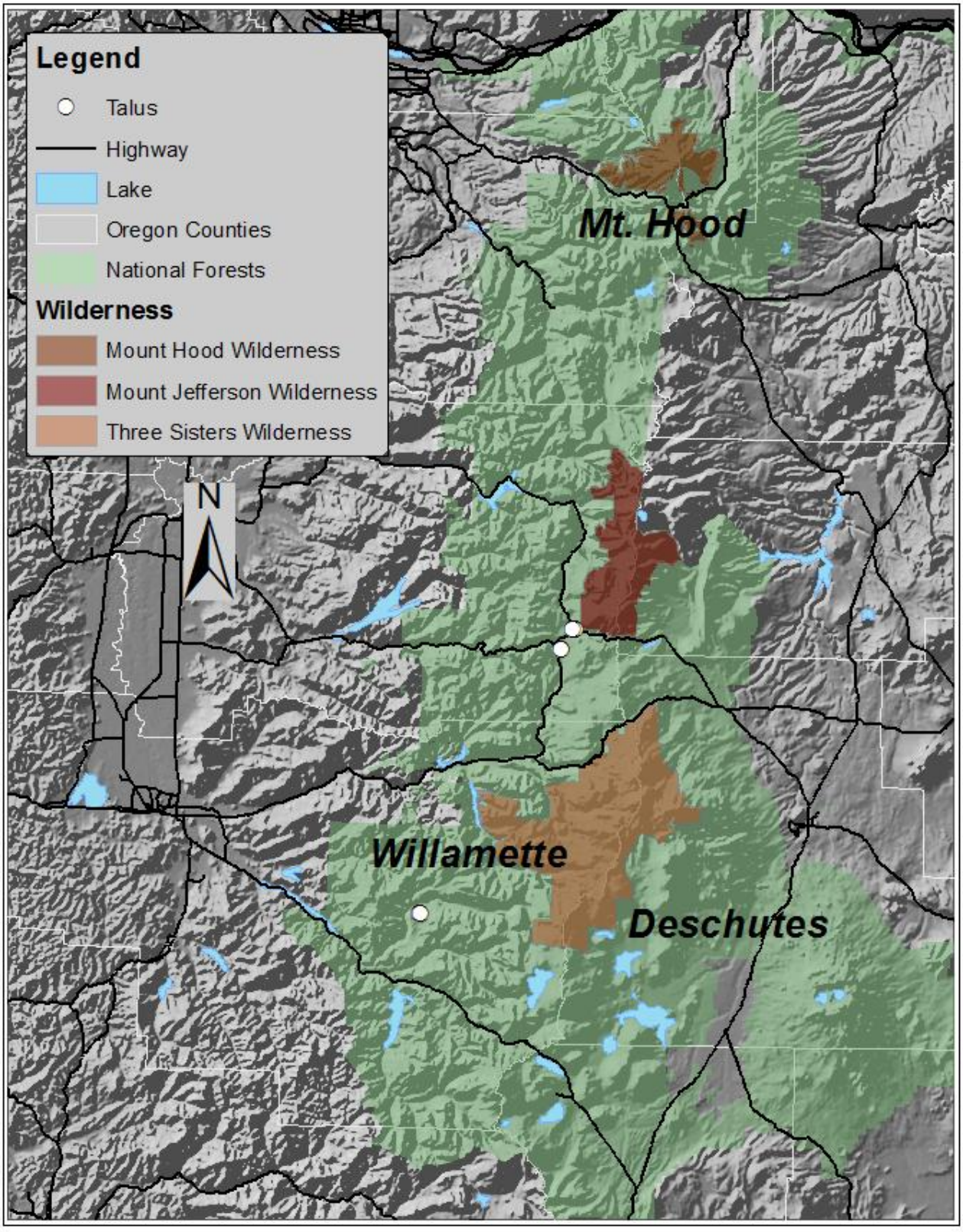
TALUS [*Acer circinatum-Frangula purshiana*] (TALUS [Vine maple-Cascara buckthorn])
TALUS [ACCI-FRPU7]
Eco-class code: NTS912

TALUS [ACCI-FRPU7]. Environmental conditions of plots.

Number of plots	6 (6 Willamette NF)
Elevation (ft)	Mean = 3150; Range = 2600-3600
Slope (%)	Mean = 11; Range = 2-40
Aspect (no. of plots)	FLAT = 0; NW = 0; NE = 3; SE = 1; SW = 2
Distribution	Western Cascades (33%), High Cascades (67%)
Slope position	Ridges, lower slopes, benches
Slope shape	Undulating topography

Environmental conditions:

This mid-montane talus community occurs on ridges, lower slopes, or benches in lava fields in the Western or High Cascades. Plots are mainly on warm, southern aspects on gentle to steep slopes. Soil accumulates in shallow pockets among the rocks. Cover of bare ground, rock, plus gravel average 66%.


Legend
Talus
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This dry mid-montane talus community is sparsely vegetated, but diverse. It can be dominated by vine maple (ACCI). Cascara buckthorn (FRPU7) is typically present. Douglas-fir (PSME) and American rockbrake (CRAC3) are common. Summed plant cover averages 36%.

Trees are found around the perimeters of talus. Few mature trees are recorded in the plots. TALUS [ACCI-FRPU7] has the lowest plant cover among the rock-garden types. These are much harsher and drier, with less soil than ACCI or ALVIS communities.

Growth form	Mean cover (%)
Forb	9.8
Graminoid	0.8
Shrub	11.3
Tree	6.7

TALUS [ACCI-FRPU7]. Constancy table. Canopy cover for species in at least 50% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
ACCI	*Acer circinatum*	Vine maple	100.0	8.2	8.2
FRPU7	*Frangula purshiana*	Cascara buckthorn	100.0	2.5	2.5
CRAC3	*Cryptogramma acrostichoides*	American rockbrake	83.3	1.5	1.8
PSME	*Pseudotsuga menziesii*	Douglas-fir	66.7	2.3	2.8
PEDA2	*Penstemon davidsonii*	Davidson's penstemon	50.0	0.8	1.7
PAMY	*Pachistima myrsinites*	Oregon boxwood	50.0	0.5	1.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

Full soil profiles are not described, but cursory soil information is available for 3 Willamette NF plots. Soils have high amounts of coarse fragments (often cobbles to boulders). Plot notes record shallow pockets of soil, mainly 2-6” deep.

Montane Dry Communities

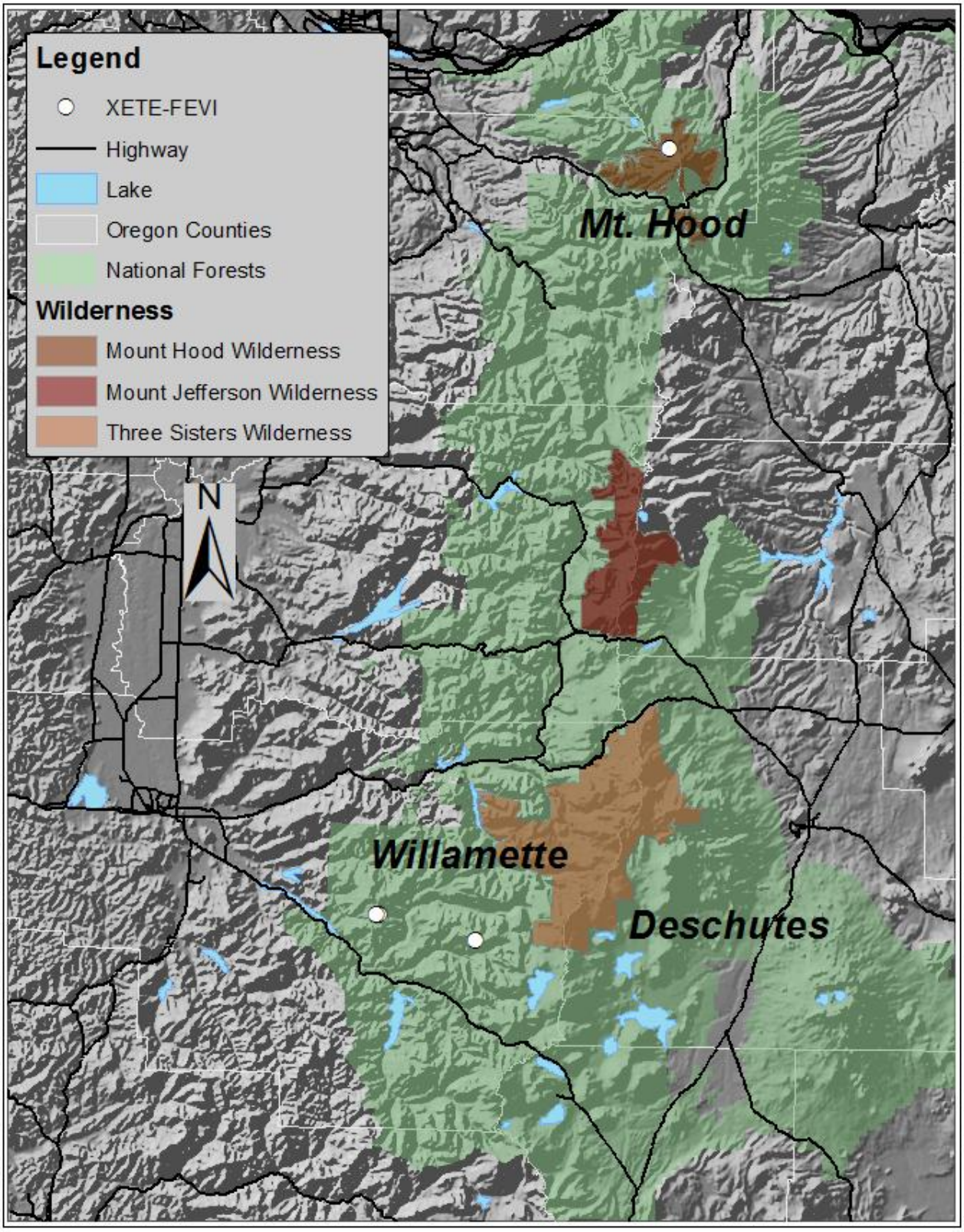
Xerophyllum tenax-Festuca virudula (Beargrass-greenleaf fescue)
XETE-FEVI
Eco-class code: FM2912

XETE-FEVI. Environmental conditions of plots.

Number of plots	4 (1 Mt. Hood NF, 3Willamette NF)
Elevation (ft)	Mean = 5100; Range = 4700-5650
Slope (%)	Mean = 20; Range = 10-30
Aspect (no. of plots)	FLAT = 0; NW = 0; NE = 1; SE = 1; SW = 2
Distribution	Western Cascades (75%), High Cascades (25 %)
Slope position	Upper slopes, ridges, lower slopes
Slope shape	Undulating or concave topography

Environmental conditions:

XETE-FEVI is an upper montane-subalpine community occurring on gentle to moderate slopes from ridge-top to lower slope positions. Young trees are found on the perimeter of the meadows, or scattered throughout, indicating that this type may be seral to forested communities, or the result of fire allowing beargrass to expand. A charcoal layer with decomposed wood is recorded in one soil profile. Soils are silt loams or sandy loams. Cover of bare ground, rock, plus gravel average 9%.


Legend
XETE-FEVI
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Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This meadow community is dominated by beargrass (XETE), and greenleaf fescue (FEVI) is always present. Fireweed (CHANA2), Columbian lily (LICO), and anemone are found in 75% of the plots. Shrubs occurring in this type include serviceberry (AMAL2) on two plots and common juniper (JUCO6) on one plot. Summed plant cover averages 96%.

Growth form	Mean cover (%)
Forb	83.8
Graminoid	6.3
Shrub	3.0
Tree	4.5

XETE-FEVI. Constancy table. Canopy cover for species in at least 50% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover (%)
XETE	*Xerophyllum tenax*	Beargrass	100.0	76.3	76.3
FEVI	*Festuca viridula*	Greenleaf fescue	100.0	4.0	4.0
CHANA2	*Chamerion angustifolium*	Fireweed	75.0	1.0	1.3
LICO	*Lilium columbianum*	Columbian lily	75.0	1.0	1.3
ANEMO	*Anemone* (possibly *A. oregana*)	Anemone (possibly Oregon anemone)	75.0	0.8	1.0
CAIN9	*Carex inops*	Long stolon sedge	50.0	1.3	2.5
AMAL2	*Amelanchier alnifolia*	Saskatoon serviceberry	50.0	0.5	1.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 3 (1 Mt. Hood NF, 2Willamette NF)

Soils are silt loams or sandy loams. One plot is on a hard pan at 28”. The Mt. Hood profile description shows multiple buried soils with several A horizons over B horizons, and mottling at 11”. A charcoal layer at 5” in that pit indicates an interval with potential forest present on the site.

Montane Mesic Communities

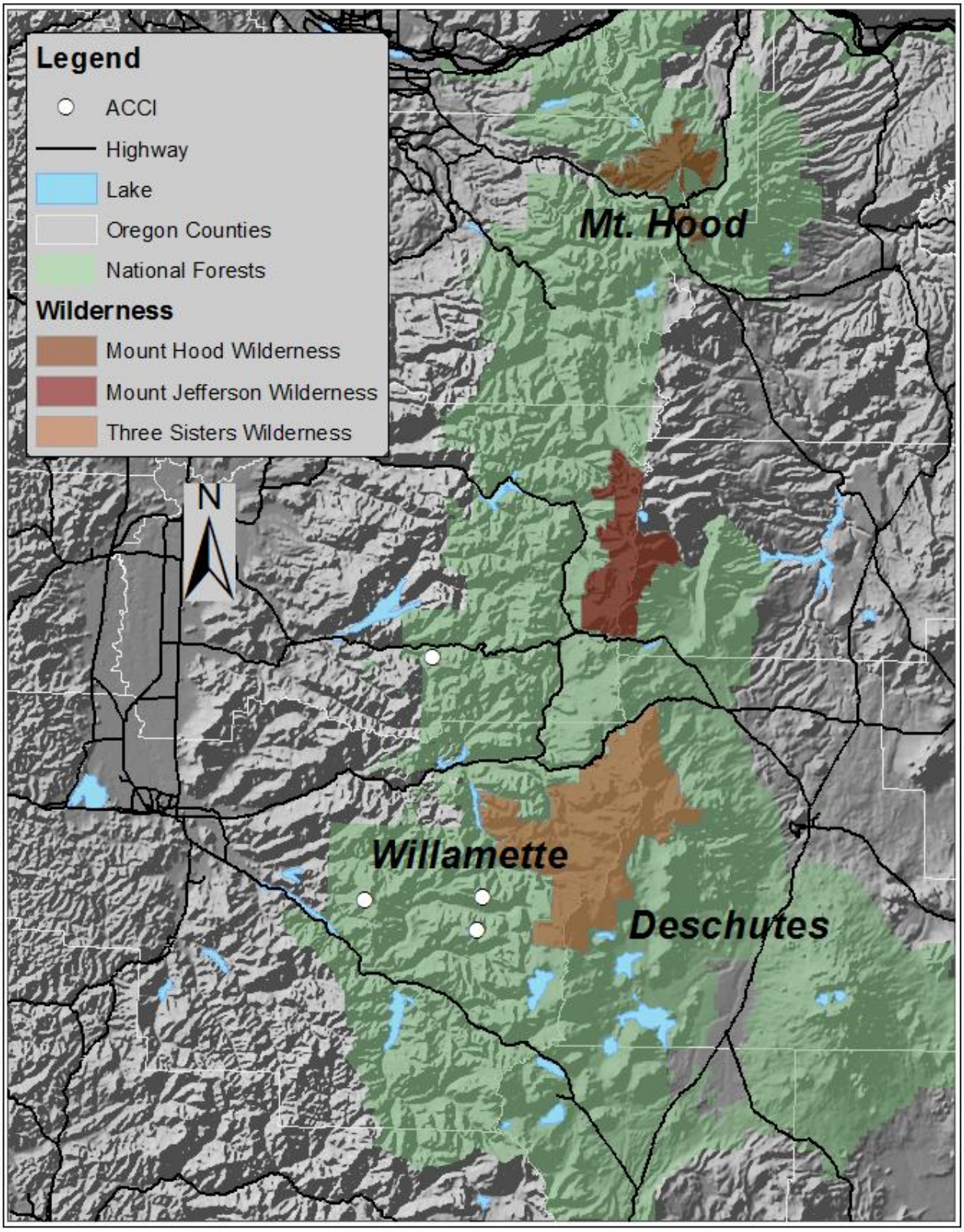
Acer circinatum (Vine maple)
ACCI
Eco-class code: SM8113

ACCI. Environmental conditions of plots.

Number of plots	4 (4 Willamette NF)
Elevation (ft)	Mean = 4100; Range = 3060-4800
Slope (%)	Mean = 36; Range = 1-65
Aspect (no. of plots)	FLAT = 1; NW = 1; NE = 0; SE = 0; SW = 2
Distribution	Western Cascades (100%)
Slope position	Mid to lower slopes
Slope shape	Convex or straight topography

Environmental conditions:

ACCI is a montane shrub community that occurs in rocky substrates on mid- to lower slopes in the Western Cascades. Aspects vary. Soils are silt loams amid boulders and rock. Bare soil, rock, plus gravel cover average 31%. Moisture does not appear to be limiting.


Legend
ACCI
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
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Mt. Hood
Willamette
Deschutes

Vegetation composition:

This montane shrub type is dominated by vine maple (ACCI). Starry false Solomon's seal (MAST4), Pacific waterleaf (HYTE), red elderberry (SARA2), Pacific bleedingheart (DIFO), and Pacific trillium (TROV2) are present in 50% of the plots. Summed plant cover averages 109%.

Growth form	Mean cover (%)
Forb	20.0
Graminoid	0.5
Shrub	87.5
Tree	0.5

The ACCI community occurs on drier sites than the ALVIS community (also a rocky, montane type). The ACCI type tends to occur on convex surfaces and the ALVIS type, on concave surfaces.

ACCI. Constancy table. Canopy cover for species in at least two of the plots (50%).

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
ACCI	*Acer circinatum*	Vine maple	100.0	79.5	79.5
MAST4	*Maianthemum stellatum*	Starry false Solomon's-seal	75.0	3.0	4.0
HYTE	*Hydrophyllum tenuipes*	Pacific waterleaf	50.0	7.0	14.0
SARA2	*Sambucus racemosa*	Red elderberry	50.0	6.3	12.5
DIFO	*Dicentra formosa*	Pacific bleedingheart	50.0	1.5	3.0
TROV2	*Trillium ovatum*	Pacific trillium	50.0	1.5	3.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

Cursory soils information is available from 3 Willamette NF plots. No full profile descriptions are available. Soils are silt loams within the first 12" to 24", forming pockets among the boulders.

Observations from plot notes:

Soil: One plot occurs on a talus slope where more support for flowing water is audible under the talus. Another notes large boulders and many streams on a talus slope.

Small mammal disturbance: Mountain beaver (*Aplodontia rufa*) burrows are recorded on two plots indicating a moist environment and continuous disturbance.

Previously described plant associations:

Kovalchik & Clausnitzer (2004) describe an *Acer circinatum* plant association in their eastern Washington guide. Plants with high constancy are starry solomonplume (100%), western solomonplume (83%), red-osier dogwood (67%), and myrtle Pachistima (67%). They note that "the ACCI association plots usually are found along C channels, ephemeral channels, and on the margins of ponds and lakes. The two ephemeral ACCI plots are actually located on an alluvial fan beside a lake."

Montane Mesic Communities

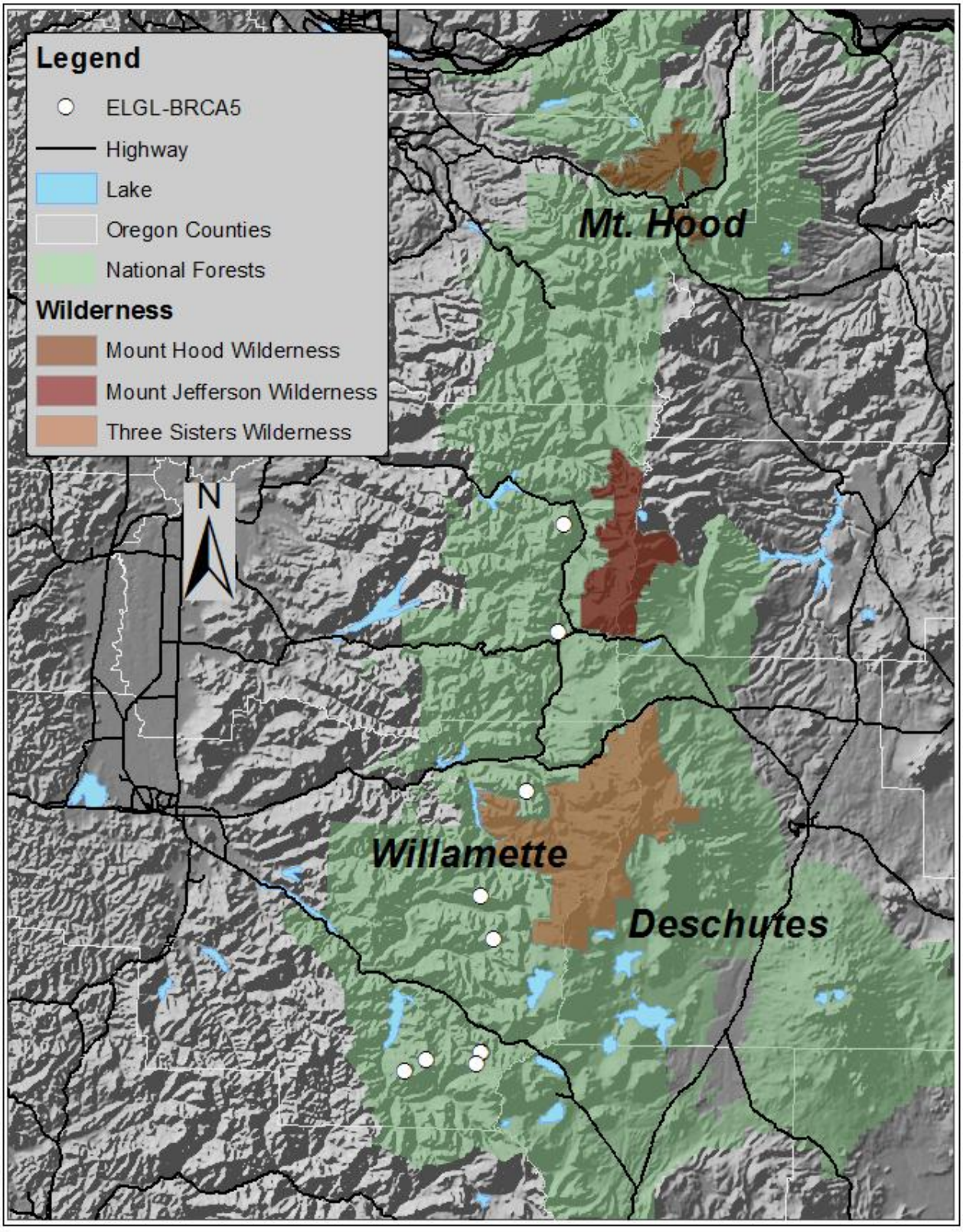
Elymus glaucus-Bromus carinatus (Blue wildrye-California brome)
ELGL-BRCA5
Eco-class code: GM4122

ELGL-BRCA5. Environmental conditions of plots.

Number of plots	11 (11 Willamette NF)
Elevation (ft)	Mean = 4750; Range = 3240-5600
Slope (%)	Mean = 22; Range = 1-50
Aspect (no. of plots)	FLAT = 1; NW = 0; NE = 0; SE = 3; SW = 7
Distribution	Western Cascades (91%), High Cascades (9 %)
Slope position	Mid-slopes, draws and basins
Slope shape	Convex, concave, straight topography

Environmental conditions:

ELGL-BRCA5 is a montane community found on warm aspects at mid- slope positions and occasionally in basins or drainages. Slopes are moderate with varied topography. Cover of bare ground, rock, plus gravel average 18%. Slope position, slope, and fine textured soils allow sites to retain moisture.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National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This mesic montane community is characterized by blue wildrye (ELGL). California brome (BRCA5) and false hellebore (VERAT) are generally present. Shrubs and trees are nearly absent. Summed plant cover averages 97%.

Heavy elk use may affect species' abundance in these meadows. It is common to find a complex of meadow types on warm exposures in the Western Cascades. These grade from drier or upper-slope positions to moist, lower-slope positions as follows: BRCA5-CAIN9, ELGL-BRCA5, RUPA, and RUOC2. Bracken can also be locally dominant.

Growth form	Mean cover (%)
Forb	57.7
Graminoid	41.8
Shrub	0.1
Tree	1.0

ELGL-BRCA5. Constancy table. Canopy cover for species in over 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
ELGL	*Elymus glaucus*	Blue wildrye	100.0	9.3	9.3
BRCA5	*Bromus carinatus*	California brome	81.8	9.0	9.0
VERAT	*Veratrum* ssp.	False hellebore species	72.7	3.9	5.4
RUOC2	*Rudbeckia occidentalis*	Western coneflower	45.5	4.5	10.0
POPH	*Polygonum phytolaccifolium*	Alpine knotweed	45.5	3.0	6.6
RUAC3	*Rumex acetosella*	Sheep sorrel	45.5	0.5	1.0
PTAQ	*Pteridium aquilinum*	Western bracken fern	36.4	14.6	40.3
HEMA80	*Heracleum maximum*	Cow-parsnip	36.4	3.1	8.5
ERAL3	*Erigeron aliceae*	Alice Eastwood's daisy	36.4	1.2	3.3
PHHE2	*Phacelia heterophylla*	Varileaf phacelia	36.4	0.3	0.8
BRIN2	*Bromus inermis*	Smooth brome	27.3	2.7	10.0
ACMI2	*Achillea millefolium*	Yarrow	27.3	2.6	9.7
LANE3	*Lathyrus nevadensis*	Purple peavine	27.3	0.6	2.3
LOTR2	*Lomatium triternatum*	Tracy's desertparsley	27.3	0.6	2.3
MAST4	*Maianthemum stellatum*	Starry false Solomon's-seal	27.3	0.6	2.3
VIAM	*Vicia americana*	American vetch	27.3	0.4	1.3

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
AGAU2	*Agoseris aurantiaca*	Orange agoseris	27.3	0.2	0.7
CASU2	*Calochortus subalpinus*	Subalpine mariposa lily	27.3	0.1	0.4

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

Cursory soils information is available from 7 Willamette NF plots.

Soils are silt loams or silty clay loams, with relatively few coarse fragments. Total depth is generally greater than 36" (minimum 16").

Previously described plant associations:

Crowe et al. (2004) describe an *Elymus glaucus* plant association with high constancy of *Bromus carinatus* (100%). It also has high constancy of *Achillea millefolium*, *Taraxacum officinale*, *Phleum alpinum*, *Lupinus polyphyllus*, *Lathyrus*, *Veratrum californicum*, *Senecio triangularis*, *Maianthemum stellata*, and *Aconitum columbianum*. They note that "sites are dry floodplains and basins at moderate elevations. Soils are deep loams that are saturated at snow melt but droughty by mid to late summer."

Kovalchick (1987) also describes an *Elymus glaucus* plant association. In the miscellaneous associations and community types he notes that "three plots were sampled at Evening Creek and Mountain Lakes Wilderness (Winema NF) and Gearhart Mountain (Fremont NF). Sites are dry floodplains and basins at moderate elevations. Blue wildrye is the dominant graminoid. Other graminoids include bluejoint reedgrass, nodding brome, meadow barley and thick-headed sedge. Forbs include western yarrow, broadpetal strawberry, California false hellebore, Gray licoriceroot, arrowleaf groundsel, and starry solomonplume." However, no constancy or cover data are provided.

Montane Mesic Communities

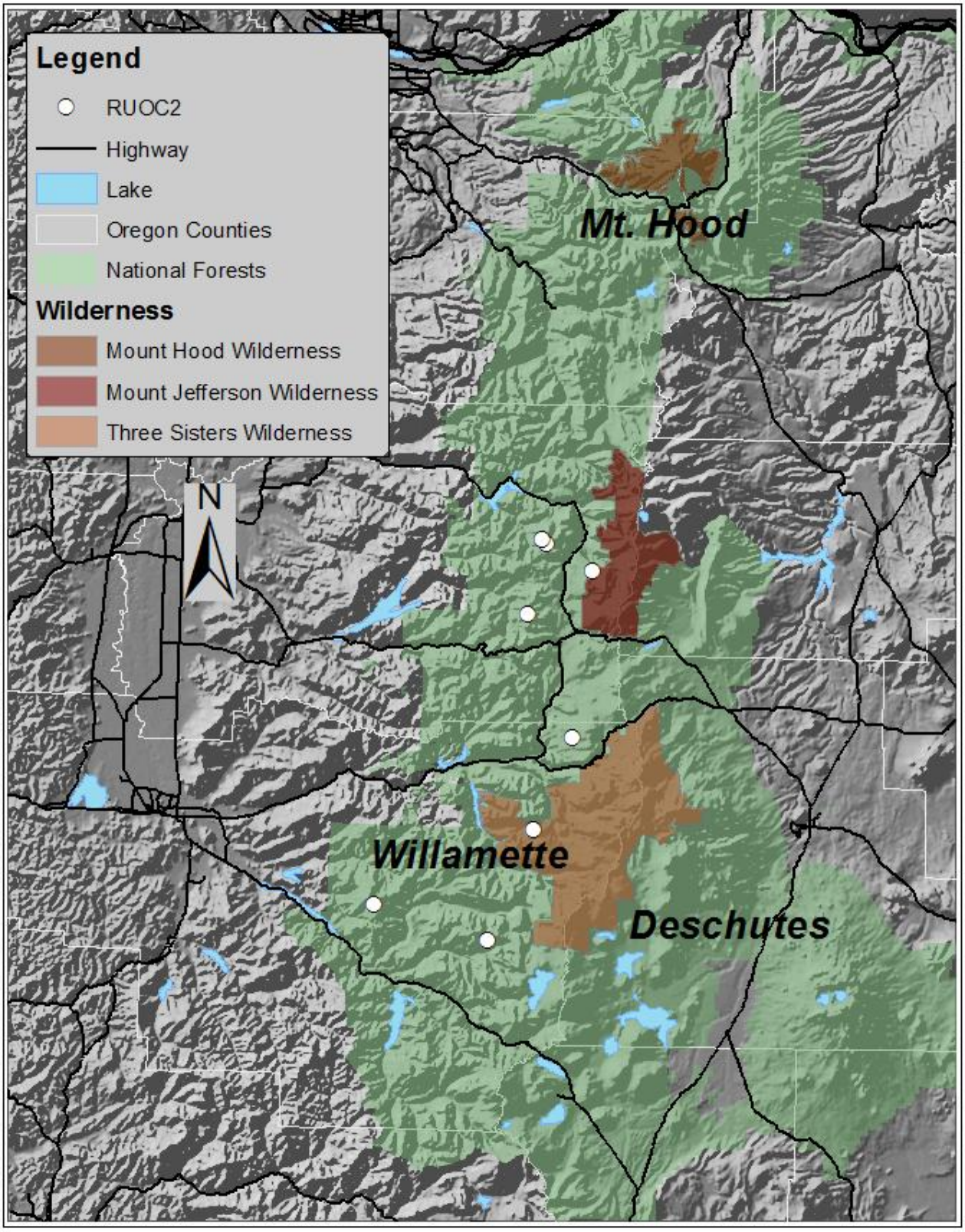
Rudbeckia occidentalis (Western coneflower)
RUOC2
Eco-class code: FS8102

RUOC2. Environmental conditions of plots.

Number of plots	8 (8 Willamette NF)
Elevation (ft)	Mean = 4450; Range = 3760-5442
Slope (%)	Mean = 17; Range = 5-26
Aspect (no. of plots)	FLAT = 0; NW = 1; NE = 1; SE = 3; SW = 3
Distribution	Western Cascades (88%), High Cascades (12 %)
Slope position	Lower to upper slopes and benches
Slope shape	Undulating to convex

Environmental conditions:

RUOC2 is a tall, lush forb community that typically occurs on mesic slopes in the mid-montane to upper-montane zone, or occasionally adjacent to creeks. Slopes are gentle to moderate, with undulating to convex topography. RUOC2 occupies all exposures, but warm aspects are most common; soils are deep and fine textured. Cover of bare ground, rock, plus gravel average 11%.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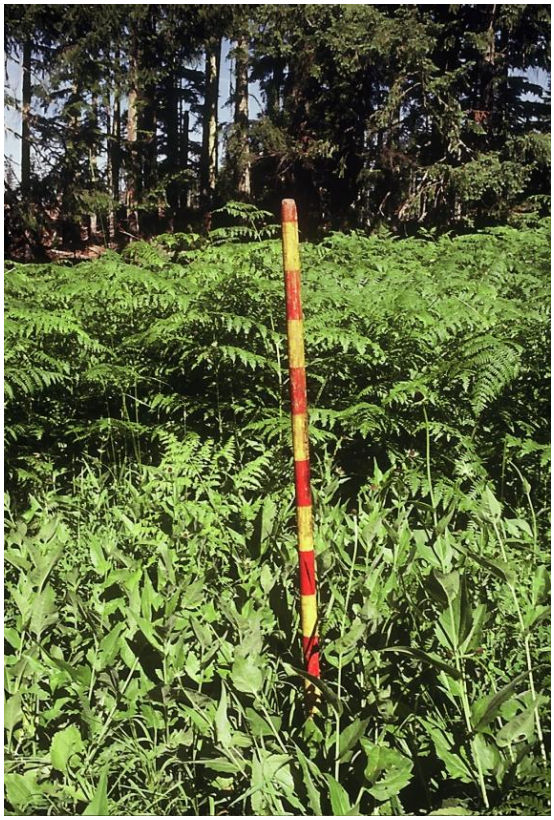
Deschutes



Vegetation composition:

This lush, mesic, montane forb community is dominated by western coneflower (RUOC2). Blue wildrye (ELGL), arrowleaf groundsel (SETR), cow-parsnip (HEMA80), and Cooley's betony (STCHC3) are present in over 60% of the plots. Other typical mesic-site species include yarrow (ACMI2), Oregon bedstraw (GAOR) and pioneer violet (VIGL). Summed plant cover averages 93%.

It is common to find a complex of meadow types on warm exposures in the Western Cascades. These grade from drier or upper-slope positions to moist, lower-slope positions as follows: BRCA5-CAIN9, ELGL-BRCA5, RUPA, and RUOC2. Bracken can also be locally dominant.

Growth form	Mean cover (%)
Forb	82.4
Graminoid	15.9
Shrub	0.6
Tree	1.0

RUOC2. Constancy table. Canopy cover for species in over 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
RUOC2	*Rudbeckia occidentalis*	Western coneflower	100.0	22.3	22.3
ELGL	*Elymus glaucus*	Blue wildrye	87.5	4.1	4.7
SETR	*Senecio triangularis*	Arrowleaf groundsel	75.0	4.4	5.8
HEMA80	*Heracleum maximum*	Cow-parsnip	62.5	3.4	5.4
STCHC3	*Stachys chamissonis cooleyae*	Cooley's betony	62.5	2.1	3.4
PTAQ	*Pteridium aquilinum*	Western bracken fern	50.0	22.9	45.8

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
ACMI2	*Achillea millefolium*	Yarrow	50.0	1.1	2.3
GAOR	*Galium oreganum*	Oregon bedstraw	50.0	0.8	1.5
VIGL	*Viola glabella*	Stream violet	50.0	0.5	1.0
LAPO3	*Lathyrus polyphyllus*	Leafy pea	37.5	1.4	3.7
CIAR4	*Cirsium arvense*	Canada thistle	37.5	0.5	1.3
VIAM	*Vicia americana*	American vetch	37.5	0.5	1.3
CLSIS	*Claytonia sibirica*	Siberian miner's lettuce	37.5	0.4	1.0
VERAT	*Veratrum* ssp.	False hellebore	37.5	0.4	1.0
LICO	*Lilium columbianum*	Columbian lily	37.5	0.4	1.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

Cursory soils information is available from 3 Willamette NF plots. Soils are silt loams, or silt loams over clay loams. Today depth is greater than 36."

Coarse fragments (2-8") in gravelly silt loam over clay loam with small rock up to 1.5" are noted on one plot.

Previously described plant associations:

Hickman (1976) defines a *Bromus carinatus*/*Rudbeckia occidentalis* Meadow Associes which appears ecotonal to the RUOC2 and ELGL-BRCA5 types described here. It occurs on somewhat drier sites (higher slope positions), with greater cover of *B. carinatus*, than our RUOC2 type.

Montane Mesic Communities

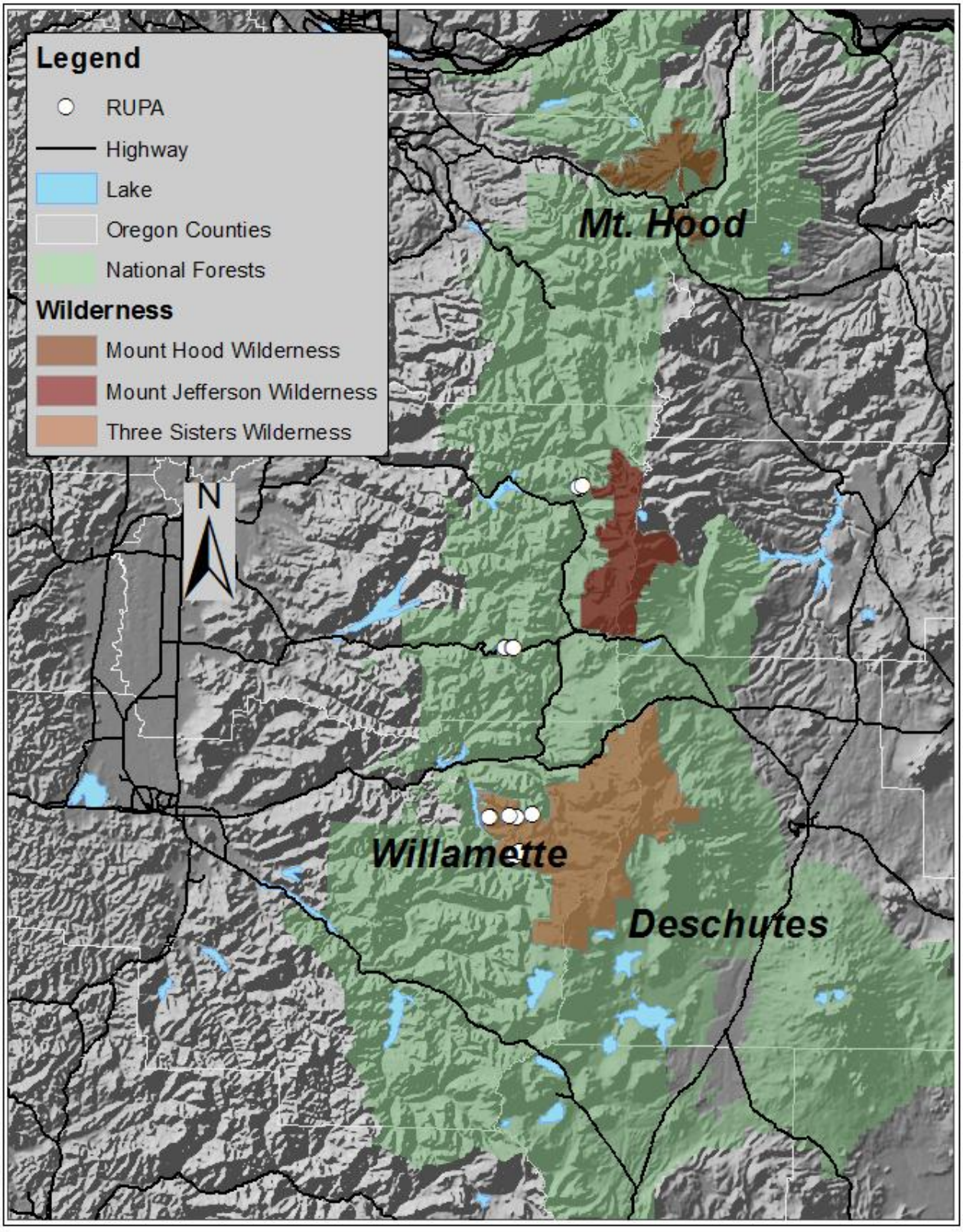
Rubus parviflorus (Thimbleberry)-NW Oregon Cascades
RUPA- NWO Cascades
Eco-class code: SM5913

RUPA-NWO Cascades. Environmental conditions of plots.

Number of plots	15 (15 Willamette NF)
Elevation (ft)	Mean = 4950; Range = 4250-5497
Slope (%)	Mean = 44; Range = 25-65
Aspect (no. of plots)	FLAT = 0; NW = 0; NE = 0; SE = 7; SW = 8
Distribution	Western Cascades (100%)
Slope position	Upper slopes
Slope shape	Undulating

Environmental conditions:

RUPA –NWO Cascades is a very common upper-montane community that occurs on south-facing aspects, at upper-slope positions in the Western Cascades. Slopes are moderate to steep with undulating topography. The soils are deep and fine textured, with low coarse fragment content. Cover of bare ground, rock, plus gravel average 18%.


Legend
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Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
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Mt. Hood
Willamette
Deschutes

It is common to find a complex of meadow types on warm exposures in the Western Cascades. These grade from drier or upper-slope positions to moist, lower-slope positions as follows: BRCA5-CAIN9, ELGL-BRCA5, RUPA, and RUOC2. Bracken can also be locally dominant.

Vegetation composition:

This shrub-dominated community is characterized by thimbleberry (RUPA) and can be co-dominated by bracken fern (PTAQ). Blue wildrye (ELGL), alpine knotweed (POPH), and purple peavine (LANE3) are generally present. Twinleaf bedstraw (GABI), fewleaf thistle (CIRE), and varileaf phacelia (PHHE2) occur in about 50% of the plots. Summed plant cover averages 138%.

RUPA-NWO Cascades. Constancy table. Canopy cover for species in at least 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
BRCA5	*Bromus carinatus*	California brome	100.0	8.7	8.7
RUPA	*Rubus parviflorus*	Thimbleberry	93.3	46.3	49.6
PTAQ	*Pteridium aquilinum*	Western bracken fern	93.3	22.6	24.2
ELGL	*Elymus glaucus*	Blue wildrye	86.7	10.3	11.8
POPH	*Polygonum phytolaccifolium*	Alpine knotweed	86.7	7.2	8.3
LANE3	*Lathyrus nevadensis*	Purple peavine	73.3	2.5	3.4
GABI	*Galium bifolium*	Twinleaf bedstraw	60.0	2.1	3.6
CIRE	*Cirsium remotifolium*	Fewleaf thistle	53.3	1.0	1.8
PHHE2	*Phacelia heterophylla*	Varileaf phacelia	53.3	0.2	0.4
VIAM	*Vicia americana*	American vetch	46.7	1.3	2.9
ANAR3	*Angelica arguta*	Sharptooth angelica	46.7	0.5	1.2
AQFO	*Aquilegia formosa*	Sitka columbine	46.7	0.3	0.7
ERAR15	*Erysimum arenicola*	Perennial sand-dwelling wallflower	46.7	0.2	0.5
MIMO3	*Mimulus moschatus*	Musk-flower	40.0	4.1	10.4
CAIN9	*Carex inops*	Long stolon sedge	40.0	3.5	8.7
ERAL3	*Erigeron aliceae*	Alice Eastwood's daisy	40.0	1.1	2.7
CAPA14	*Carex pachystachya*	Thick-headed sedge	40.0	0.9	2.2

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
MAST4	*Maianthemum stellatum*	Starry false Solomon's-seal	40.0	0.5	1.2
HEMA80	*Heracleum maximum*	Cow-parsnip	40.0	0.3	0.9
DEME	*Delphinium menziesii*	Menzies' larkspur	40.0	0.3	0.7
ARLU	*Artemisia ludoviciana*	Louisiana sagewort	33.3	3.5	10.6
LIGR	*Ligusticum grayi*	Gray's lovage	33.3	2.6	7.8
RUOC2	*Rudbeckia occidentalis*	Western coneflower	33.3	2.3	7.0
STME2	*Stellaria media*	Chickweed	33.3	2.1	6.2
CHANA2	*Chamerion angustifolium*	Fireweed	33.3	1.3	3.8
MERTE	*Mertensia*	Bluebell species	33.3	1.1	3.4
LULA4	*Lupinus latifolius*	Broadleaf lupine	33.3	1.0	3.0
POCA4	*Polemonium carneum*	Great Jacob's-ladder	33.3	0.4	1.2
RUAC3	*Rumex acetosella*	Sheep sorrel	26.7	1.1	4.0
MYLA	*Myosotis laxa*	Small-flowered forget-me-not	26.7	0.6	2.3
SYFOF	*Symphyotrichum foliaceum*	Alpine leafybract aster	26.7	0.4	1.6
VERAT	*Veratrum* ssp.	False hellebore	26.7	0.1	0.5
LUCO6	*Luzula campestris*	Field wood-rush	26.7	0.0	0.1

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

Cursory soil information comes from 14 Willamette NF plots. Soils are generally deep silt loams or sandy loams. Coarse fragment content is low.

Previously described plant associations:

In the Western Cascades of Oregon, Hickman (1976) describes a similar *Rubus parviflorus*/*Pteridium aquilinum* Meadow Associes, which includes *Pteridium*-dominated sites.

Wells (2006) describes a *Rubus parviflorus* plant association for northeastern Oregon. He notes that "the thimbleberry plant community was found on low-elevation (579 to 1128 m) terraces in Hells Canyon." Constancy and cover information are not provided because there are few plots (3), however he observes that "thimbleberry (avg. 95 percent) forms a thick overstory and is often joined on the edges of the community by Rocky Mountain maple and Lewis' mock orange. The thick overstory results in a scattered, but rich, understory of forbs, including cleavers, chervil, perfoliated miners-lettuce, enchanter's nightshade, waterleaf, and mountain sweetcecily."

Douglas (1972) describes a *Rubus parviflorus-Epilobium angustifolium* community in his "Colluvial Slope Meadow Habitat" type. He notes that "in contrast to the relatively small stands of other subalpine community types the *Rubus-Epilobium* community may encompass extremely large areas...The community is common on steep slopes and avalanche tracks between 1,500 and 1,800 m elevation." Other important species in this community are *Valeriana sitchensis*, *Pteridium aquilinum*, *Veratrum viride*, *Viola glabella*, *Heracleum lanatum*, *Thalictrum occidentale*, and *Hydrophllum fendleri*.

Montane Moist Communities

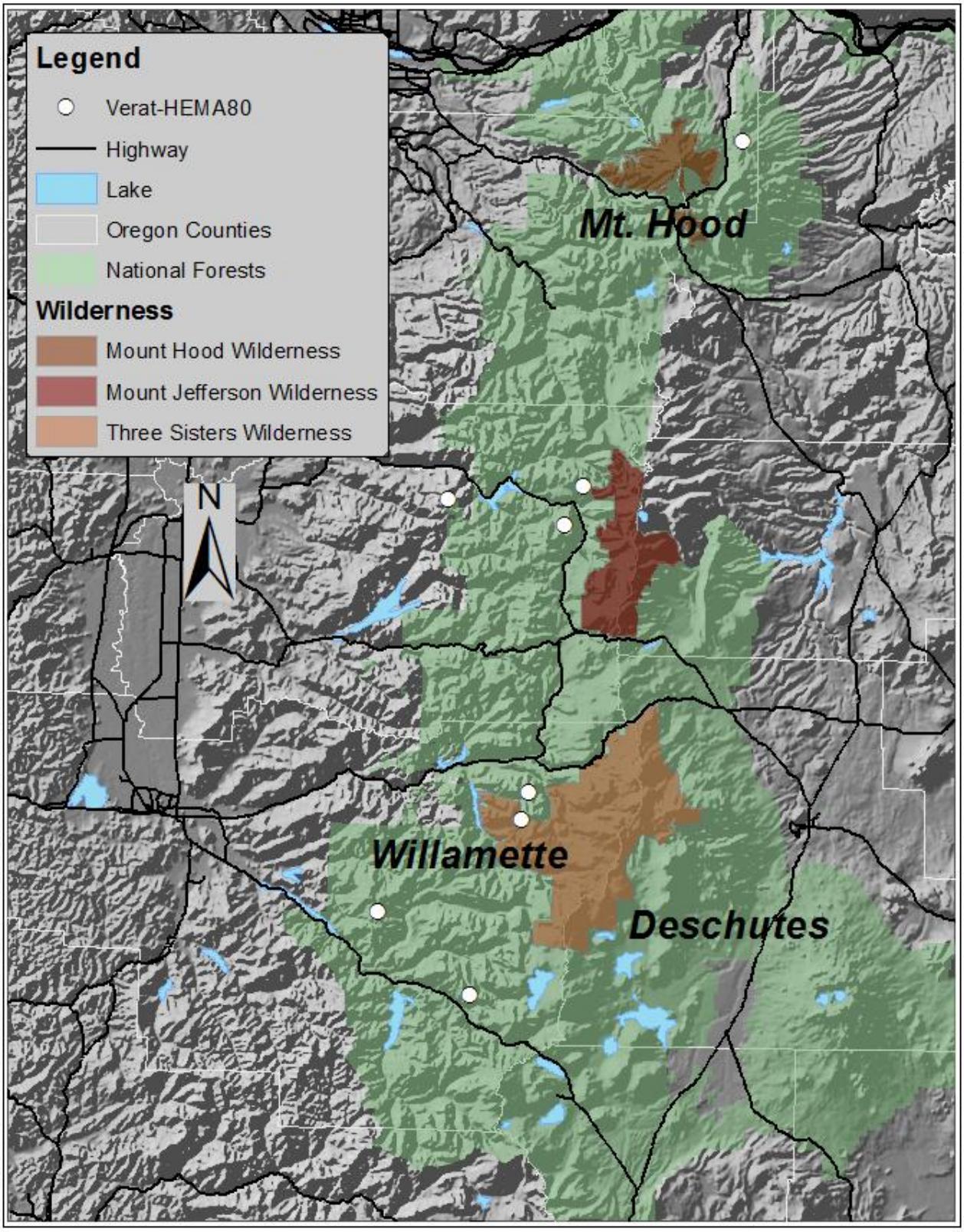
Veratrum-Heracleum maximum (False hellebore-Cow-parsnip)
VERAT-HEMA80
Eco-class code: FW5112

VERAT-HEMA80. Environmental conditions of plots.

Number of plots	9 (1 Mt. Hood NF, 8 Willamette NF)
Elevation (ft)	Mean = 4350; Range = 3960-4900
Slope (%)	Mean = 7; Range = 1-25
Aspect (no. of plots)	FLAT = 1; NW = 2; NE = 2; SE = 3; SW = 1
Distribution	Western Cascades (89%), High Cascades (11%)
Slope position	Basins and drainages, benches
Slope shape	Mainly straight; also undulating/concave topography

Environmental conditions:

VERAT-HEMA80 is a montane moist-meadow community that occurs in basins or drainages, or on benches in the Western and, to a lesser extent, High Cascades. Slopes are gentle with straight to undulating topography. Soils are deep and fine textured, with few coarse fragments. Cover of bare ground, rock, plus gravel average 22%.


Legend
Verat-HEMA80
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This tall, lush montane forb community is dominated by one of two false hellebore sepcies (VERAT), *Veratrum californicum* or *V. viride*, and cow-parsnip (HEMA80). Arrowleaf groundsel (SETR) is generally present. Summed plant cover averages 153%.

The SETR and VERAT-HEMA80 types often occur in the same mesic/moist meadow mosaics.

Growth form	Mean cover (%)
Forb	129.4
Graminoid	13.8
Shrub	0.8
Tree	0.1

VERAT-HEMA80. Constancy table. Canopy cover for species in over 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
VERAT	*Veratrum* spp. (*V. californicum* or *V. viride*)	False hellebore (California or green false hellebore)	100.0	42.8	42.8
HEMA80	*Heracleum maximum*	Cow-parsnip	100.0	23.7	23.7
SETR	*Senecio triangularis*	Arrowleaf groundsel	88.9	17.3	19.5
ELGL	*Elymus glaucus*	Blue wildrye	44.4	5.6	12.5
SYFOF	*Symphyotrichum foliaceum*	Alpine leafybract aster	44.4	2.7	6.0
MEBE	*Mertensia bella*	Beautiful bluebells	44.4	0.7	1.5
VIGL	*Viola glabella*	Stream violet	33.3	7.8	23.3
RUOC2	*Rudbeckia occidentalis*	Western coneflower	33.3	3.7	11.0
ACMI2	*Achillea millefolium*	Yarrow	33.3	1.2	3.7
CACA4	*Calamagrostis canadensis*	Bluejoint	33.3	1.0	3.0
POPH	*Polygonum phytolaccifolium*	Alpine knotweed	33.3	0.9	2.7
THOC	*Thalictrum occidentale*	Western meadowrue	33.3	0.3	1.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 1 (1 Mt. Hood NF, in The Dalles' watershed)

Soil from this pit is a silt loam, with mottling at 12", and charcoal at 18." This plot is in a moist meadow, dry by July, with braided channels running around the perimeter of the site.

Additional, but cursory soil information is available from 7 Willamette NF plots. Soils are silt loams or silty clay loams. One plot has a clay loam horizon at 30". Total soil depth is mainly greater than 36" with few coarse fragments. One plot had a summer depth to water table of 12"; water tables were not reached in the other plots.

Observations from plot notes:

On one plot, bare soil is due to elk wallows and trampling.

Previously described plant associations:

In the central western Cascades of Oregon, Hickman (1976) describes a variant of his *Veratrum viride*/*Valeriana sitchensis*/*Senecio triangularis* Wet Meadow Associes. It occupies exposed side slopes of bogs and is dominated by *Veratrum californicum* and *Heracleum lanatum*, with *Senecio triangularis* also present.

Smith (1998) describes a *Veratrum californicum* plant association for the National Forests in Northeastern California. Plants with high constancy, in addition to *V. californicum*, are *Taraxacum officinale* (80%), *Achillea millefolium* (70%), *Collomia linearis* (60%), *Galium bifolium* (40%), *Trifolium*

longipes (40%), and *Polygonum douglasii* (40%). She notes that "succession and management are a dilemma because of the persistence of this rhizomatous perennial species once it's established. The large patches of *Veratrum californicum* one sees in meadows in the Warner Mountains and Cascade Mountains may be remnants of the excessive sheep and cattle grazing of the early parts of this century."

Kovalchik (1987) describes a California false hellebore community type in miscellaneous associations and community types of his guide for the Deschutes, Ochoco, Fremont and Winema National Forests. He notes that "this community type is found throughout central Oregon but is especially abundant on the Femont NF. Sites with a high percent of ground cover in false hellebore often indicate degraded rangeland. Heavy livestock grazing has reduced the competitive ability of natural dominants in favor of California false hellebore and other herbs. Common grasses include bluejoint reedgrass, blue wildrye and Kentucky bluegrass. The forb component includes longstalk clover, sticky starwort, mountain bluebell, sweetroot, and meadowrue."

Douglas (1972) describes a subalpine *Valeriana sitchensis-Veratrum viride* community as part of his "Rawmark Meadow Habitat" (rawmark meadow is characterized by short snow-free periods, moist soils, and the lack of a closed vegetative cover). This is a lush herbaceous community that appears similar to a *Rubus-Epilobium* community described in the same paper (also noted under the "previously described plant associations" section of *Rubus parviflorus* plant association in this guide.) Other important species in Douglas' *Valeriana sitchensis-Veratrum viride* community are *Lupinus latifolius* var. *subalpinus*, *Carex spectabilis*, *Mitella breweri* and *Polygonum bistortoides*.

Montane Wet Communities

Alnus incana/Glyceria striata (Mountain alder/Fowl mannagrass)
ALIN2/GLST
Eco-class code: SS2218

ALIN2/GLST. Environmental conditions of plots.

Number of plots	3 (2 Mt. Hood NF, 1 Willamette NF)
Elevation (ft)	Mean = 4350; Range = 3760-4760
Slope (%)	Mean = 7; Range = 1-13
Aspect (no. of plots)	FLAT = 1; NW = 0; NE = 0; SE = 2; SW = 0
Distribution	High Cascades (67%), Western Cascades (33%)
Slope position	Drainages, upper to mid-slopes
Slope shape	Undulating to straight

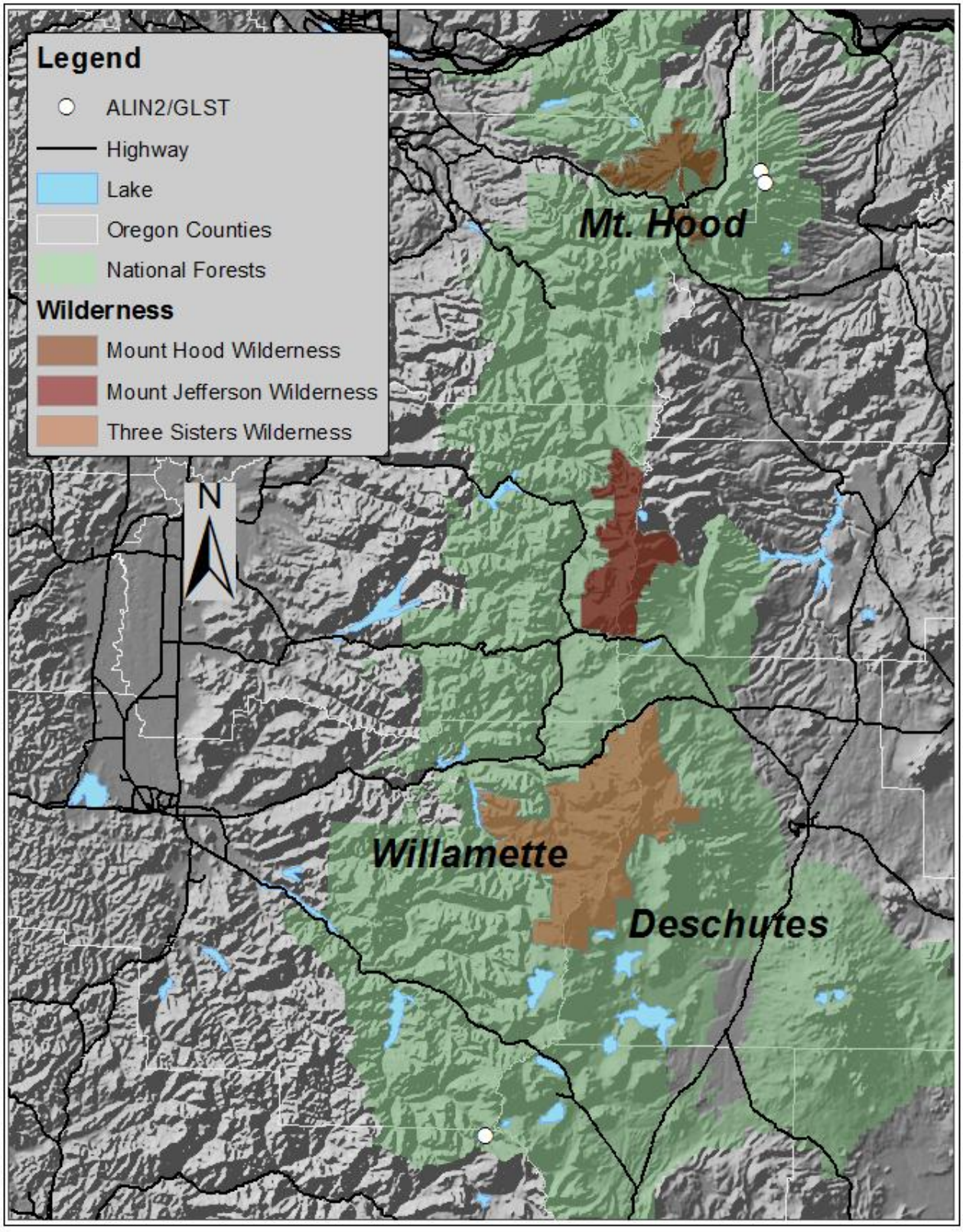
Environmental conditions:

ALIN2/GLST is a montane fen/shrub-swamp that occurs along drainages in the Western and High Cascades. Slopes are very gentle with undulating to straight topography. ALIN2/GLST soils are seasonally moist to perennially saturated, moderately fine textured, often with deep organic layers. Exposed bare ground is extremely low (average of 1% cover), while surface rock and gravel are absent.

Vegetation composition:

This fen/shrub-swamp community is dominated by mountain alder (ALIN2); fowl mannagrass (GLST) and lady fern (ATFI) are always present. Summed plant cover averages 170%.

Growth form	Mean cover (%)
Forb	56.1
Graminoid	40.4
Shrub	73.4
Tree	0.3


Legend
ALIN2/GLST
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

ALIN2/GLST. Constancy table. Canopy cover for species at least 2 plots (66.7%)

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
ALIN2	*Alnus incana*	Mountain alder	100.0	73.3	73.3
GLST	*Glyceria striata*	Fowl mannagrass	100.0	13.0	13.0
ATFI	*Athyrium filix-femina*	Lady fern	100.0	3.7	3.7
STCHC3	*Stachys chamissonis cooleyae*	Cooley's betony	66.7	15.0	22.5
SETR	*Senecio triangularis*	Arrowleaf groundsel	66.7	8.3	12.5
MIGU	*Mimulus guttatus*	Yellow monkeyflower	66.7	6.0	9.0
GATR3	*Galium triflorum*	Sweetscented bedstraw	66.7	0.7	1.0
PLST4	*Platanthera stricta*	Slender bog-orchid	66.7	0.7	1.0
EPCIG	*Epilobium ciliatum glandulosum*	Fringed fireweed	66.7	0.4	0.6
SANE3	*Saxifraga punctata*	Stream saxifrage	66.7	0.4	0.6
VEAM2	*Veronica americana*	American brooklime	66.7	0.4	0.6
MIBR6	*Mitella breweri*	Brewer's miterwort	66.7	0.1	0.1

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 1 (1 Mt. Hood NF)

The pit is situated in a wet opening with a small channel and described as spongy, with mossy seeps. The pit has two O layers, the first 3" is muck/peak, then second 2" is muck. The first mineral horizon is 3” of gravelly silt loam over an A2 6” deep cobbly silty clay loam horizon. The lowest horizon described is a Bg (gleyed) 25” deep, also cobbly silty clay loam. Summer depth to water table is 12".

In another plot without a full profile description, organic material is over 20” deep, and the summer water table is at the surface.

Previously described plant associations:

Smith (1998) describes an *Alnus incana tenuifolia/Glyceria striata* plant association (using the former name, *Glyceria elata*). She observes that it “occurs mainly outside of the eastside areas of the Modoc Plateau and Cascade Subsections. The type is early seral on gravel bars and scoured edges of mountain streams.” While her plots did not have *Athyrium filix-femina*, they did have *Galium triflorum*, *Mimulus guttatus*, *Veronica americana*, *Senecio triangularis* and *Saxifraga* spp.

In northwestern Oregon, Christy (2004) describes an *Alnus incana /Lysichiton americanus* plant association characteristic of montane fens and shrub-swamps. *Athyrium filix-femina* and *Glyceria striata* have high constancy, along with *Carex laeviculmis*, *Senecio triangularis*, *Stachys ciliata* and *Veronica americana*.

Crowe et al. (2004) describe an *Alnus incana*/*Glyceria striata* association. This mid-elevation shrub type has high constancy of *Galium triflorum* and *Veronica americana*, as well as *Ribes hudsonianum*, *Geum macrophyllum* and *Aconitum columbianum*, but lacks *Athyrium flix-femina*.

Wells (2006) describes an *Alnus incana*/*Glyceria striata* association (*Glyceria elata* is used in his guide), from the Strawberry Mountain Wilderness in Oregon. He also describes an *Alnus incana*/*Athyrium filix-femina* with high constancy of *Glyceria striata* from the Wenaha-Tucannon and North Fork Umatilla Wilderness of Oregon.

Kovalchik and Clausnitzer (2004) describe an *Alnus incana*/*Glyceria striata* association (*Glyceria elata* is used in their guide) for eastern Washington. Plants with high constancy were mountain alder (100%), tall mannagrass (76%), red-osier dogwood (76%), prickly currant (76%), largeleaf avens (76%), sweetscented bedstraw (71%), wood reed-grass (71%), common horsetail (71%) and American speedwell (65%). They describe many *A. incana* plant associations, noting that some occur in riparian areas and others are in wetlands, but that "others, such as ALIN/ATFI, ALIN/EQUIS, ALIN/GLEL, and ALIN-SPDO seem to have strategies for surviving in both riparian and wetland zones."

Kovalchik (1987) describes an *Alnus incana* association with constancy (89%) of *Glyceria striata* (*Glyceria elata*) for the Deschutes, Ochoco, Fremont and Winema National Forests. Additional species with high constancy include *Equisetum arvense* (78%), *Galium triflorum* (78%), *Scirpus microcarpus* (67%), and *Smilacina stellata* (67%).

Montane Wet Communities

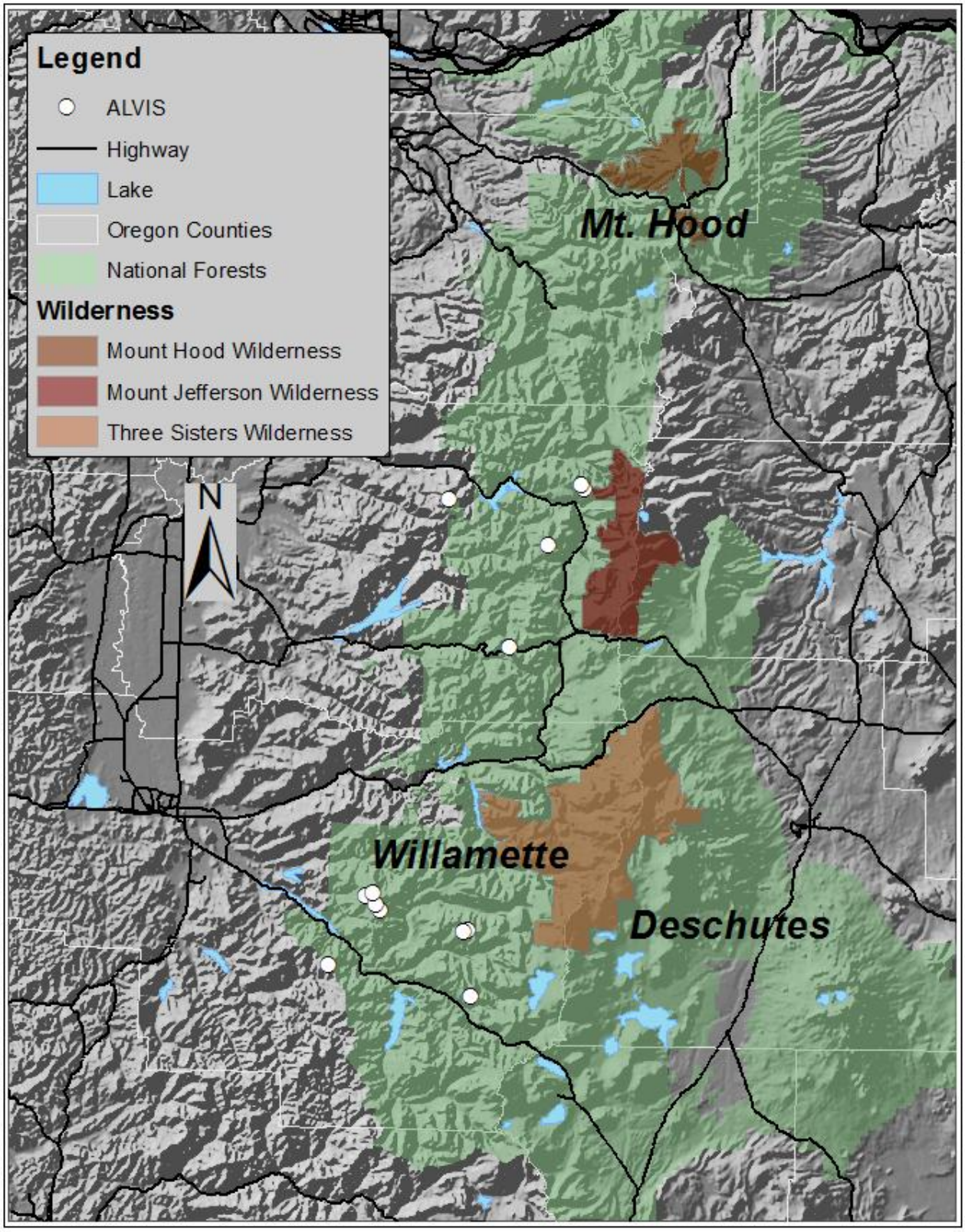
Alnus viridis ssp. *sinuata* (Sitka alder)
ALVIS
Eco-class code: SW2134

ALVI2. Environmental conditions of plots.

Number of plots	13 (13 Willamette NF)
Elevation (ft)	Mean = 4350; Range = 3920-5000
Slope (%)	Mean = 25; Range = 0-55
Aspect (no. of plots)	FLAT = 2; NW = 3; NE = 2; SE = 3; SW = 3
Distribution	Western Cascades (100%)
Slope position	Mid- to lower-slopes; also drainages and basins
Slope shape	Concave or undulating topography

Environmental conditions:

ALVIS is a montane shrub community that occurs on rocky substrates, on mid- to lower slopes, and in drainages and basins, in the Western Cascades. Aspects vary and slopes are flat to moderate. Soils are silt loams amid boulders and rock. Sites include seeps and springs and can be part of a large wet-meadow complex. Soils are fine texured loams, often with summer water tables within the rooting zone. Slope position and topography concentrate moisture; soil textures provide good soil-moisture retention. Cover of bare ground, rock, plus gravel average 15%.


Legend
ALVIS
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This moist montane shrub type is dominated by Sitka alder (ALVIS). Moist site indicators, Pacific waterleaf (HYTE) and salmonberry (RUSP), are generally present. Stink currant (RIBR), Cooley's betony (STCHC3), starry false Solomon's seal (MAST4), and Pacific bleedingheart (DIFO) are present in more than 60% of plots. Red elderberry (SARA2) is common. Summed plant cover averages 155%.

The ALVIS community is wetter than the ACCI montane rocky shrub type. It has strong similarities to Cascadian riparian types: the ALVIS and (ALRU2-ACMA3)/RIBR-RUSP/TOME communities (McCain 2004). In some rocky openings, ACCI is present on convex surfaces and ALVIS, on concave surfaces.

Growth form	Mean cover (%)
Forb	56.1
Graminoid	40.4
Shrub	73.4
Tree	0.5

ALVIS. Constancy table. Canopy cover for species in over 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
ALVIS	*Alnus viridis sinuata*	Sitka alder	100.0	66.0	66.0
HYTE	*Hydrophyllum tenuipes*	Pacific waterleaf	76.9	5.9	7.7
RUSP	*Rubus spectabilis*	Salmonberry	69.2	19.3	27.9
RIBR	*Ribes bracteosum*	Stink currant	61.5	5.2	8.5
STCHC3	*Stachys chamissonis cooleyae*	Cooley's betony	61.5	4.1	6.6
MAST4	*Maianthemum stellatum*	Starry false Solomon's-seal	61.5	2.2	3.6
DIFO	*Dicentra formosa*	Pacific bleedingheart	61.5	1.7	2.8
SARA2	*Sambucus racemosa*	Red elderberry	53.8	3.2	6.0
PTAQ	*Pteridium aquilinum*	Western bracken fern	46.2	5.5	11.8
TOME	*Tolmiea menziesii*	Piggyback plant	38.5	6.7	17.4
CLSIS	*Claytonia sibirica*	Siberian miner's lettuce	30.8	0.7	2.3

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 13 (13 Willamette NF)

None of the plots have full profile descriptions. Soils are silt loams, or silt loams over silty clay loams or sandy loams. One plot has a clay hardpan at 14." Two plots record a summer depth to water table of 7"and 20". Large rocks in the soil are noted in 9 of the 13 plots.

Observations from plot notes:

Small mammal disturbance: Mountain beaver (*Aplodontia rufa*) burrows (indicative of moist conditions) are recorded on more than half the plots.

Previously described plant associations:

Crowe and Clausnitzer (1997) describe an *Alnus viridis* ssp. *sinuata*/Mesic forb plant association (*Alnus sinuata* in their guide) for the Malheur, Umatilla and Wallowa-Whitman National Forests. They note that "Sitka alder (ALSI) (sometimes together with mountain alder [ALIN]) forms a dense canopy over a variety of mesic forbs and graminoids, including stream violet (VIGL), western meadowrue (THOC), western coneflower (RUOC), sweet-scented bedstraw (GATR), enchanter's nightshade (CIAL), starry false-Solomon's seal (SMST), nodding fescue (FESU), tall mannagrass (GLEL), and silvery sedge (CACA4)." However, no constancy or cover data are provided in their descriptions.

Crowe et al. (2004) describe two *Alnus viridis* ssp. *sinuata* associations in central and eastern Oregon (*Alnus viridus* ssp. *sinuata*/*Cinna latifolia* and *Alnus viridus* ssp. *sinuata*/*Athyrium flix-femina*); however, neither is very similar floristically to the ALVIS type described in this guide.

Kovalchik and Clausnitzer (2004) describe nine different *Alnus viridis* ssp. *sinuata* associations in eastern Washington (*Alnus sinuata* is used in their guide): *Alnus sinuata-Cornus stolonifera*; *Alnus sinuata-Oplopanax horridum*; *Alnus sinuata-Ribes lacustre*; *Alnus sinuata-Rubus spectabilis*; *Alnus sinuata*/alluvial bar; *Alnus sinuata/Athyrium filix-femina*; *Alnus sinuata/Gymnocarpium dryopteris*; *Alnus sinuata*/mesic forb; and *Alnus sinuata/Senecio triangularis*. *Alnus sinuata-Rubus spectabilis* is, perhaps, most similar to the ALVIS type described in this guide. Common species include Pacific silver fir (63% constancy), Sitka alder (100%) Pacific silver fir (63%), Sitka alder (100%), salmonberry (63%), and queencup beadlily (63%).

Montane Wet Communities

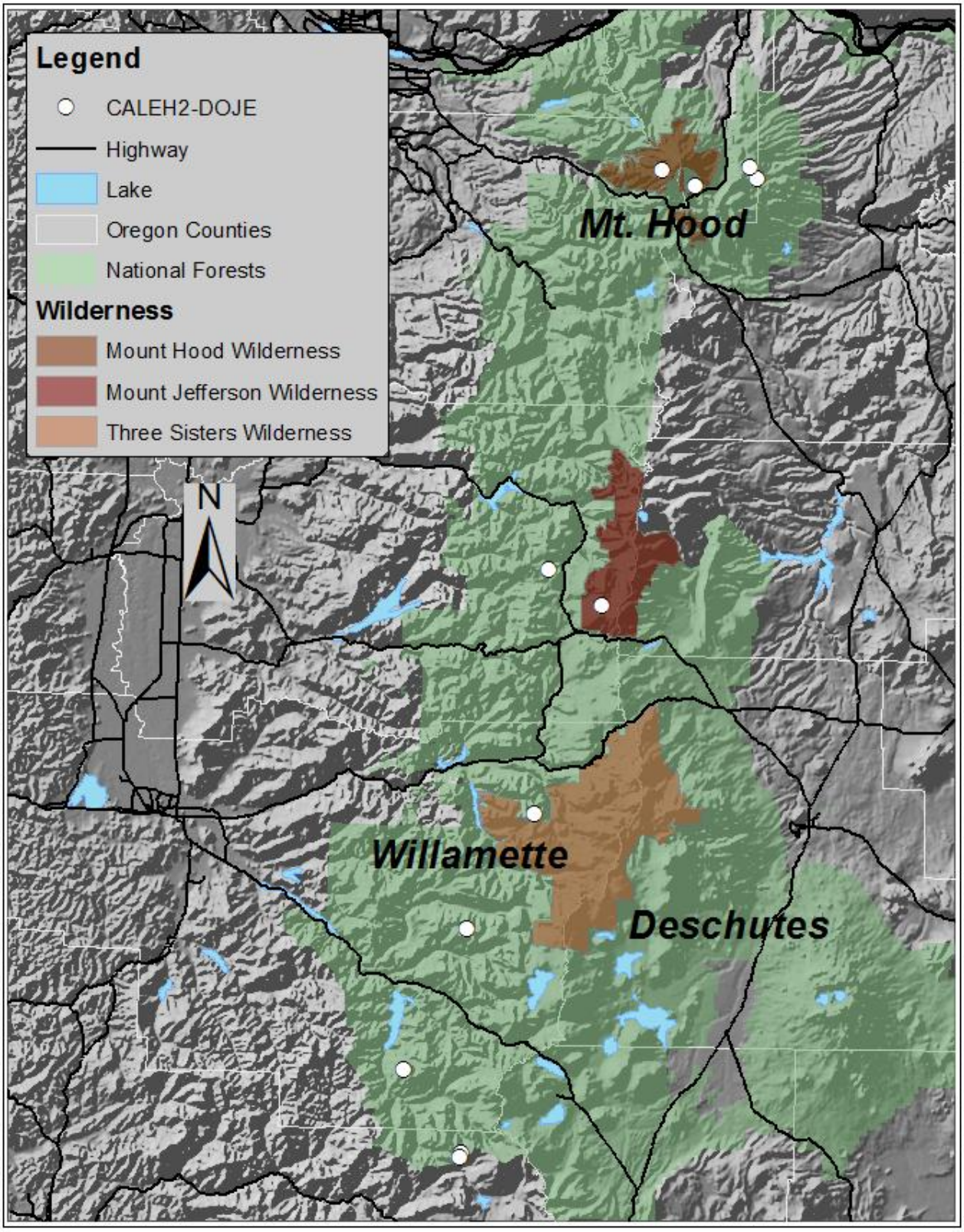
Caltha leptosepala ssp. *howellii-Dodecatheon jeffreyi* (Marsh-marigold-Jeffrey's shootingstar)
CALEH2-DOJE
Eco-class code: FW4256

CALEH2-DOJE. Environmental conditions of plots.

Number of plots	11 (4 Mt. Hood NF, 7 Willamette NF)
Elevation (ft)	Mean = 4950; Range = 3500-5870
Slope (%)	Mean = 4; Range = 0-30
Aspect (no. of plots)	FLAT = 4; NW = 2; NE = 0; SE = 1; SW = 4
Distribution	Western Cascades (55%), High Cascades (45%)
Slope position	Basins, toe slopes, lower slopes
Slope shape	Straight to undulating

Environmental conditions:

CALEH2-DOJE is an upper-montane to subalpine wet-meadow community that occurs in basins, adjacent to streams, or on toeslopes in the Western and High Cascades. Slopes are flat to gentle with straight or undulating topography. Sites are moist to perennially saturated, with summer water tables within the rooting zone. Soils are fine textured, with deep muck or peat-muck. Bare ground is rare (1% average cover), as are surface rock and gravel.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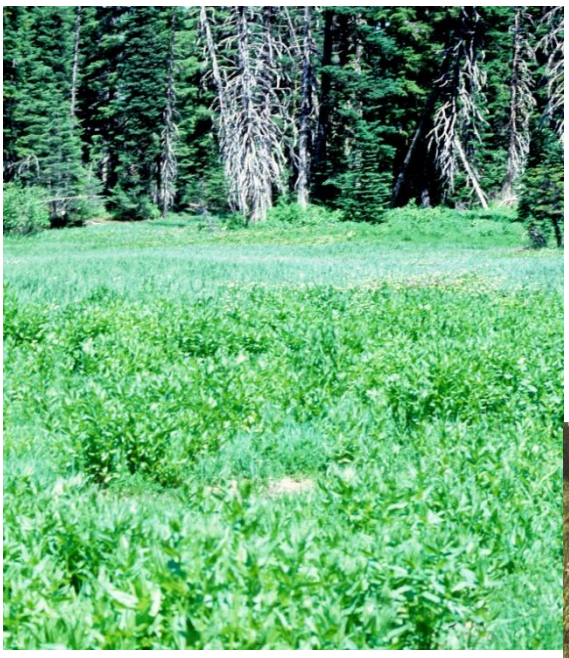
Willamette
Deschutes



Vegetation composition:

This rich forb-sedge community is characterized by marsh-marigold (CALEH2), generally with Jeffrey's shootingstar (DOJE). Elephant's head (PEGR2) and arrowleaf groundsel (SETR) are present in over 50% of the plots. Important sedges include woodrush sedge (CALU7) and tufted sedge (CAALE8). Frequent and abundant willow species include variable willow (SACO2), Sitka willow (SASI2), and Geyer's willow (SAGE2). Summed plant cover averages 112%.

Growth form	Mean cover (%)
Forb	56.4
Graminoid	29.1
Shrub	17.9
Tree	2.3

CALEH2-DOJE. Constancy table. Canopy cover for species in more than 25% of plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
CALEH2	*Caltha leptosepala howellii*	Marsh-marigold	100.0	21.3	21.3
DOJE	*Dodecatheon jeffreyi*	Jeffrey's shootingstar	90.9	9.8	10.8
PEGR2	*Pedicularis groenlandica*	Elephant's head	72.7	0.9	1.3
SETR	*Senecio triangularis*	Arrowleaf groundsel	54.5	4.1	7.5
POBI6	*Polygonum bistortoides*	American bistort	45.5	5.5	12.2
CALU7	*Carex luzulina*	Woodrush sedge	45.5	2.3	5.0
CALE8	*Carex lenticularis*	Tufted sedge	36.4	2.4	6.5
TRLO	*Trifolium longipes*	Long-stalked clover	36.4	1.7	4.8
LIGR	*Ligusticum grayi*	Gray's lovage	36.4	0.7	2.0
HYAN2	*Hypericum anagalloides*	Bog St.John's-wort	36.4	0.6	1.8
EQAR	*Equisetum arvense*	Common horsetail	36.4	0.6	1.5

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
SACO2	*Salix commutata*	Variable willow	27.3	10.9	40.0
CAAQ	*Carex aquatilis*	Water sedge	27.3	4.5	16.7
POFL3	*Potentilla flabellifolia*	Fan-leaved cinquefoil	27.3	1.0	3.7
VIMA2	*Viola macloskeyi*	Small white violet	27.3	0.7	2.7
MUFI2	*Muhlenbergia filiformis*	Slender muhlenbergia	27.3	0.6	2.3
DECE	*Deschampsia cespitosa*	Tufted hairgrass	27.3	0.4	1.3
TRGL5	*Triantha glutinosa*	Sticky false asphodel	27.3	0.4	1.3

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 4 (3 Mt. Hood NF, 1 Willamette NF)

Depth to water table averages 14" (0-24") during the summer months. Organic layers (muck or peat-muck) average 8" (0-27"). A horizons vary in texture: silt, silty clay loam, sandy loam, or loamy sand. Lower horizons are silt loams, sandy loams or sandy clay loams. Coarse fragments are low. All profiles show evidence of buried soils. Mottling, indicative of temporary anaerobic conditions, is noted on two plots.

Previously described plant associations:

In northwestern Oregon, Christy (2004) notes a similar *Caltha leptosepala* ssp. *howellii* plant association. He observes that "habitat is montane fens, forming lawns or flushes on gentle to moderate slopes below springs and seeps. Slopes are laced with rivulets or rills and are also irrigated by sheet flow… This association represents stands where *Caltha* is the primary species in the herb layer. Woody plants have scant cover and are primarily restricted to hummocks or "tree islands" within a herbaceous matrix, or they are peripheral to the wetland."

Hickman (1976) describes a *Caltha biflora*/*Carex sitchensis*/*Dodecatheon jeffreyi* plant association for the central western Cascade Mountains of Oregon. (The current name for *C. biflora* is *C. leptosepala* ssp. *howellii*, and the current name for C. *sitchensis* is *C. aquatilis* var. *dives*.) He notes that it occurs in "continually wet habitats of gentle or level slope where snowmelt or spring water saturates rich organic soils throughout the summer [which] support a number of species characteristic of sphagnum bogs." Hickman's plant association is also dominated by *Sphagnum* spp., *Deschampsia cespitosa*, *Ranunculus gormanii*, *Aster alpigenus*, *Pedicularis groenlandica*, *Tofieldia glutinosa*, *Vaccinium uliginosum* and *Lonicera utahensis*.

Montane Wet Communities

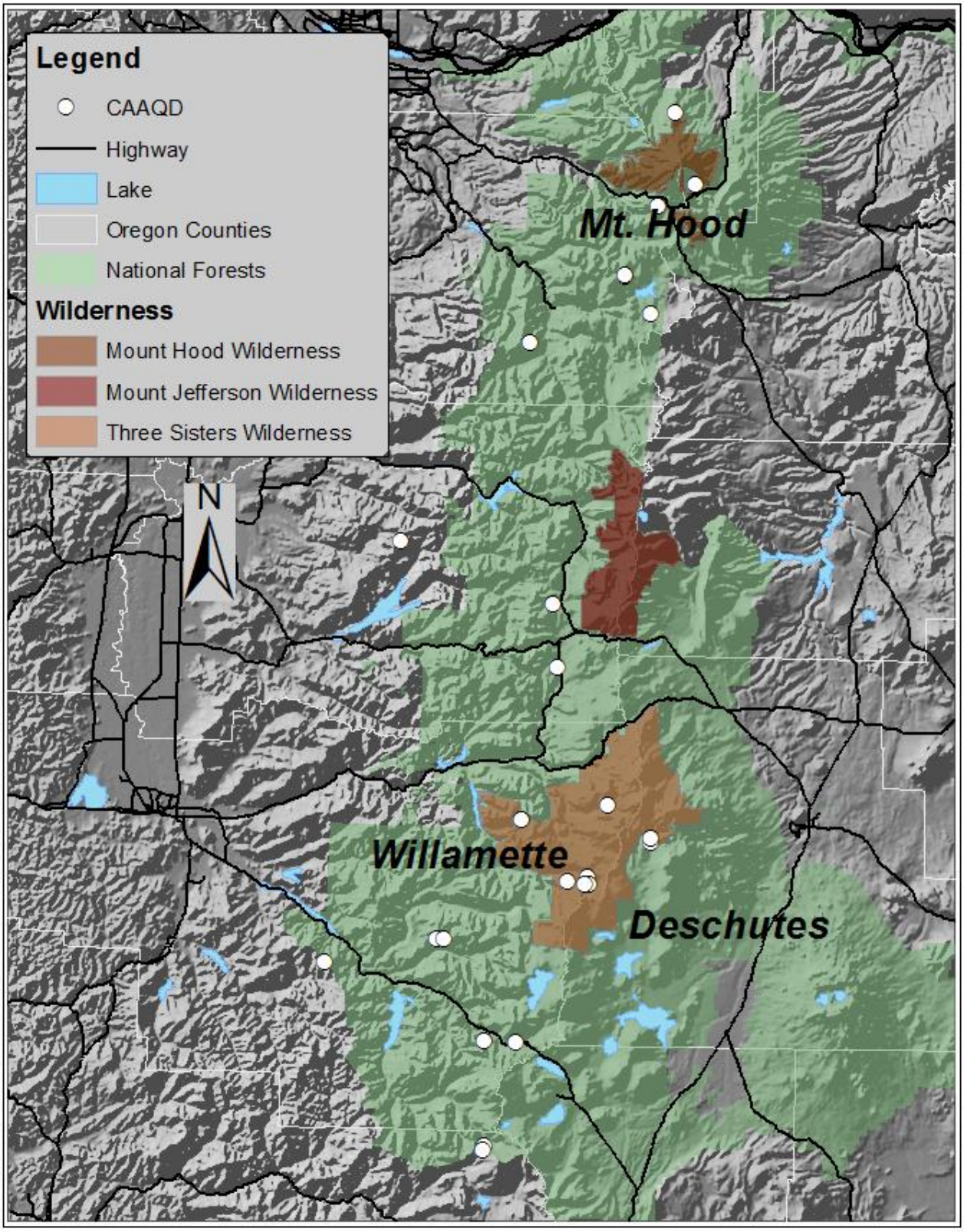
Carex aquatilis var. *dives* (Sitka sedge)
CAAQD
Eco-class code: MW1922

CAAQD. Environmental conditions of plots.

Number of plots	28 (7 Mt. Hood NF, 18 Willamette NF, 2 Deschutes NF, 1 Salem BLM)
Elevation (ft)	Mean = 4300; Range = 3040-5428
Slope (%)	Mean = 1; Range = 0-17
Aspect (no. of plots)	FLAT = 23; NW = 1; NE = 0; SE = 3; SW = 12
Distribution	High Cascades (54%), Western Cascades (46%)
Slope position	Mainly basins; also drainages, benches
Slope shape	Flat; in flat to convex or concave setting

Environmental conditions:

CAAQD is a montane wet meadow/fen community that is common to wet basins of the Western and High Cascades. Sites are flat and seasonally flooded to perennially saturated. Soils are organic (peats and mucks) over fine-textured mineral horizons. Summer water tables are often at or near the surface. Bare ground averages 9% (0 to 30%); surface rock and gravel are absent.


Legend
CAAQD
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This community is dominated by Sitka sedge (CAAQD). Bog St. John's wort (HYAN2) is present in over 40% of the plots. Bog blueberry (VAUL) is the most common shrub, occurring in 36% of the plots. Willow and spiraea species are frequently important. Sphagnum mosses average 45%. Summed plant cover (excluding mosses) averages 137%.

Growth form	Mean cover (%)
Forb	28.0
Graminoid	71.2
Shrub	21.4
Tree	0.6

CAAQD. Constancy table. Canopy cover for species in over 25% of plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
CAAQD	*Carex aquatilis* var. *dives*	Sitka sedge	100.0	62.5	62.5
SPHAG2	*Sphagnum* spp.	Sphagnum species	42.9	8.6	20.1
HYAN2	*Hypericum anagalloides*	Bog St.John's-wort	42.9	7.3	17.1
DOJE	*Dodecatheon jeffreyi*	Jeffrey's shootingstar	39.3	3.3	8.5
PLDID	*Platanthera dilatata*	White bog-orchid	39.3	0.3	0.8
VAUL	*Vaccinium uliginosum*	Bog blueberry	35.7	6.5	18.3
CAUT	*Carex utriculata*	Northwest Territory sedge	32.1	6.8	21.2
CALEH2	*Caltha leptosepala howelli*	Marsh-marigold	32.1	3.3	10.1
DECE	*Deschampsia cespitosa*	Tufted hairgrass	32.1	1.9	6.0

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
POBI6	*Polygonum bistortoides*	American bistort	32.1	1.2	3.7
EQAR	*Equisetum arvense*	Common horsetail	28.6	0.9	3.1
ELQU2	*Eleocharis quinqueflora*	Few-flowered spikerush	25.0	2.8	11.3

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 6 (6 Mt. Hood NF)

Multiple O layers of peat, muck-peat, and peat-muck overlay mineral soils of silty clay loam, silt loam, or silty clay. Mineral horizons often have high organic-matter content. Coarse fragments are extremely low or absent. Gleying and mottles (evidence of anaerobic conditions) are recorded on three plots. Cursory soil information is available from 8 additional plots (5 Willamette NF, 2 Deschutes NF, 1 Salem BLM). Soils are peats or highly organic layers over silt loam, silt, or sand. Coarse fragments are absent or minor.

Summer water tables are at the surface in 7 of 12 plots where water table information is recorded. Summer depth to water table averages 3" (0-16").

Observations from plot notes:

Vegetation: Landscape settings with the CAAQD type are characterized as basins with "bog," "classic sag pond," "sedge meadow with tall willows around edge," "dry, small, winding channel (snow-melt) cuts down through plot," and "active beaver dam."

Previously described plant associations:

Wells (2006) describes a *Carex aquatilis* plant association with high constancy of *Deschampsia cespitosa* and *Equisetum arvense*. He observes that this association is not floristically diverse and it "occurred along high-elevation (2067 to 2409 m) [6780 to 7900 ft] floodplains, lake edges and wet meadows."

In northwestern Oregon, Christy (2004) describes a similar plant association, *Carex aquatilis* var. *dives*. He notes that "habitat is usually montane fens. The association is widespread and important in the Cascade Range…" He also observes that this plant association is highly diverse, although *Carex aquatilis* var. *dives* is the primary species.

Crowe et al. (2004) describe a *Carex aquatilis* var. *dives* plant association. They observe that "the association is dominated by a sward of Sitka sedge. Other graminoids become significant only where the Sitka sedge association is ecotonal to other associations such as bladder sedge (*Carex utriculata*) or widefruit sedge (*Carex angustata*)."

Kovalchik and Clausnitzer (2004) describe a *Carex aquatilis* plant association with high constancy of bluejoint reedgrass (CACA, 45%), marsh cinquefoil (POPA, 55%), Sitka sedge (CAAQS, 82%) and bladder sedge (CAUT, 100%).

Crowe and Clausnitzer (1997) describe a *Carex aquatilis* plant association for Oregon's Blue Mountains with high constancy of large-leaf avens (48%), common willow-herb (48%), and tufted hairgrass (42%). They note that "it is found at moderate to high elevations (3060 to 7470 ft) in 65-1000 ft wide, low gradient, trough- and V-shaped valleys (sometimes in U- or flat-shaped) with gentle to moderately steep side slopes. Sites are wet basins (fens), floodplains, and occasionally springs and lake edges."

Kovalchik (1987) describes a *Carex aquatilis* plant association for central Oregon. Plants with high constancy include *Rumex occidentalis* (71%), *Carex utriculata* (*C. rostrata* in his guide) (71%), *Veronica americana* (71%), *Deschampsia cespitosa* (57%), *Hordeum brachyantherum* (57%), and *Equisetum arvense* (57%). He also describes a *Carex sitchensis* plant association (the current name is *Carex aquatilis* var. *dives*). This association has high constancy for "reedgrass" (57%), willows (50%), and *Carex utriculata* (*C. rostrata* in his guide) (43%).

Montane Wet Communities

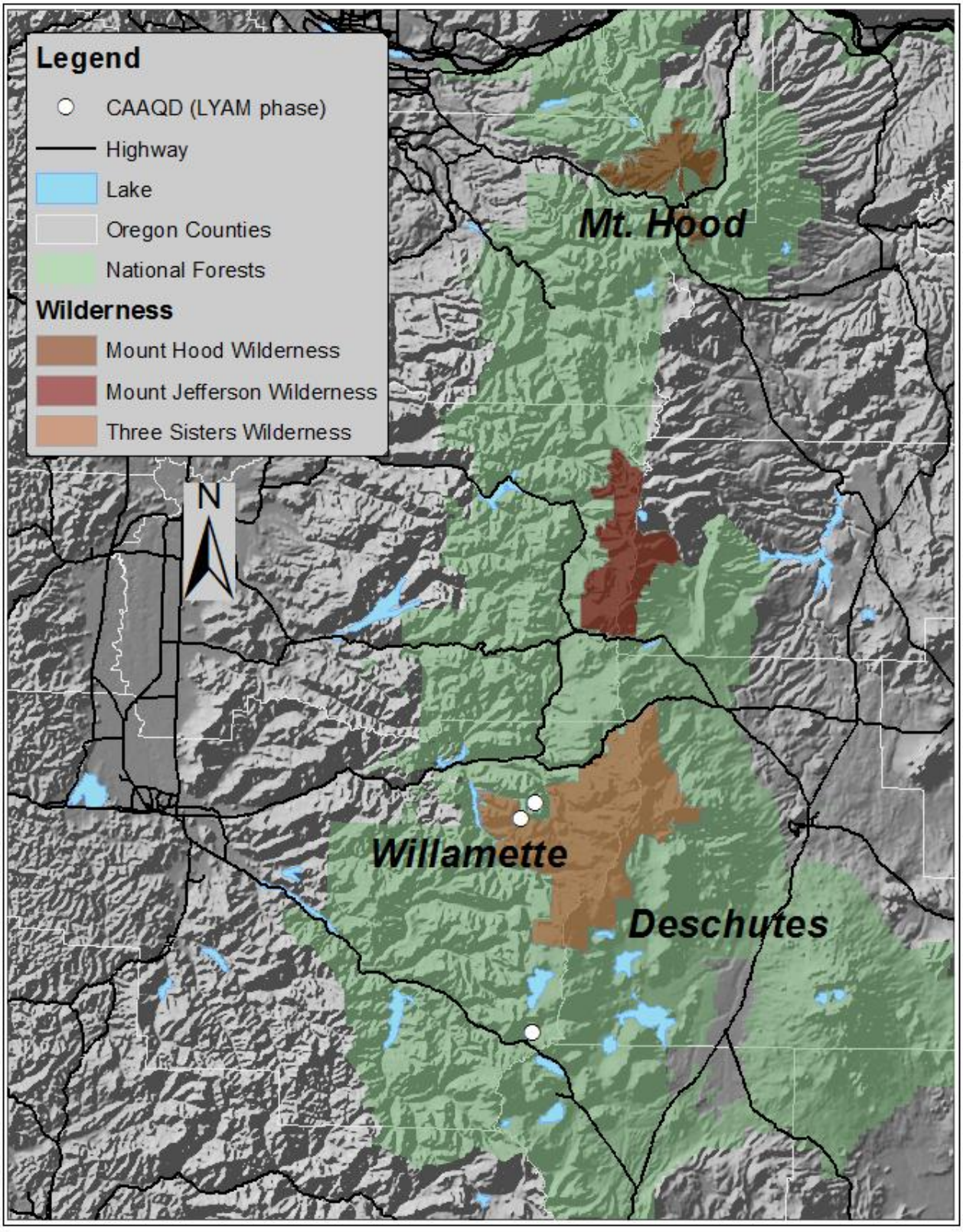
Carex aquatilis var. *dives* [*Lysichiton americanus* phase] (Sitka sedge [Skunk cabbage phase])
CAAQD [LYAM3 phase]
Eco-class code: MW1928

CAAQD [LYAM3 phase]. Environmental conditions of plots.

Number of plots	7 (7 Willamette NF)
Elevation (ft)	Mean = 4550; Range = 4238-4800
Slope (%)	Mean = 2; Range = 0-5
Aspect (no. of plots)	FLAT = 3; NW = 2; NE = 1; SE = 0; SW = 1
Distribution	Western Cascades (100%)
Slope position	Basins and drainages
Slope shape	Flat

Environmental conditions:

CAAQD [LYAM3 phase] is a variant of an upper montane fen/shrub-swamp community, that occurs in wet basins of the Western Cascades. Topography is flat. Sites are seasonally flooded to perennially saturated. Little soil information is available. Bare soil plus gravel average 2%. Surface rock is absent. Landscape settings containing the CAAQD [LYAM3 phase] type are described as floodplains adjacent to small stream channels, generally in wetland complexes.


Legend
CAAQD (LYAM phase)
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This community is dominated by Sitka sedge (CAAQD). Skunk cabbage (LYAM3) is always present. Jeffrey's shootingstar (DOJE) and fringed fireweed (EPCIW) are present in over 70% of the plots. Geyer's willow (SAGE2), Douglas' spiraea (SPDO), and big leaf huckleberry (VAME) occur in 40% of the plots. Booth's willow (SABO2) and Sitka alder (ALVIS) occur with characteristic cover of 10%. Summed plant cover, excluding mosses, averages 188%, the highest cover among all communities in this guide.

Growth form	Mean cover (%)
Forb	60.5
Graminoid	93.6
Shrub	35.2
Tree	1.1

CAAQD [LYAM3 phase]. Constancy table. Canopy cover for species in at least 40% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
CAAQD	*Carex aquatilis dives*	Sitka sedge	100.0	74.9	74.9
LYAM3	*Lysichiton americanus*	Skunk cabbage	100.0	6.1	6.1
DOJE	*Dodecatheon jeffreyi*	Jeffrey's shootingstar	71.4	5.6	7.8
EPCIW	*Epilobium ciliatum*	Fringed fireweed	71.4	1.4	2.0
VIMA2	*Viola macloskeyi*	Small white violet	57.1	11.3	19.8
CASTI3	*Calamagrostis stricta inexpansa*	Northern reedgrass	57.1	5.4	9.5
SETR	*Senecio triangularis*	Arrowleaf groundsel	57.1	5.1	9.0
ANAR3	*Angelica arguta*	Sharptooth angelica	57.1	2.4	4.3
HYAN2	*Hypericum anagalloides*	Bog St.John's-wort	57.1	2.1	3.8
SAGE2	*Salix geyeriana*	Geyer's willow	42.9	16.4	38.3
SPDO	*Spiraea douglasii*	Douglas spiraea	42.9	5.7	13.3
MIGU	*Mimulus guttatus*	Yellow monkeyflower	42.9	3.0	7.0
POBI6	*Polygonum bistortoides*	American bistort	42.9	2.6	6.0
VAME	*Vaccinium membranaceum*	Big huckleberry	42.9	0.9	2.0
EQAR	*Equisetum arvense*	Common horsetail	42.9	0.6	1.3

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
HYSC5	*Hypericum scouleri*	Scouler's St. John's-wort	42.9	0.4	1.0
PLDID	*Platanthera dilatata*	White bog-orchid	42.9	0.3	0.7

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 3 (3Willamette NF)

Only cursory soils information is available. Mineral soil is silty clay loam and coarse fragments are absent or minor. There is no information on water-table depth.

Montane Wet Communities

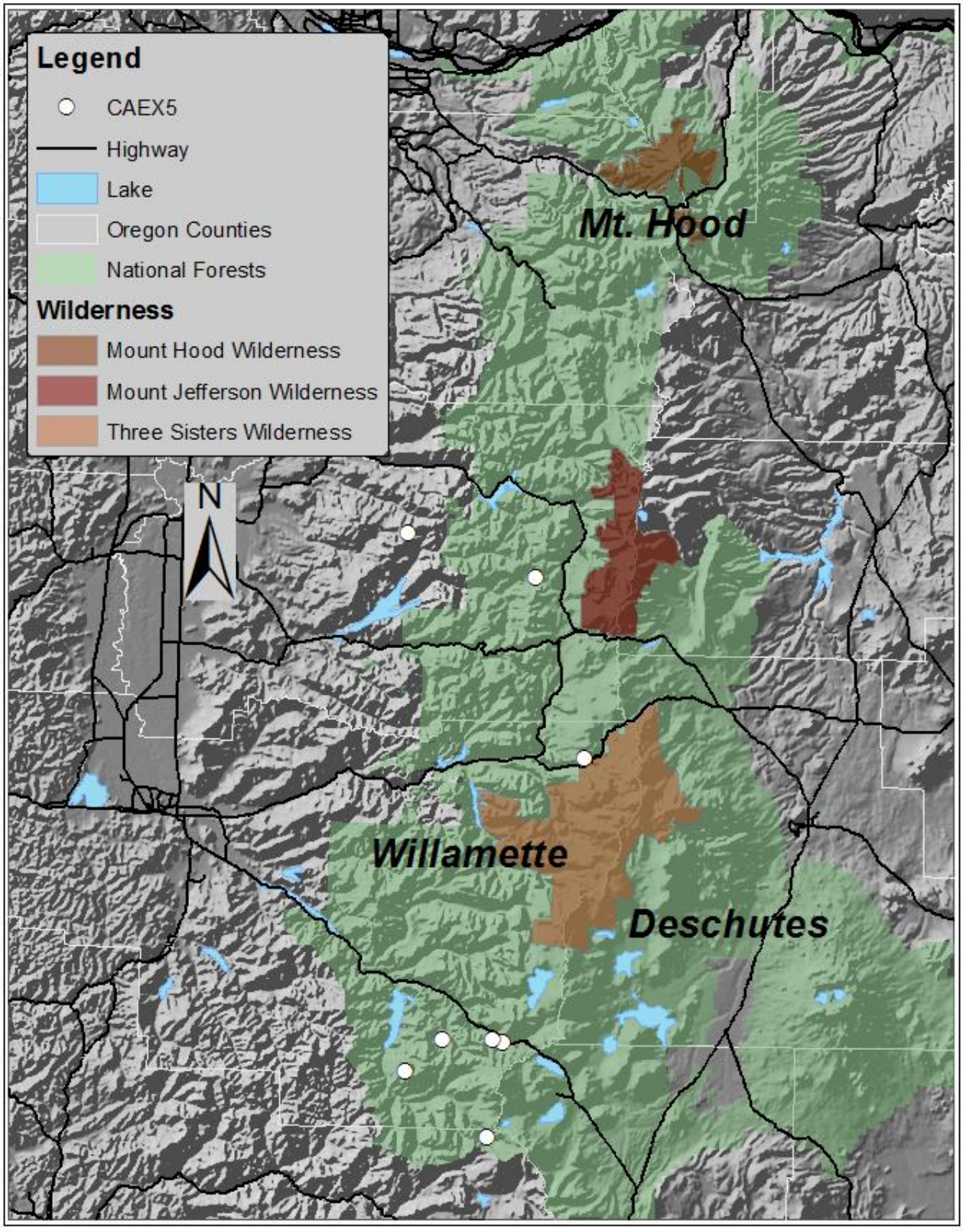
Carex exsiccata (Western inflated sedge)
CAEX5
Eco-class code: MW1923

CAEX5. Environmental conditions of plots.

Number of plots	8 (7 Willamette NF, 1 Salem BLM)
Elevation (ft)	Mean = 4100; Range = 2920-5000
Slope (%)	Mean = 1; Range = 0-3
Aspect (no. of plots)	FLAT = 7; NW = 0; NE = 1; SE = 0; SW = 0
Distribution	Western Cascades (88%), High Cascades (12%)
Slope position	Basins
Slope shape	Flat to concave

Environmental conditions:

CAEX5 is a montane wet meadow type that occurs in basins, often associated with vernal or persistent ponds or lakes in the Western and High Cascades. Topography is flat. Sites are seasonally flooded to perennially saturated, often with highly organic soils. Summer water tables can be at or within 6”of the soil surface. Bare ground averages 17%, while surface rock and gravel are absent.


Legend
CAEX5
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This community is heavily dominated by western inflated sedge (CAEX5). Reed mannagrass (GLGR), Douglas spiraea (SPDO), and Scouler's St. John's-wort (HYSC5) are present in 38% of plots. Bog blueberry (VAUL) and mountain alder (ALIN2) can be abundant. Summed plant cover averages 99%.

Growth form	Mean cover (%)
Forb	11.9
Graminoid	74.3
Shrub	6.4
Tree	0.5

CAEX5. Constancy table. Canopy cover for species in over 25% of plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
CAEX5	*Carex exsiccata*	Western inflated sedge	100.0	57.0	57.0
GLGR	*Glyceria grandis*	Reed mannagrass	37.5	1.1	3.0
SPDO	*Spiraea douglasii*	Douglas spiraea	37.5	0.9	2.4
HYSC5	*Hypericum scouleri*	Scouler's St. John's-wort	37.5	0.9	2.3
CIDO	*Cicuta douglasii*	Douglas' water-hemlock	25.0	4.1	16.5
SCMI2	*Scirpus microcarpus*	Small-flowered bullrush	25.0	1.9	7.5
VEAM2	*Veronica americana*	American brooklime	25.0	1.4	5.5
CAECE	*Carex echinata echinata*	Star sedge	25.0	0.6	2.5
EPCIG	*Epilobium ciliatum glandulosum*	Fringed fireweed	25.0	0.5	2.0
MIGU	*Mimulus guttatus*	Yellow monkeyflower	25.0	0.5	2.0
DECE	*Deschampsia cespitosa*	Tufted hairgrass	25.0	0.4	1.5
LYAM3	*Lysichiton americanus*	Skunk cabbage	25.0	0.4	1.5
ERPE3	*Erigeron peregrinus*	Subalpine daisy	25.0	0.3	1.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 6 (5 Willamette NF, 1 Salem BLM)

Surface organic horizons are noted on two plots (one muck, one wet peat). A third plot has a silt loam with high organic matter, "not enough to qualify as muck." Top mineral horizons are silt or silt loam, or silty clay loam. Summer water tables in three plots are near the surface (0-6").

Previously described plant associations:

In northwestern Oregon, Christy (2004) describes a similar *Carex exsiccata* plant association. Other than *C. exsiccata*, few species have high constancy. Those that are fairly common include: those with relatively high constancy are *Veronica scutellata* (21%) and *Spiraea douglasii* (18%). Christy observes that "habitat is small to large shallow basins on a variety of soil types. This association is widely distributed in northwestern Oregon at various elevations and the composition is diverse with no obvious segregate types. Stands are usually flooded seasonally to a depth of one to three feet and may dry out by midsummer with the water table just below the soil surface."

In eastern Washington Kovalchik and Clausnitzer (2004) describes a *Carex vesicaria* plant association (*C. vesicaria* var. *major* has been reclassified as *C. exsiccata*). Species with high constancy are bladder sedge (CAUT, 40%), creeping spike-rush (ELPA, 40%), bluejoint reedgrass (CACA, 30%), and small bedstraw (GATR, 30%).

Montane Wet Communities

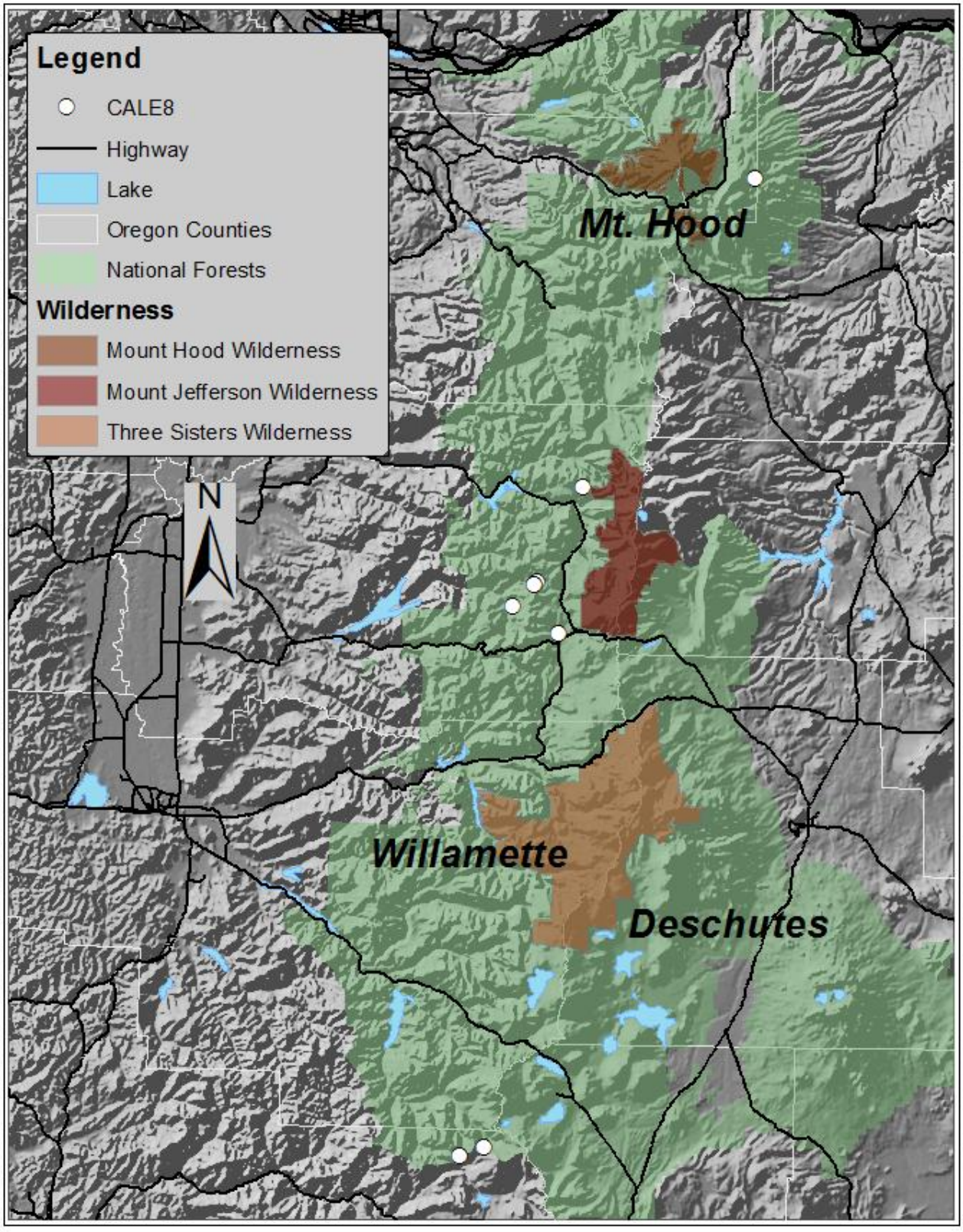
Carex lenticularis (Tufted sedge)
CALE8
Eco-class code: MW1927

CALE8. Environmental conditions of plots.

Number of plots	10 (1 Mt. Hood NF, 9 Willamette NF)
Elevation (ft)	Mean = 4150; Range = 3240-5150
Slope (%)	Mean = 1; Range = 0-2
Aspect (no. of plots)	FLAT = 9; NW = 0; NE = 0; SE = 1; SW = 0
Distribution	Western Cascades (90%), High Cascades (10%)
Slope position	Basins
Slope shape	Undulating to straight

Environmental conditions:

CALE3 is a montane wet meadow community that occurs in basins, mainly in the Western Cascades. Slopes are flat with undulating topography. Soils are typically saturated, with the water table at the surface during the summer months. Deep organic layers develop on some plots. Bare ground is extremely low (average of 1% cover); surface rock and gravel are absent.


Legend
CALE8
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This community is dominated by tufted sedge (CALE8). American bistort (POBI6) is present in 60% of the plots. Other important sedges include woodrush sedge (CALU7), western inflated sedge (CAEX5), and Sitka sedge (CAAQD). Summed plant cover averages 103%.

Growth form	Mean cover (%)
Forb	22.2
Graminoid	79.3
Shrub	0.7
Tree	0.4

CALE8. Constancy table. Canopy cover for species in more than 25% of plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
CALE8	*Carex lenticularis*	Tufted sedge	100.0	51.7	51.7
POBI6	*Polygonum bistortoides*	American bistort	60.0	0.9	1.5
CALU7	*Carex luzulina*	Woodrush sedge	40.0	3.1	7.8
CAEX5	*Carex exsiccata*	Western inflated sedge	40.0	1.6	4.0
AGHU	*Agrostis humilis*	Alpine bentgrass	40.0	1.2	3.0
CAAQD	*Carex aquatilis dives*	Sitka sedge	30.0	4.5	15.0
EQAR	*Equisetum arvense*	Common horsetail	30.0	1.6	5.4
METR3	*Menyanthes trifoliata*	Buckbean	30.0	1.3	4.3
HYAN2	*Hypericum anagalloides*	Bog St.John's-wort	30.0	1.1	3.7
HEMA80	*Heracleum maximum*	Cow-parsnip	30.0	1.1	3.7
MIGU	*Mimulus guttatus*	Yellow monkeyflower	30.0	0.5	1.7
SETR	*Senecio triangularis*	Arrowleaf groundsel	30.0	0.4	1.3

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 4 (4 Willamette NF)

No full soil profiles are available. In three plots water tables are at the surface during the summer months. Mottles are noted at 4" in one plot, developed in an old stream channel with silt and gravel deposits. Organic layers range from 3-20". Only one plot reports soil texture, a silt loam.

Previously described plant associations:

In northwestern Oregon Christy (2004) describes a similar *Carex lenticularis* plant association. He observes that "habitat is montane wet meadows interspersed with forest edge. *Picea engelmannii* is the primary mature and reproducing tree but it is mostly peripheral along with five other species, all occurring with low constancy and mostly in trace amounts."

Crowe et al. (2004) describe a *Carex lenticularis* plant association that has high constancy of *Carex microptera*, *Juncus Balticus,* and *Glyceria striata*. They note that "if the sediments on which this association occurs remain intact for long enough periods of time this association may succeed to the Mountain alder (Alnus incana)/Densely-tufted sedge Association."

Kovalchik and Clausnitzer (2004) describe a *Carex lenticularis* plant association for eastern Washington based on three plots. They observe that "the CALE5 association is dominated by lenticular sedge. Other herbs are scarce. Those with relatively high constancy include sheep sedge, saw-leaved sedge, and many-spiked cotton-grass."

Crowe and Clausnitzer (1997) describe a *Carex lenticularis* var. *lenticularis* plant association for Oregon's Blue Mountains. Plants with high constancy include small-winged sedge (67%), Baltic rush (44%), tall mannagrass (44%), field mint (44%), yarrow (44%), musk monkey-flower (44%), and western polemonium (44%). They note that "sites are wet basins, floodplains, and occasionally springs."

Montane Wet Communities

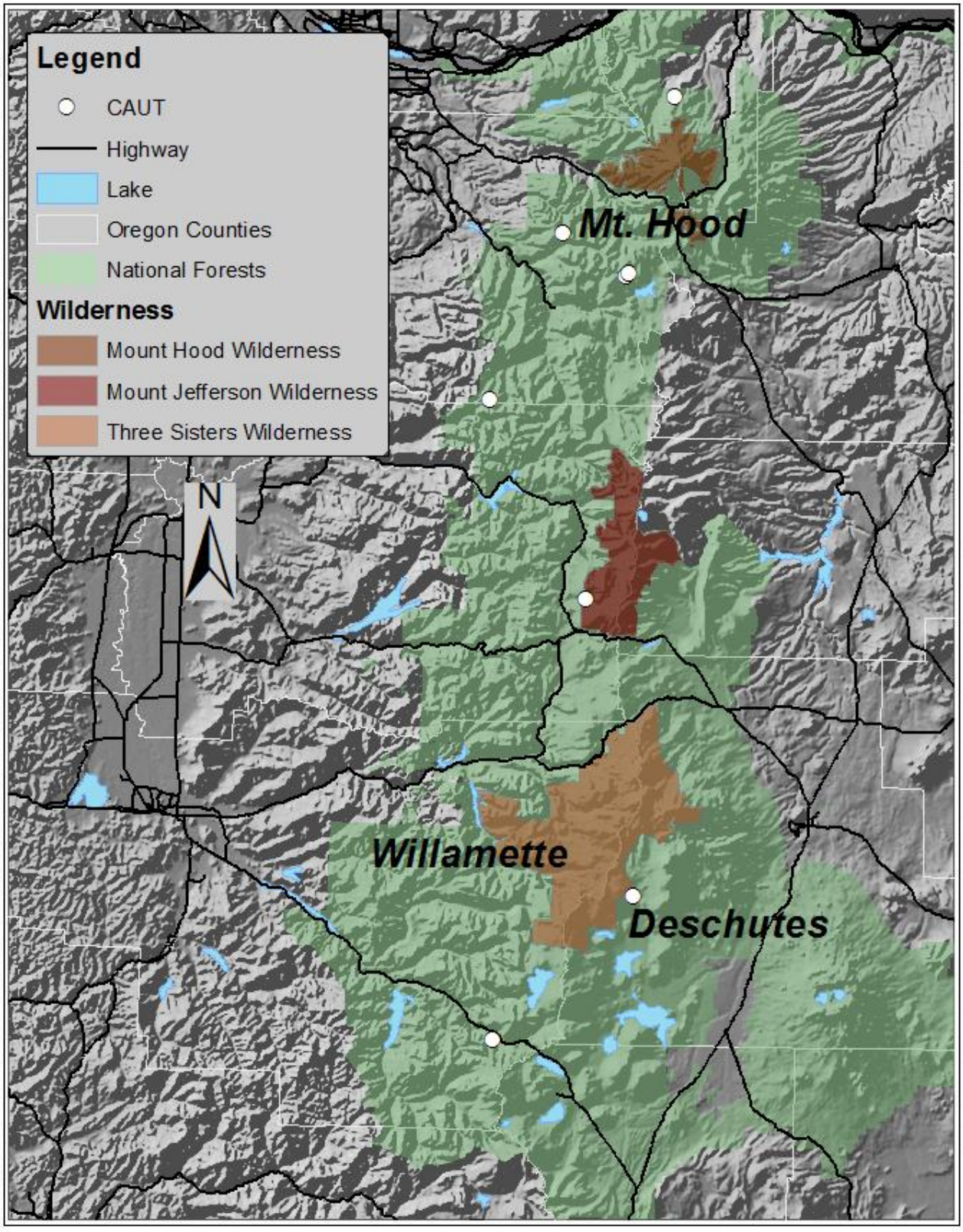
Carex utriculata (Beaked sedge)
CAUT
Eco-class code: MW1929

CAUT. Environmental conditions of plots.

Number of plots	9 (6 Mt. Hood NF, 2 Willamette NF, 1 Deschutes NF)
Elevation (ft)	Mean = 4150; Range = 3800-4759
Slope (%)	Mean = 0; Range = 0-2
Aspect (no. of plots)	FLAT = 8; NW = 0; NE = 0; SE = 0; SW = 1
Distribution	High Cascades (44%), Western Cascades (56%)
Slope position	Basins
Slope shape	Flat-straight

Environmental conditions:

CAUT is a montane fen community that occurs in wet basins of the Western and High Cascades. It commonly borders lakes or streams. Sites are seasonally flooded to moist, often with deep peat layers. Cover of bare ground can be relatively high for these wet meadows (35% average); surface rock and gravel are generally absent.


Legend
CAUT
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This fen community is dominated by beaked sedge (CAUT). Bluejoint (CACA4) occurs in over 40% of plots. Sitka alder (ALVIS) and variable willow (SACO2) can be abundant. Summed plant cover averages 96%.

Growth form	Mean cover (%)
Forb	12.0
Graminoid	68.8
Shrub	15.0
Tree	0.9

CAUT. Constancy table. Canopy cover for species in over 25% of plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
CAUT	*Carex utriculata*	Northwest Territory sedge	100.0	47.2	47.2
CACA4	*Calamagrostis canadensis*	Bluejoint	44.4	7.9	17.8

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 5 (4Mt. Hood NF, 1 Willamette NF)

Upper horizons of 4 plots are organic peat or muck over peat-mucks (4” to >40”). Mineral horizons are silt loams or silty clay loams. Depth to water table in these profiles averages 3" (0-7").

The soil pit shown here is the only one described that does not have a well-developed organic surface horizon. It has two sandy loam A layers over a sandy loam AC layer. The sand C horizon is found at 28”. Depth to water table in this pit is 29”. This site lies between a beaver pond/wetland complex and a wet meadow drained by a creek.

Observations from plot notes:

Vegetation: Landscapes settings in which the CAUT community is found are described as small lake basins, sag ponds, or meadows with a spring channel running through.

Mammal disturbance: The meadow pictured on the previous page and here is described as: “Shallow lake (made) by beavers damming up creek—fed on Sitka alder; this killed spruce. Dam broke and created this meadow with a creek running through it. Engelmann spruce is now invading on mounds of old stumps and down logs.”

Previously described plant associations:

Campbell (1973) describes a similar, but higher-elevation, *Carex rostrata-Sphagnum* community from Hunts Cove, Mt. Jefferson. Seyer (1979) also describes a *Carex rostrata*-dominated reedswamp from Sphagnum Bog, Crater Lake NP and from Gold Bog near Willamette Pass, Oregon.

Wells (2006) describes a *Carex utriculata* plant association that is relatively species poor, with *Epilobium glaberrimum* (28%), *Agrostis variabilis* (28%), and *Equisetum arvense* (28%).

A *Carex utriculata* plant association is described by Christy (2004), for northwestern Oregon. He observes that “habitat is montane fens. This is a common and important association in the Cascade Range. Stands are usually seasonally flooded to a depth of 1-2 feet, or may dry out by midsummer with the water table just below the soil surface.”

Crowe et al. (2004) describe a *Carex utriculata* plant association with high constancy of *Juncus balticus* (34%), *Scirpus microcarpus* (23%) and *Veronica americana* (23%). They note that “because of its wide

geographic and elevational distribution, the association occurs on a wide variety of physiographic areas and riparian landforms."

Kovalchik and Clausnitzer (2004) describe a species-poor *Carex utriculata* plant association. Bluejoint reedgrass has high constancy (45%), similar to its presence in the type described here; additional associates include largeleaf avens (35%) and small bedstraw (33%). They observe that "the CAUT association is dominated by bladder sedge and/or awned sedge. Other herbs have low constancy and are uncommon owing to the wide environmental distribution of the association. Only bluejoint reedgrass has more than 40 percent constancy."

Smith (1998) also describes a *Carex utriculata* plant association for northeastern California. She observes that "the type can be found in depressions that accumulate water, or as a streambank band in finer-textured alluvium and backwater channels." Other common species include *Carex nebrascensis* and *Deschampsia cespitosa*.

Crowe and Clausnitzer (1997) describe a *Carex utriculata* plant association for Oregon's Blue Mountains. Species with high constancy include small-fruit bulrush (33%) and western Polemonium (28%). They note that "The CAUT association occurs in wet basins (fens) and springs, at the edge of ponds, on floodplains and occasionally on gravel bars."

Kovalchik (1987) describes a *Carex rostrata* plant association that he describes as being "one of the wettest riparian associations. One of the synonyms for *Carex utriculata* is *C. rostrata* var. *utriculata*.Because of its wide geographic and elevational distribution, the association occurs on a wide variety of physiographic areas and riparian landforms. It is present to some extent in every physiographic area in central Oregon."

Potter (2005) describes a species poor *Carex utriculata* plant association for the west-slope central and southern Sierra Nevada Mountains in California. Taxa with relatively high constancy include moss (51%), *Polygonum bistortoides* (37%), and *Mimulus primuloides* (32%).

From the southern Sierra, Halpern (1986) describes a *Carex rostrata* type that occurs under a variety of topographic and hydrologic regimes. Where standing water is deep, pure stands of *C. rostrata* develop. On sloping sites or where water tables are depressed, abundance and vigor of *C. rostrata* decrease and species richness increases. Common associates include *Dodecatheon jeffreyi*, *Polygonum bistortoides*, *Oxypolis occidentalis*, and *Perideridia parishii*.

Benedict (1981, 1983) also describes a subalpine *Carex rostrata-Mimulus primuloides* Association--from the Whitney and Rock Creek drainages of Sequoia NP. It typifies sites with depressed water tables. Finally, Ratliff (1979, 1982) describes a *Carex rostrata* (beaked sedge/Site Class A) type from the Sierra that occupies poorly or imperfectly drained sites.

Montane Wet Communities

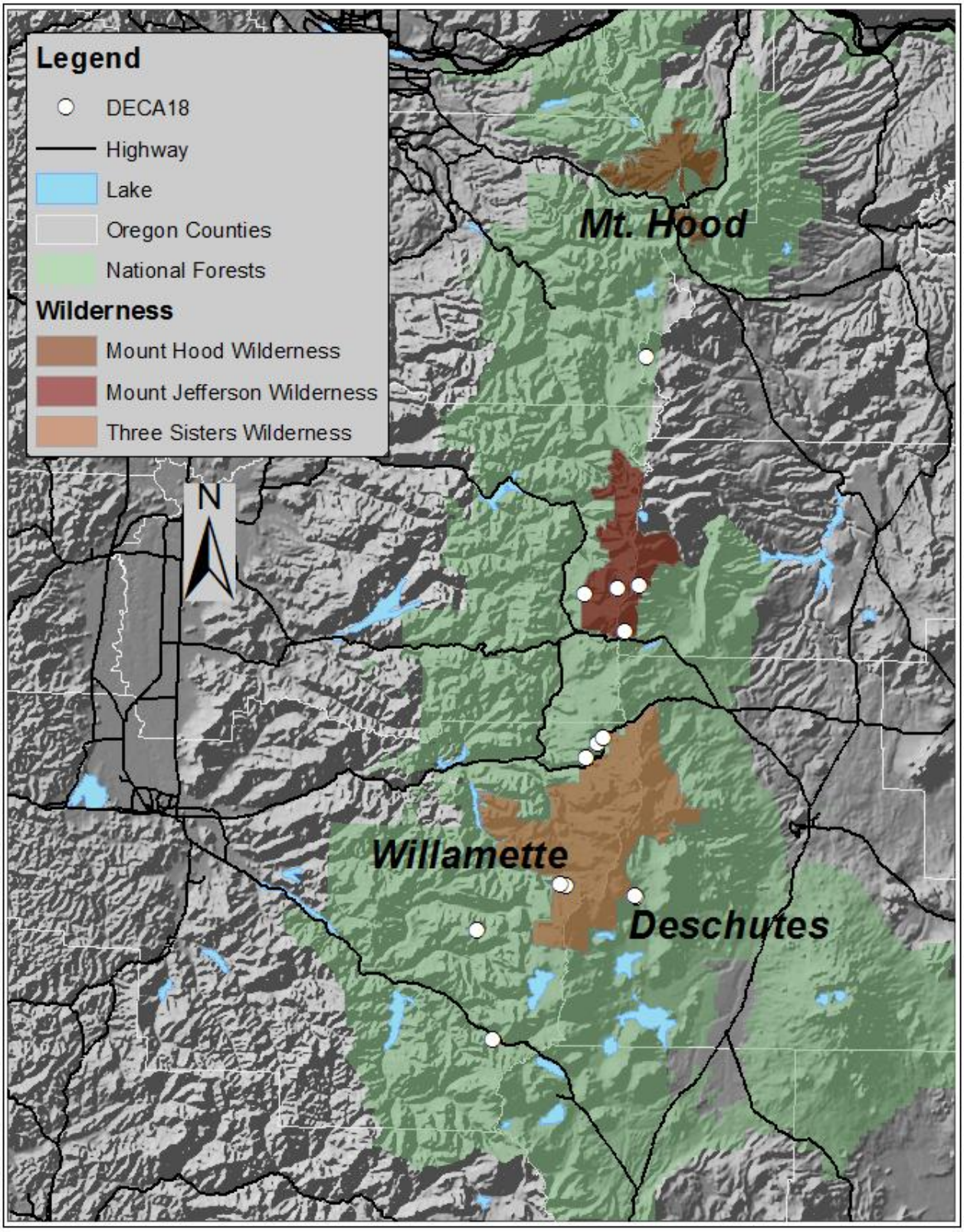
Deschampsia cespitosa (Tufted hairgrass)
DECE
Eco-class code: MM1923

DECE. Environmental conditions of plots.

Number of plots	14 (1 Mt. Hood NF, 9 Willamette NF, 4 Deschutes NF)
Elevation (ft)	Mean = 4650; Range = 3660-5225
Slope (%)	Mean = 1; Range = 0-2
Aspect (no. of plots)	FLAT = 13; NW = 1; NE = 0; SE = 0; SW = 0
Distribution	High Cascades (86%), Western Cascades (14%)
Slope position	Basins
Slope shape	Flat to concave

Environmental conditions:

DECE is a montane fen community that occurs in the Western and High Cascades. Slopes are flat. Sites are perennially moist to saturated (occasionally submerged in spring to late summer). Cover of bare ground averages only 5%; surface rock and gravel are absent. Landscape settings in which the DECE type is found are described as cirque basins, vernal ponds, and lake meadows.


Legend
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Highway
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National Forests
Wilderness
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Mount Jefferson Wilderness
Three Sisters Wilderness
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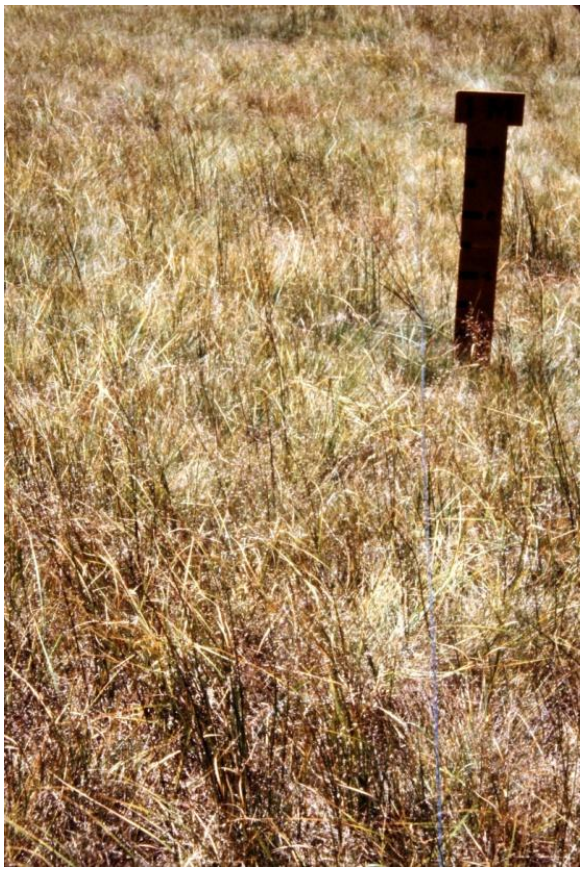
Mt. Hood
Willamette
Deschutes



Vegetation composition:

This community is dominated by tufted hairgrass (DECE). Western inflated sedge (CAEX5) is present in greater than 50% of the plots, particularly those occupying perennially wetter sites. Mountain rush (JUARL) is present in greater than 40% of plots. Douglas spiraea (SPDO) and Bog blueberry (VAUL) are the most common shrubs, present in 29% of plots but with only 1-2% characteristic cover. Summed plant cover averages 93%.

Growth form	Mean cover (%)
Forb	6.6
Graminoid	85.2
Shrub	1.4
Tree	0.0

DECE. Constancy table. Canopy cover for species in over 25% of plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
DECE	*Deschampsia cespitosa*	Tufted hairgrass	100.0	51.3	51.3
CAEX5	*Carex exsiccata*	Western inflated sedge	57.1	13.4	23.5
JUARL	*Juncus arcticus littoralis*	Mountain rush	42.9	2.2	5.2
SYSPS	*Symphyotrichum spathulatum*	Western mountain aster	28.6	2.3	8.0
CAUT	*Carex utriculata*	Northwest Territory sedge	28.6	1.2	4.0
ORALA2	*Oreostemma alpigenum*	Alpine aster	28.6	0.7	2.5

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
SPDO	*Spiraea douglasii*	Douglas spiraea	28.6	0.4	1.5
VAUL	*Vaccinium uliginosum*	Bog blueberry	28.6	0.4	1.3

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 6 plots (3 Willamette NF, 2 Deschutes NF, 1 Mt. Hood NF).

O horizons or organic-rich A horizons are noted on 4 plots. A horizons are most frequently silt loams, or silty clay loams. Lower horizons are sandy loams, or sands, with one clay loam. An impermeable layer at 19" is noted on one plot. Mottles, indicating fluctuating anaerobic conditions, are noted on 3 plots. Depth to late-summer water table in 5 plots averages 11" (0-26"). Gravelly or cobbly C horizons are common. Buried soils are a feature of most soil pits described.

Previously described plant associations:

In northeast Oregon, Wells (2006) describes a *Deschampsia cespitosa* plant association under Miscellaneous Moist Graminoid Types. However, data on species constancy and cover are lacking. He notes that "tufted hairgrass (average 63 percent) occurs in bunches throughout the community. Other species include high mountain cinquefoil, willowherb, alpine meadow butterweed, Holm's Rocky Mountain sedge, and bladder sedge."

A similar type, *Deschampsia cespitosa* montane "wet meadow" complex: *Carex exsiccata* phase, is described by Christy (2004) in northwestern

Oregon. He observes that, similar to most of the *Deschampsia cespitosa* montane "wet meadow" complexes, "habitat is montane fens." He also notes "*Deschampsia caespitosa* and *Carex exsiccata* are the primary species in the herb layer, *Deschampsia* with an average cover of 63 percent and ranging to 80 percent, while *Carex exsiccata* has about one third the average cover and ranges to 40 percent."

In central and eastern Oregon Crowe et al. (2004) describe a *Deschampsia caespitosa* plant association with high constancy of *Juncus balticus* (57%), *Polygonum bistortoides* (47%), *Trifolium longipes* (43%) and *Potentilla gracilis* (37%). They observe that "tufted hairgrass associations have a broad elevational and geographical distribution in central and eastern Oregon. Several related associations were classified based on vegetative composition. They are: Tufted hairgrass, Tufted hairgrass-Aquatic sedge, Tufted hairgrass-Nebraska sedge, Tufted hairgrass-Timber oatgrass, and Tufted hairgrass-Baltic rush. These latter three types may be successional variants on the Tufted hairgrass Association."

Kovalchik and Clausnitzer (2004) describe a *Deschampsia cespitosa* plant association in their eastern Washington guide. They note that "other herbs are scarce. Those with relatively high constancy include western yarrow, western aster, Watson willow-weed, broadpetal strawberry, small bedstraw, largeleaf avens, slender-beaked sedge, thickheaded sedge, bladder sedge, and reed canarygrass."

Crowe & Clausnitzer (1997) describe a *Deschampsia cespitosa* plant association in Oregon's Blue Mountains. Plants with high constancy are Baltic rush (66%), American bistort (59%), northwest cinquefoil (55%), Kentucky bluegrass (48%) and small-winged sedge (45%). They note that "sites are wet, moist and dry basins, floodplains, stream terraces, and one spring."

Kovalchik (1987) describes a *Deschampsia cespitosa* plant association for the Deschutes, Ochoco, Fremont and Winema National Forests. Plants with high constancy are *Muhlenbergia* species (*Muhlenbergia filiformis* and *M. richardsonis*) (63%), Trifolium longipes (57%) and "Reedgrasses" (47%, including *Poa pratensis*, *Calamagrostis canadensis*, *Danthonia Californica,* and *Koeleria cristata*). Kovalchik notes "because of the broad elevational and geographic distribution of sites, tufted hairgrass is one of the most abundant and diverse associations in central Oregon."

Hopkins (1979) describes a *Deschampsia caespitosa* plant association for the Fremont NF. Plants with high constancy are *Juncus arcticus* ssp. *littoralis* (*J. balticus* in his guide) (100%), *Carex nebrascensis* (80%), *Carex microptera* (60%) and *Muhlenbergia filiformis* (60%).

Montane Wet Communities

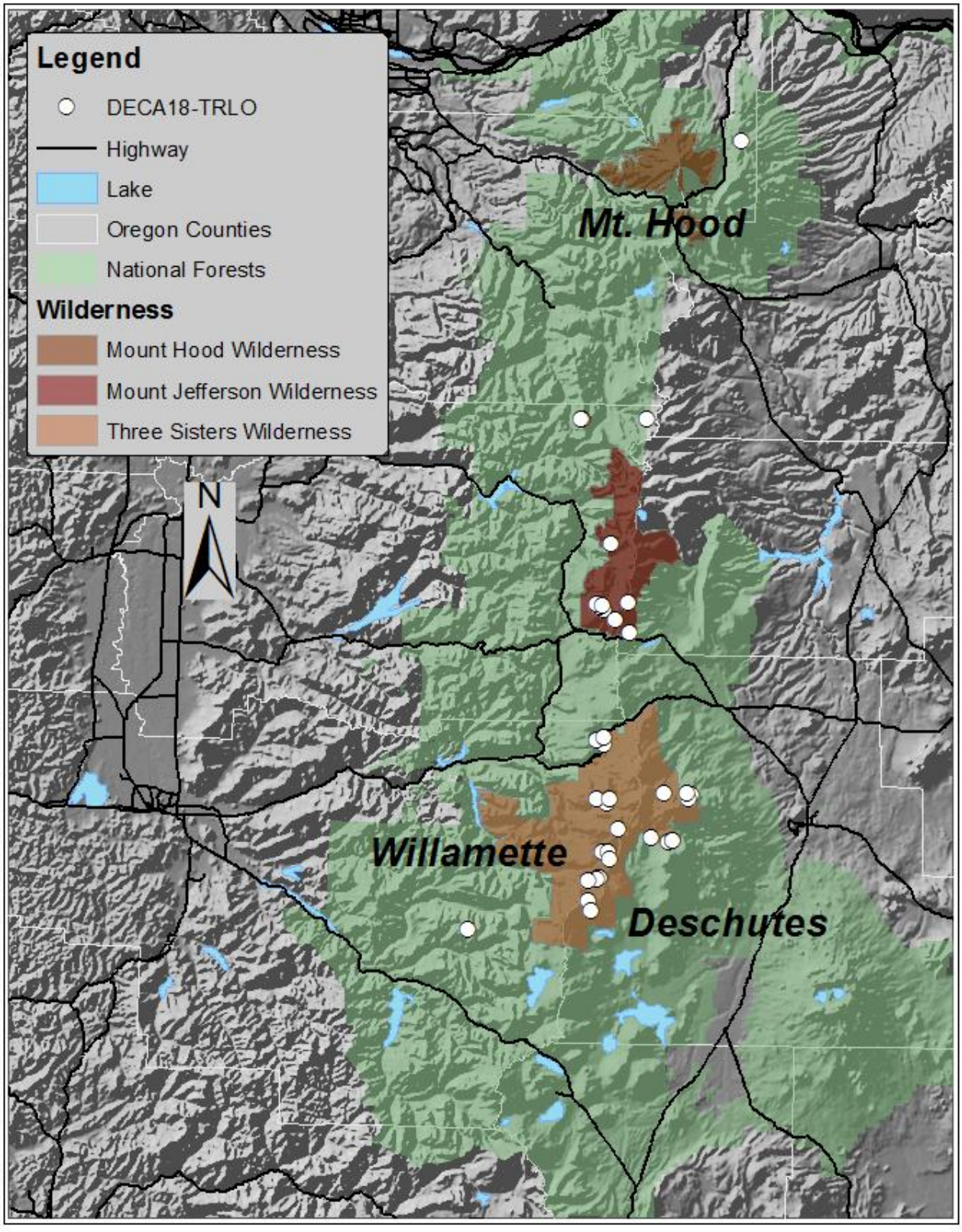
Deschampsia cespitosa-Trifolium longipes (Tufted hairgrass-Long-stalked clover)
DECE-TRLO
Eco-class code: MM1925

DECE-TRLO. Environmental conditions of plots.

Number of plots	39 (5 Mt. Hood NF, 25 Willamette NF, 9 Deschutes NF)
Elevation (ft)	Mean = 5200; Range = 4400-6635
Slope (%)	Mean = 1; Range = 0-14
Aspect (no. of plots)	FLAT = 29; NW = 1; NE = 1; SE = 4; SW = 4
Distribution	Western Cascades (10%), High Cascades (90 %)
Slope position	Basins and drainages
Slope shape	Straight slopes

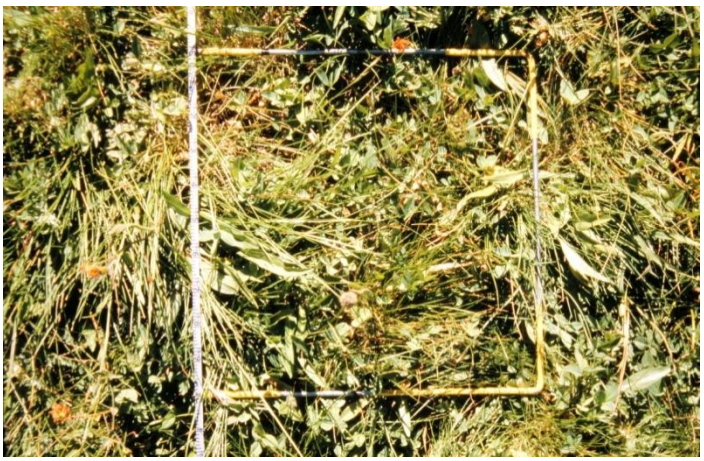
Environmental conditions:

DECE-TRLO is a widespread high-montane to subalpine community found on flats, in gently sloping basins, and along drainages. It is often associated with glacial kettles, lakesides, basins, or swales in morrainal areas. Soils are poorly drained and seasonally to perennially moist. Cover of bare ground, rock, plus gravel average 8%.


Legend
DECA18-TRLO
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This wet graminoid community is dominated by tufted hairgrass (DECE). Long-stalked clover is typically present. Summed plant cover averages 113%.



Growth form	Mean cover (%)
Forb	47.7
Graminoid	64.5
Shrub	0.4
Tree	0.1

DECE-TRLO. Constancy table. Canopy cover for species in at least 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
DECE	*Deschampsia cespitosa*	Tufted hairgrass	100.0	42.1	42.1
TRLO	*Trifolium longipes*	Long-stalked clover	84.6	14.3	16.9
RAGO	*Ranunculus gormanii*	Gorman's buttercup	43.6	3.2	7.3
SYFOF	*Symphyotrichum foliaceum*	Alpine leafybract aster	41.0	3.3	8.1
PODR	*Potentilla drummondii*	Drummond's cinquefoil	41.0	2.9	7.0
DAIN	*Danthonia intermedia*	Timber oat-grass	41.0	2.4	6.0
PHAL2	*Phleum alpinum*	Alpine timothy	38.5	1.0	2.7
CALU7	*Carex luzulina*	Woodrush sedge	35.9	2.4	6.8
ORALA2	*Oreostemma alpigenum*	Alpine aster	33.3	2.1	6.3
MUFI2	*Muhlenbergia filiformis*	Slender muhlenbergia	30.8	1.6	5.2
POFL3	*Potentilla flabellifolia*	Fan-leaved cinquefoil	28.2	1.5	5.4
LIGR	*Ligusticum grayi*	Gray's lovage	28.2	1.5	5.2
ACMI2	*Achillea millefolium*	Yarrow	25.6	2.0	7.8
SYSPS	*Symphyotrichum spathulatum*	Western mountain aster	25.6	1.4	5.4

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 19 (5 Mt. Hood NF, 9 Willamette NF, 5 Deschutes NF)

Profiles generally show multiple A or AC horizons over sequences of A to AC or C horizons. Textures are silt loams, silty clay loams, loams, or sandy loams. Sands are often the lowest described horizons, with massive structure. Summer depth to water table averages 37" (18" to 50+"); roots are concentrated in the upper 18" (14-22").

Krotovinas (rodent tunnels in lower horizons filled with material from surface layers) are noted in two plots. Restrictive layers are encountered in two plots. Mottles are recorded in 7 pits, indicative of fluctuating anaerobic conditions. Depth to mottles averages 17" (2-30").

Observations from plot notes:

Vegetation: Adjacent forest types include silver fir/bigleaf huckleberry/beargrass plant association to subalpine stands of mountain hemlock/bigleaf huckleberry/beargrass plant association.

Small and large mammal disturbance: Small mammal activity (gophers, mice) is noted on 25% of the plots. Deer and elk use is abundant. Some plot notes also refer to substantial impacts from past domestic animal grazing; plot notes also suggest that grazing has contributed to a "proliferation of forbs into interstices of grasses."

Previously described plant associations:

A similar type, *Deschampsia caespitosa* montane “wet meadow” complex: *Trifolium longipes* phase, is described in Christy (2004) for northwestern Oregon. He observes that “habitat is montane meadows and fringes of fens. This phase is transitional between wet *Deschampsia* fen vegetation on organic soils and the more widespread but drier *Deschampsia* "meadow" vegetation on seasonally moist loam or pumice. As such, it contains elements of both habitats, but is closer to meadow than fen.” In Christy’s *Trifolium longipes* phase, “*Deschampsia caespitosa* and *Trifolium longipes* are the primary species, with *Potentilla drummondii* occurring in about half the plots but at low cover.”

In central and eastern Oregon, Crowe et al. (2004) describe a *Deschampsia caespitosa-Danthonia intermedia* plant association with high constancy of *Trifolium longipes* (100%), *Potentilla flabellifolia* (75%) and *Achillea millefolium* (50%). The elevation range of plots in this plant association is 4640-6200 ft.

Smith (1998) also describes a *Deschampsia caespitosa* in northeastern California based on two plots. She observes that “this is a minor, disturbed community type included here to document its existence, and to record values for greenline and meadow cross-section transects.” Other species with high cover and density are *Ranunculus alismifolius*, *Microsteris gracilis*, *Muhlenbergia richardsonis*, *Hordeum brachyantherum,* and *Eleocharis acicularis* var. *bella*.

Montane Wet Communities

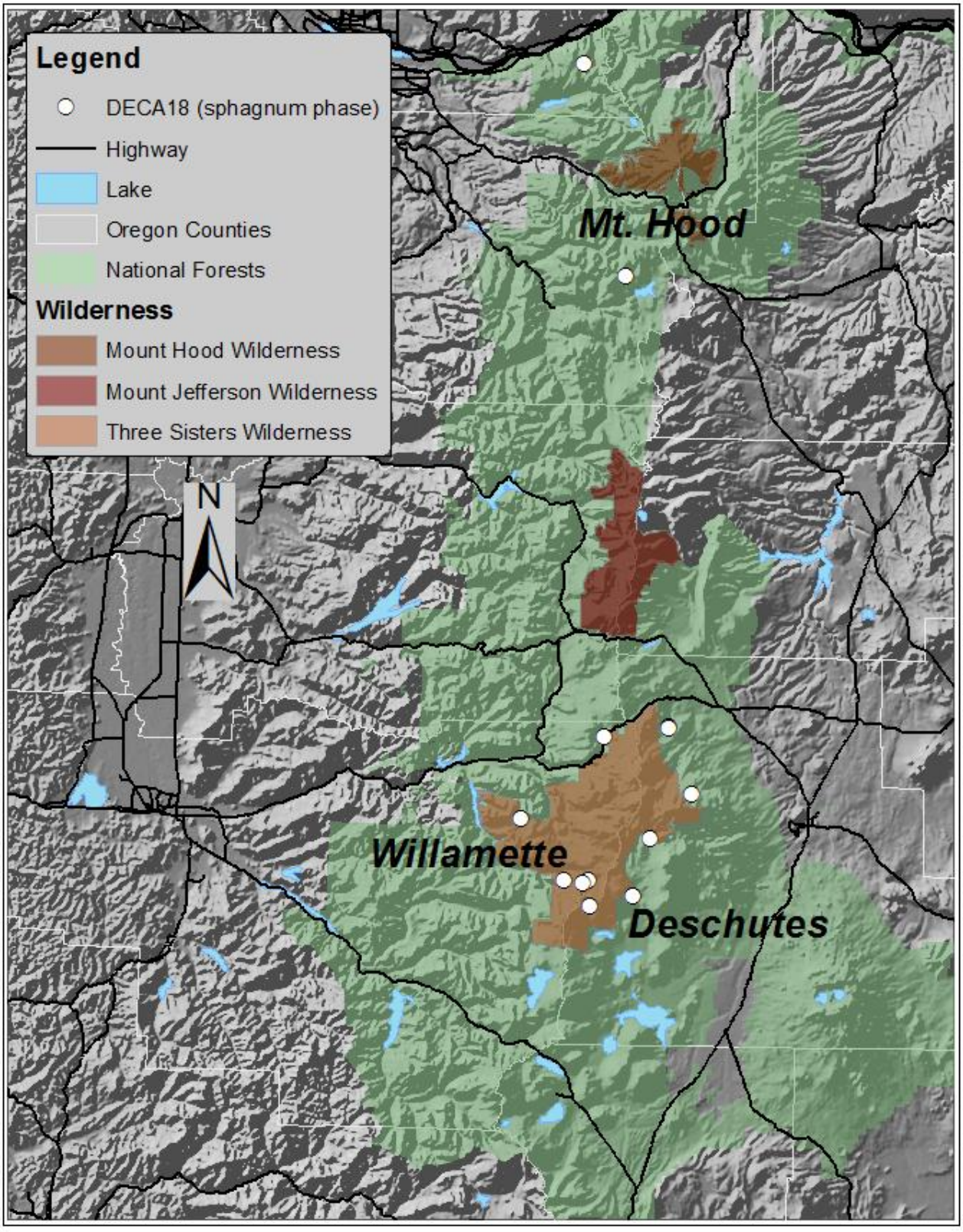
Deschampsia cespitosa [*Sphagnum* phase] (Tufted hairgrass [Sphagnum phase])
DECE [Sphagnum phase]
Eco-class code: MM1924

DECE [Sphagnum phase]. Environmental conditions of plots.

Number of plots	16 (2 Mt. Hood NF, 8 Willamette NF, 6 Deschutes NF)
Elevation (ft)	Mean = 4650; Range = 3690-6317
Slope (%)	Mean = 1; Range = 0-3
Aspect (no. of plots)	FLAT = 13; NW = 1; NE = 2; SE = 0; SW = 0
Distribution	Western Cascades (19%), High Cascades (81%)
Slope position	Basins
Slope shape	Flat to concave

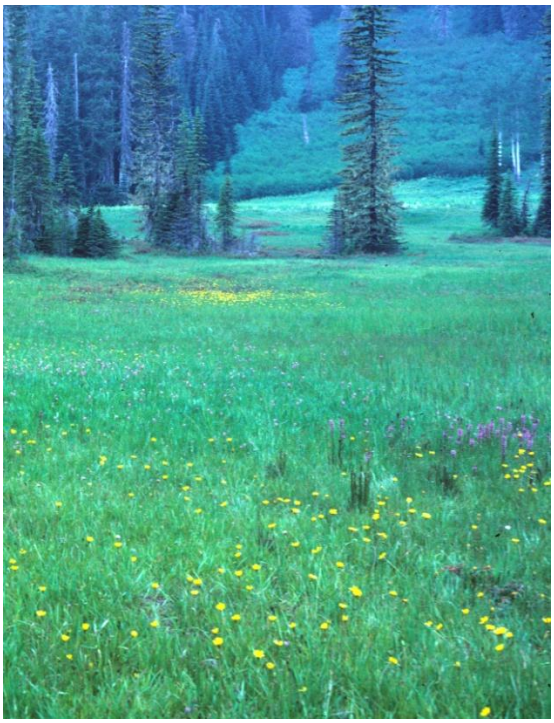
Environmental conditions:

DECE [Sphagnum phase] is a montane community that occurs in fens in the Western and High Cascades. Sites are perennially moist to saturated. Cover of bare ground averages 5%; surface rock and gravel are generally absent.


Legend
DECA18 (sphagnum phase)
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This graminoid-forb community is dominated by tufted hairgrass (DECE) over sphagnum mosses. Jeffrey's shootingstar (DOJE), few-flowered spikerush (ELQU2), slender muhlenbergia (MUFI2), bog St. John's wort (HYAN2), Sitka sedge (CAAQD), and bog blueberry (VAUL) are generally present. Sphagnum mosses average 35% cover. Summed plant cover (excluding mosses) averages 169%.



Growth form	Mean cover (%)
Forb	56.3
Graminoid	102.6
Shrub	4.8
Tree	0.1

DECE [Sphagnum phase]. Constancy table. Canopy cover for species in over 25% of plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
DECE	*Deschampsia cespitosa*	Tufted hairgrass	100.0	43.6	43.6
SPHAG2	*Sphagnum* spp.	Sphagnum species	87.5	33.1	37.8
DOJE	*Dodecatheon jeffreyi*	Jeffrey's shootingstar	75.0	6.4	8.5
ELQU2	*Eleocharis quinqueflora*	Few-flowered spikerush	68.8	10.3	14.9
MUFI2	*Muhlenbergia filiformis*	Slender muhlenbergia	68.8	6.6	9.6
HYAN2	*Hypericum anagalloides*	Bog St.John's-wort	68.8	6.5	9.5
CAAQD	*Carex aquatilis dives*	Sitka sedge	68.8	5.8	8.4
VAUL	*Vaccinium uliginosum*	Bog blueberry	68.8	3.0	4.4
CAUT	*Carex utriculata*	Northwest Territory sedge	56.3	8.1	14.3
CALU7	*Carex luzulina*	Woodrush sedge	50.0	12.9	25.8
RAGO	*Ranunculus gormanii*	Gorman's buttercup	43.8	8.0	18.3
PEGR2	*Pedicularis groenlandica*	Elephant's head	43.8	2.1	4.7
TRGL5	*Triantha glutinosa*	Sticky false asphodel	43.8	1.8	4.1
SCCO	*Scirpus congdonii*	Congdon's bulrush	43.8	0.6	1.3
MIBO	*Microseris borealis*	Apargidium	37.5	5.3	14.0

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
MIPR	*Mimulus primuloides*	Primrose monkeyflower	37.5	3.5	9.3
CAECE	*Carex echinata echinata*	Star sedge	37.5	2.6	7.0
TRLO	*Trifolium longipes*	Long-stalked clover	37.5	1.5	4.0
CALEH2	*Caltha leptosepala howellii*	Marsh-marigold	31.3	2.2	7.0
ORALA2	*Oreostemma alpigenum*	Alpine aster	31.3	0.9	3.0
SAGE2	*Salix geyeriana*	Geyer's willow	31.3	0.6	1.8
SYFOF	*Symphyotrichum foliaceum*	Alpine leafybract aster	31.3	0.5	1.5
EPAL	*Epilobium alpinum*	Alpine willowherb	31.3	0.3	0.8
SPRO	*Spiranthes romanzoffiana*	Ladies' tresses	31.3	0.1	0.3
PAST10	*Senecio cymbalarioides*	Rocky Mountain groundsel	25.0	1.8	7.0
POBI6	*Polygonum bistortoides*	American bistort	25.0	1.6	6.5
CAJO	*Carex jonesii*	Jones' sedge	25.0	1.0	4.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 2 (2 Mt. Hood NF)

One profile has a deep peat horizon over highly organic silt with mottles (generally indicating fluctuating anaerobic conditions). The other profile includes an A1 horizon (7" silt loam), a B horizon (6" silty clay loam), and a IIC cobbly silt clay loam. Depth to water table is 2".

An additional 7 plots (5 Willamette NF, 2 Desechutes NF) have cursory soil information. Soil textures are silty clay loams; only one soil is described as a loam. Coarse fragments are absent or very minor.

Previously described plant associations:

A similar type, *Deschampsia caespitosa* montane "wet meadow" complex, is described in Christy (2004). He observes that "*Deschampsia caespitosa* probably has the widest ecological amplitude of any native wetland species in Oregon and historically has been one of our most important grasses. It occurs from coastal salt marsh to subalpine wetlands on a variety of environmental gradients."

Montane Wet Communities

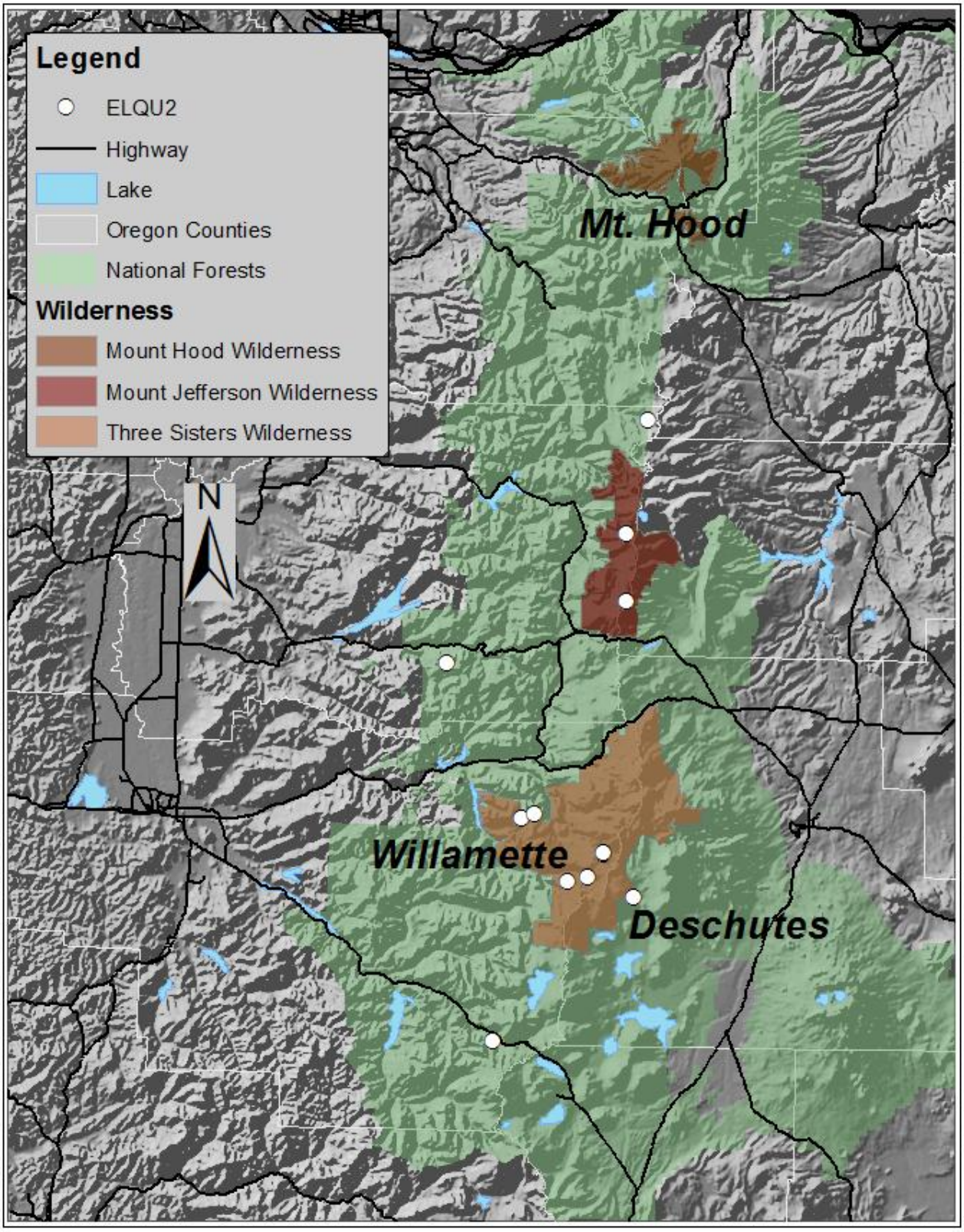
Eleocharis quinqueflora (Few-flowered spikerush)
ELQU2
Eco-class code: MM5011

ELQU2. Environmental conditions of plots.

Number of plots	12 (1 Mt. Hood NF, 10 Willamette NF, 1 Deschutes NF)
Elevation (ft)	Mean = 4700; Range = 4100-5380
Slope (%)	Mean = 1; Range = 0-6
Aspect (no. of plots)	FLAT = 7; NW = 0; NE = 2; SE = 1; SW = 2
Distribution	Western Cascades (33%), High Cascades (67%)
Slope position	Basins
Slope shape	All

Environmental conditions:

ELQU2 is a montane fen community that occurs in wet basins in the Western and High Cascades. Slopes are very gentle with undulating to straight topography. Soils are fine-textured and perennially moist to saturated. Microsite variation due to hummocks and rills increases species diversity. Deep peat layers develop on some plots. Bare ground is extremely low (average of 1% cover); exposed rock and gravel are absent.


Legend
ELQU2
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This fen community is typically dominated by few-flowered spikerush (ELQU2), although it is not always present. Jeffrey's shootingstar (DOJE) is typically present. Sticky false asphodel (TRGL5), bog blueberry (VAUL), and bog St. John's-wort (HYAN2) occur in greater than 60% of the plots. Several species of sphagnum can be present, as well as other mosses. Sphagnum is present in greater than 50% of the plots. Summed plant cover, excluding mosses, averages 134%. The similar CALEH2-DOJE type had lower summed cover (112%).

This community has many species in common with VAUL/TRGL5 and CALEH2-DOJE. ELQU2 tends to occur where water does not flow, while CALH2-DOJE is more common along stream channels with moving water.

Growth form	Mean cover (%)
Forb	36.9
Graminoid	73.5
Shrub	10.5
Tree	0.3

Bog blueberry (VAUL) is the most common shrub, but willows can also be important. Willows occur in 50% of the plots with 6% characteristic cover; individual species include variable willow (SACO2), Geyer's willow (SAGE2), Booth's willow (SABO2), and Lemmon's willow (SALE).

ELQU2. Constancy table. Canopy cover for species in at least 25% of plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
DOJE	*Dodecatheon jeffreyi*	Jeffrey's shootingstar	91.7	5.1	5.6
ELQU2	*Eleocharis quinqueflora*	Few-flowered spikerush	83.3	36.1	43.3
VAUL	*Vaccinium uliginosum*	Bog blueberry	75.0	5.0	6.7
TRGL5	*Triantha glutinosa*	Sticky false asphodel	75.0	2.1	2.8
HYAN2	*Hypericum anagalloides*	Bog St.John's-wort	66.7	2.4	3.7
SPHAG2	*Sphagnum* spp.	Sphagnum species	58.3	18.8	32.3
CALU7	*Carex luzulina*	Woodrush sedge	50.0	5.9	11.8
CALEH2	*Caltha leptosepala. howellii*	Marsh-marigold	50.0	4.3	8.5
CAUT	*Carex utriculata*	Northwest Territory sedge	50.0	1.1	2.2
PEGR2	*Pedicularis groenlandica*	Elephant's head	50.0	0.8	1.5
EQAR	*Equisetum arvense*	Common horsetail	50.0	0.5	1.1
ORALA2	*Oreostemma alpigenum*	Alpine aster	50.0	0.4	0.9
DECE	*Deschampsia cespitosa*	Tufted hairgrass	50.0	0.4	0.7
CAAQD	*Carex aquatilis dives*	Sitka sedge	41.7	6.8	16.4
RAGO	*Ranunculus gormanii*	Gorman's buttercup	41.7	2.7	6.4
MUFI2	*Muhlenbergia filiformis*	Slender muhlenbergia	41.7	2.2	5.2
POBI6	*Polygonum bistortoides*	American bistort	41.7	1.8	4.2
CAJO	*Carex jonesii*	Jones' sedge	41.7	1.2	2.8
MIBO	*Microseris borealis*	Apargidium	41.7	0.2	0.5
PLDID	*Platanthera dilatata*	White bog-orchid	41.7	0.2	0.5
EPAL	*Epilobium alpinum*	Alpine willowherb	41.7	0.0	0.1
CAECE	*Carex echinata echinata*	Star sedge	33.3	2.7	8.0
CASC12	*Carex scopulorum*	Mountain sedge	33.3	1.8	5.5
SAOR2	*Saxifraga oregana*	Oregon saxifrage	33.3	0.4	1.1
MIPR	*Mimulus primuloides*	Primrose monkeyflower	33.3	0.2	0.6
SACO2	*Salix commutata*	Variable willow	25.0	3.8	15.0
CASI2	*Carex simulata*	Analogue sedge	25.0	1.1	4.4
AGHU	*Agrostis humilis*	Alpine bentgrass	25.0	0.4	1.4
SCCO	*Scirpus congdonii*	Congdon's bulrush	25.0	0.4	1.4
COPA28	*Comarum palustre*	Purple marsh locks	25.0	0.2	0.7
JUEN	*Juncus ensifolius*	Dagger-leaved rush	25.0	0.1	0.4
SPRO	*Spiranthes romanzoffiana*	Ladie's tresses	25.0	0.0	0.1

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 1 (1 Mt. Hood NF)

Among plots with cursory soils information, water tables at the surface are noted on 6 plots. Two plots show deep organic layers 20-30" thick, characterized as sphagnum peat with sedge roots/rhizomes. Another plot is described as on volcanic sand with peat, while another as "soupy organic peat with thick matted roots." Several plots are described as bogs.

A full profile is described for only one site. Channels run through the plot and the summer water table is at the surface. There is an 8" sphagnum layer at the surface underlain by two organic horizons, one 2" deep over another 12" deep peat-muck layer. The mineral horizon at 22" is sandy silt.

Observations from plot notes:

Vegetation: Engelmann spruce are frequently adjacent to the wetlands in which the ELQU2 community is found.

Previously described plant associations:

Seyer (1979) describes an *Eleocharis pauciflora*/bryophyte community from Shagnum Bog, Crater Lake NP. She also describes an *Eleocharis*/herbs/*Aulacomnium-Sphagnum* community from Multopor Fen (Mt Hood NF), which is a similar low-statured community with saturated soils. Campbell (1973) describes a higher elevation, *Eleocharis-Aulacomnium* community from Hunts Cove (Mt Jefferson), from within a larger *Carex scopulorum* complex.

Wells (2006) describes an *Eleocharis quinqueflora* plant association (*Eleocharis pauciflora* in his guide) in eastern Oregon. He notes that "other hummock species include alpine shootingstar, high mountain cinquefoil, tinker's penny, willowherb, alpine meadow butterweed, elephanthead lousewort, Idaho licorice-root, tufted hairgrass, and slender muhly. Aquatic sedge sometimes co-occurs with few-flowered spikerush in the wettest portions of the plot."

A similar type, *Eleocharis quinqueflora*, is described in Christy (2004) in northwestern Oregon. He observes that "habitat is montane fens, wet edges of meadows, and sometimes on floating lake-fill mats. *Eleocharis quinqueflora* occurs in a variety of vegetation types at higher elevations. This association is primarily a wet lawn with woody vegetation confined to hummocks or 'tree islands.' The wet lawn may be perennially flooded with 1-3 inches of water."

Crowe et al. (2004) describe an *Eleocharis quinqueflora* plant association in central and eastern Oregon that has high constancy of *Deschampsia cespitosa* (55%), *Carex scopulorum* (52%), *Mimulus primuloides* (52%), and *Pedicularis groenlandica* (42%). They note that "the few-flowered spikerush association is abundant throughout the Cascade, Wallowa, and Elkhorn Mountains, but is scattered in the Yamsay, Gearhart, Strawberry and Steens Mountains. Landforms supporting the few-flowered spikerush association are found in headwater basins."

Kovalchik and Clausnitzer (2004) describe an *Eleocharis quinqueflora* type (they use the former name: *E. pauciflora* and the plant code ELPA2) in their eastern Washington guide. Plants with high constancy are elephanthead pedicularis (62%), many-spiked cotton-grass (46%), green-keeled cotton-grass (38%), ladies tresses (38%), and bluejoint reedgrass (38%). They note that "ELPA2, ERPO2, and CALI are characteristic of nutrient-poor, poorly aerated bogs."

Smith (1998) also describes an *Eleocharis quinqueflora* type (although she uses the former name: *E. pauciflora*). The species commonly found in her Northern California plots were *Mimulus primuloides*, *Carex simulata*, *Juncus nevadensis*, *Carex nebrascensis*, *Juncus balticus* and *Epilobium halleanum*. Smith

notes that “sites where this species is dominant are perennially wet spring/seep sites, wet meadows, forested wet basins, and wet floodplains.”

Crowe and Clausnitzer (1997) describe an *Eleocharis quinqueflora* plant association (*Eleocharis pauciflora* in their guide) in Oregon’s Blue Mountains. They note that “few-flowered spikerush (ELPA2) is the dominant species. Other herbaceous species present include nodding chickweed, slender muhly, field woodrush, tufted hairgrass, and aquatic sedge. This type is widespread in the Blue and Wallowa Mountains where cirque basins and bogs occur.”

Kovalchik (1987) describes an *Eleocharis quinqueflora* plant association (*Eleocharis pauciflora* in his guide) for central Oregon. Plants with high constancy are *Mimulus primuloides* (70%), *Deschampsia cespitosa* (60%), *Dodecatheon* sp. (55%), *Saxifraga oregana* (55%), and *Epilobium alpinum* (50%). He notes that “the few-flowered spikerush association is abundant throughout the Cascade Mountains but is scattered eastward. In the Cascade Mountains, landforms supporting the few-flowered spikerush association are found in headwater basins such as Seven-mile Marsh (Winema NF) and Wire Meadow and Little Cultus Marsh (Deschutes NF).”

Potter (2005) describes an *Eleocharis quinqueflora* plant association (*Eleocharis pauciflora* in his guide) for the West-slope central and southern Sierra Nevada Mountains in California. Taxa with high constancy include *Eleocharis pauciflora* (86%), moss (75%), *Mimulus primuloides* (72%), *Muhlenbergia filiformis* (64%), *Carex* sp. (62%), *Aster alpigenus* (currently *Oreostemma alpigenum* var. *alpigenum*) (56%), and *Juncus* sp. (54%).

From the Sierra, Halpern (1986) describes a similar set of *Eleocharis* types (dominated by *E. montevidensis*) among the hydric montane meadows of Sequoia NP. These are characterized by standing, or nearly stagnant, water at or above the soil surface. Benedict (1981, 1983) also describes an *Eleocharis pauciflora* Association and an *Eleocharis pauciflora-Mimulus primuloides* variant from the Rock Creek and Whitney drainages of Sequoia NP. Finally, Ratliff (1979, 1982) defines an *Eleocharis pauciflora* type (few-flowered spike-rush/Site Class H) from the subalpine zone of Yosemite, Sequoia, and Kings Canyon NPs and adjacent national forest lands.

Montane Wet Communities

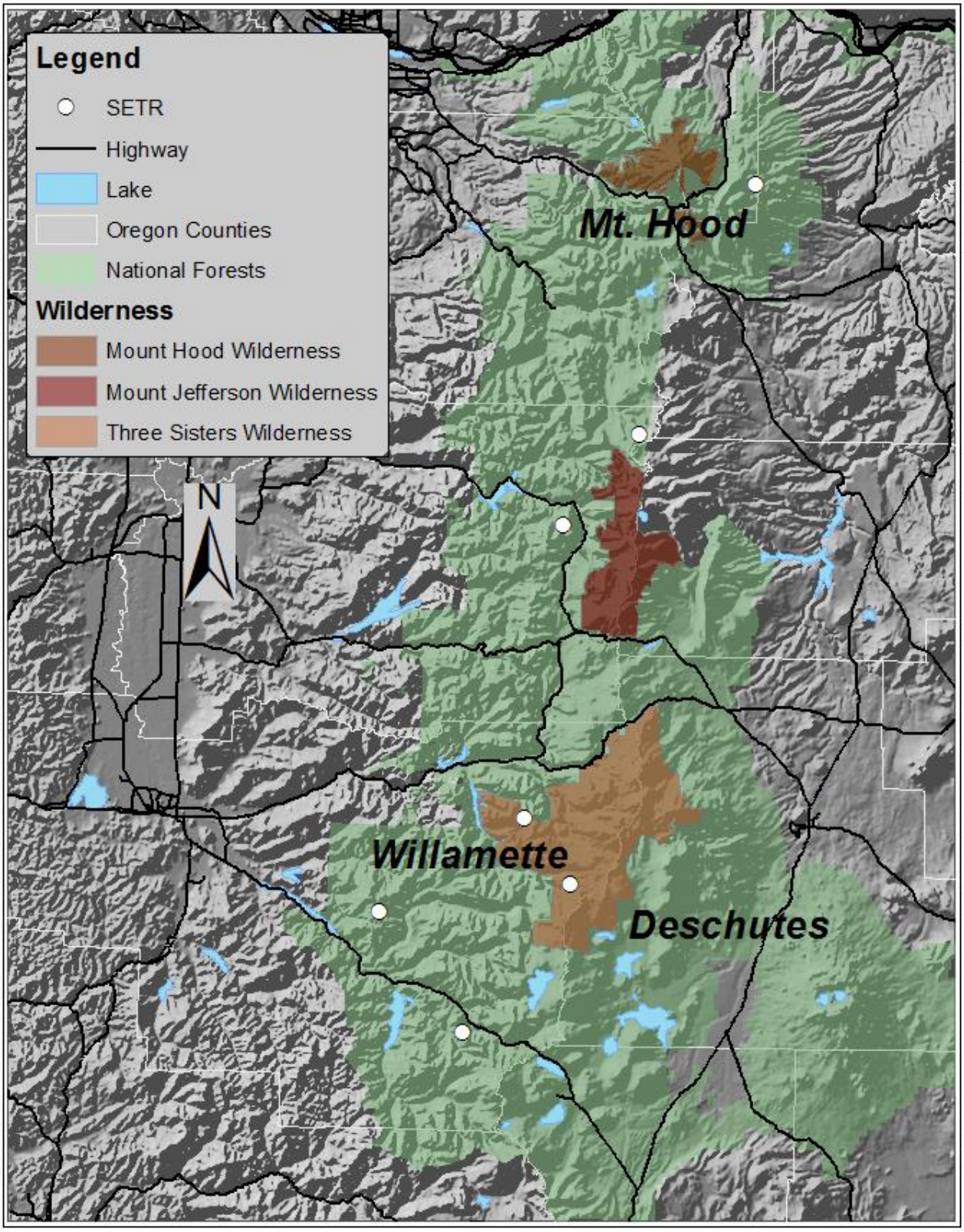
Senecio triangularis (Arrowleaf groundsel)
SETR
Eco-class code: FW4257

SETR. Environmental conditions of plots.

Number of plots	7 (2 Mt. Hood NF, 5 Willamette NF)
Elevation (ft)	Mean = 4500; Range = 3960-4150
Slope (%)	Mean = 4; Range = 0-18
Aspect (no. of plots)	FLAT = 4; NW = 0; NE = 0; SE = 2; SW = 0
Distribution	Western Cascades (57%), High Cascades (43%)
Slope position	Basins and drainages
Slope shape	Straight slopes

Environmental conditions:

SETR is a wet montane community that occurs in basins and drainages in the Western and High Cascades. Slopes are flat to gentle with straight topography. SETR often occurs in larger wetland mosaics with other wet-site communities. Soils can have deep organic horizons. Cover of bare ground, rock, plus gravel average 5%.


Legend
SETR
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
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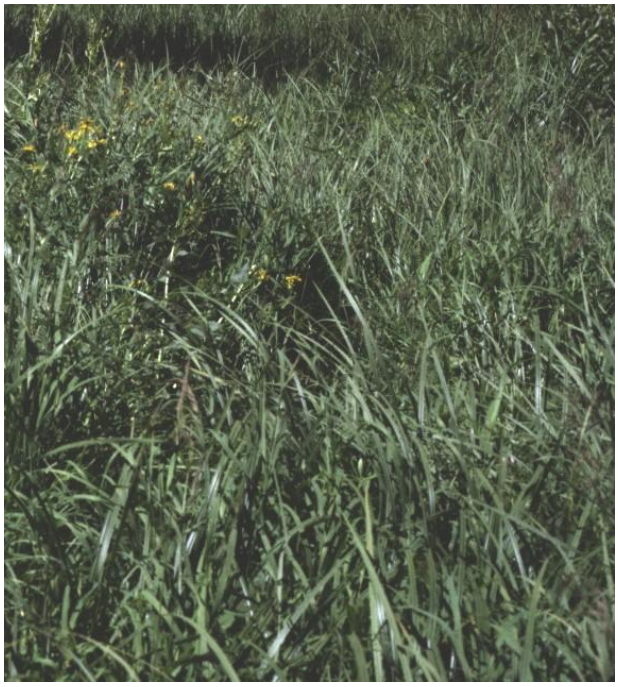
Mt. Hood
Willamette
Deschutes



Vegetation composition:

This diverse forb-graminoid community is characterized by arrowleaf groundsel (SETR), but bluejoint (CACA3) and Columbian monkshood (ACCO4) are generally present. Fringed fireweed (EPCIG) and yellow monkeyflower (MIGU) occur in greater than 50% of the plots.

This is similar to the higher elevation SETR-VERAT-VASI type, but is only two thirds the cover of the VERAT-HELA community with which it can be interspersed. Summed plant cover averages 96%.

Growth form	Mean cover (%)
Forb	51.5
Graminoid	43.6
Shrub	0.6
Tree	0.3

SETR. Constancy table. Canopy cover for species in more than 2 plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
SETR	*Senecio triangularis*	Arrowleaf groundsel	100.0	13.7	13.7
CACA4	*Calamagrostis canadensis*	Bluejoint	71.4	15.4	21.6
ACCO4	*Aconitum columbianum*	Columbian monkshood	71.4	2.3	3.2
EPCIG	*Epilobium ciliatum glandulosum*	Fringed fireweed	57.1	1.4	2.5
MIGU	*Mimulus guttatus*	Yellow monkeyflower	57.1	1.4	2.5
TRLO	*Trifolium longipes*	Long-stalked clover	42.9	2.6	6.0
BOMA3	*Boykinia major*	Large boykinia	42.9	2.4	5.7
POBI6	*Polygonum bistortoides*	American bistort	42.9	2.0	4.7
VERAT	*Veratrum* ssp.	False hellebore	42.9	1.9	4.3
PLRE2	*Pleuropogon refractus*	Nodding semaphore grass	42.9	1.7	4.0
CABI2	*Caltha biflora*	Broad-leaved marsh-marigold	42.9	1.6	3.7
STCHC3	*Stachys chamissonis cooleyae*	Cooley's betony	42.9	1.1	2.7
JUEN	*Juncus ensifolius*	Dagger-leaved rush	42.9	0.4	1.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 1 (1 Mt. Hood NF)

The only full soil profile is from the east side of the Mt. Hood NF. Plot notes provide this description: “Small spring runs mostly underground above on steeper slope, then emerges to provide patchy area of wetland forbs and grasses as well as mountain alder.” On that site, there is a 6” organic surface horizon over a cobbly silt loam A horizon and B horizon. Soil depth is greater than 40”. Depth to summer water table is 10” depth.

On another Mt. Hood NF plot, part of a larger wetland mosaic, greater than 40” of crumbly organic matter is recorded. Brief soil information from 4 Willamette NF includes two plots where the summer water table is at the surface. Soils are silty clay loams or loams, with a surface organic layer 1-20” thick.

Previously described plant associations:

A similar *Senecio triangularis* plant association is described in Christy (2004) in northwestern Oregon. Christy observes that “habitat is hummocks or "tree islands" in peatlands, forest ecotone at edges of wetlands, or in openings on seepy slopes. It is best described as forest ecotone with at least seasonally wet soil.”

Smith (1998) also describes a *Senecio triangularis* type for northeastern California. She observes that “sites are streambanks, floodplains, and gravel point bars in higher gradient perennial streams. Sites receive moisture from upstream flows and from capillary rise. Sites mostly do not dry out during the summer.” Species with high constancy and cover are: *Lupinus latifolius*, *Veratrum californicum*, *Arnica amplexicaulis*, *Aconitum columbianum*, *Mimulus guttatus*, and *Trifolium longipes*.

Crowe et al. (2004) describe a *Senecio triangularis*-mixed subalpine forb plant association for central and eastern Oregon. In addition to *S. triangularis*, plants with high constancy are *Mimulus lewisii* (63%), *Cinna latifolia* (50%), *Heracleum maximum* (50%), *Saxifraga odontoloma* (50%), *Delphinium occidentale* (50%), *Aster* spp. (50%), and *Urtica dioica* (50%). They observe that “a mix of herbaceous forbs and occasionally wet site-loving grasses make up the vegetation cover on the site. Sites vary as to the combination of dominant forbs, which is probably determined, in part, by which species' seeds arrived at the site first.”

Wells (2006) describes a *Senecio triangularis-Mimulus lewisii* plant association for northeastern Oregon. In addition to *S. triangularis*, species with the greatest constancy include *Mimulus lewisii* (90%), *Saxifraga arguta* (72%), *Cinna latifolia* (54%), and *Juncus mertensianus* (27%). He notes that it occurs “throughout the Eagle Cap Wilderness, Strawberry Mountain Wilderness and Seven Devils Mountains.”

Kovalchik (1987) describes a *Senecio triangularis* plant association in the Deschutes, Ochoco, Fremont, and Winema National Forests without *Veratrum* spp. or *Valeriana* spp.

Montane Wet Communities

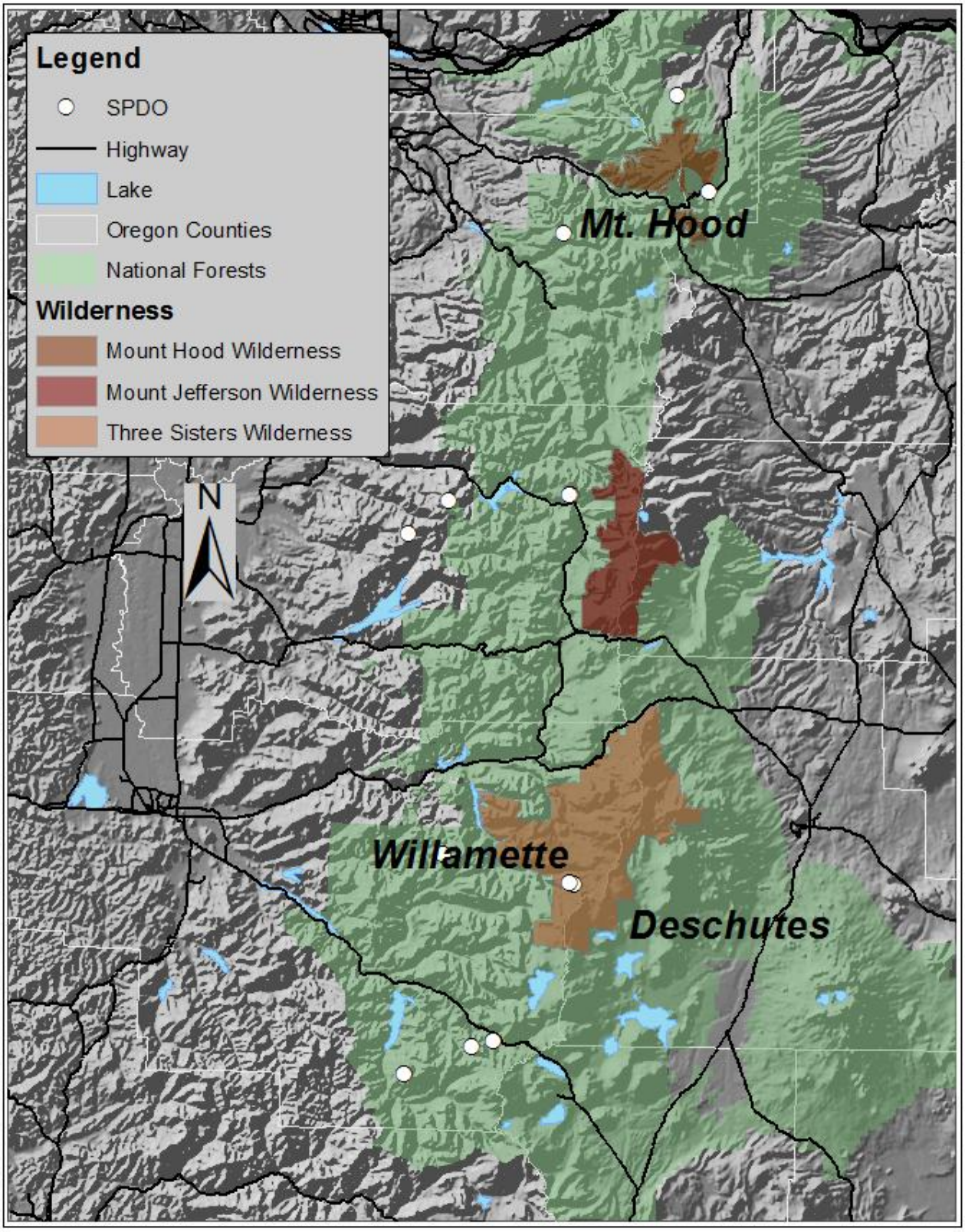
Spiraea douglasii (Douglas' spiraea)
SPDO
Eco-class code: SW4116

SPDO. Environmental conditions of plots.

Number of plots	16 (3 Mt. Hood NF, 12 Willamette NF, 1 Salem BLM)
Elevation (ft)	Mean = 4200; Range = 3460-4900
Slope (%)	Mean = 2; Range = 0-6
Aspect (no. of plots)	FLAT = 7; NW = 5; NE = 1; SE = 2; SW = 1
Distribution	Western Cascades (81%), High Cascades (19%)
Slope position	Basins, toe slopes
Slope shape	Straight to convex

Environmental conditions:

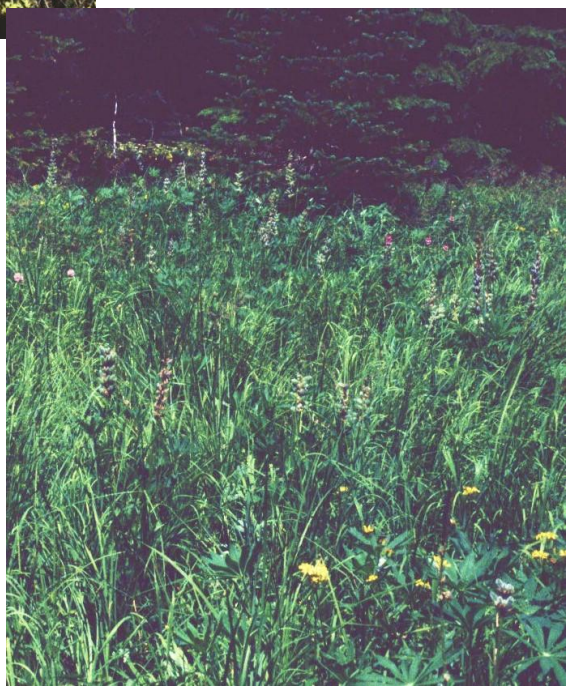
SPDO is a wetland-margin community that occurs in basins or on toeslopes in the Western and High Cascades. Slopes are flat to very gentle with straight or convex topography. It often occurs as a transitional type between upland and wetland communities in a larger mosaic of wet-meadow types. During summer months, depth to the water table can be relatively shallow (6-18"). Soils are generally silt loams or silty clay loams, often with deep surficial organic layers. Some show evidence of buried soils. Cover of bare ground is very low (average of 3% and less than 1%, respectively) and surface rock is absent.


Legend
SPDO
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This structurally simple montane shrub community is characterized by Douglas spiraea (SPDO). Western inflated sedge (CAEX5) is present in at least 50% of the plots. Other shrubs that can occur with high cover include bog blueberry (VAUL), Geyer's willow (SAGE2), oval-leaved blueberry (VAOV), and mountain alder (ALIN2). Summed plant cover averages 125%.

Growth form	Mean cover (%)
Forb	18.7
Graminoid	24.5
Shrub	82.7
Tree	0.4



SPDO. Constancy table. Canopy cover for species in at least 25% of plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
SPDO	*Spiraea douglasii*	Douglas spiraea	93.8	62.5	66.7
CAEX5	*Carex exsiccata*	Western inflated sedge	50.0	5.0	10.0
CACA4	*Calamagrostis canadensis*	Bluejoint	37.5	7.3	19.5
DOJE	*Dodecatheon jeffreyi*	Jeffrey's shootingstar	31.3	5.7	18.2
CAAQD	*Carex aquatilis dives*	Sitka sedge	31.3	1.1	3.4
DECE	*Deschampsia cespitosa*	Tufted hairgrass	31.3	0.8	2.4
CALU7	*Carex luzulina*	Woodrush sedge	25.0	3.4	13.5
VAUL	*Vaccinium uliginosum*	Bog blueberry	25.0	2.8	11.3
CALE8	*Carex lenticularis*	Tufted sedge	25.0	0.7	2.8

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 5 (3 Willamette NF, 2 Mt. Hood NF)

Saturated soil at the surface is noted on two plots. Some sites have water tables within 6-20" of the ground surface during the summer months. Organic layers 5-22+" deep are recorded on 5 plots. A horizons are silt loams or silty clay loams (one loamy sand under 22" of muck and peat-muck). Lower horizons are silt loams, silts, sandy silts or sandy clay loams. Coarse fragment content is low. Some profiles show evidence of buried soils. Mottling or gleying are noted on two plots, indicating fluctuating anaerobic conditions.

Observations from plot notes:

Landscape context: Plots descriptions of landscape context include: "slump pond along edge of cliffs" and "spring-summer pool on a wide shelf," "lake outlet swale," and "pond and wet meadow perched on a shelf high on a mountain side."

Additional descriptions note a "thick band of spiraea," as well as a "shrubby band between open meadow and wet forest." On some sites there is also a ring of rhododendron or rhododendron-mountain alder between SPDO communities and the adjacent upland forest.

Large mammal disturbance: Elk use is noted on several plots.

Previously described plant associations:

A similar *Spiraea douglasii* plant association is described in Christy (2004) in northwestern Oregon. He observes that "habitat is shrub swamp in riparian zones, prairies, and fens. Plots are highly variable and indicate that numerous phases are present that need further study." While the herb cover for the *Spiraea douglasii* plant association described in this guide is low, it is described in Christy's guide as being even sparser: "The association described here is more or less monotypic and common at lower elevations. Trees are absent or peripheral. The shrub layer is dominated by *Spiraea douglasii* with an average cover of 95 percent, and is so dense that the herb layer is nearly nonexistent."

Smith (1998) also describes a *Spirea douglasii* plant association for northeastern California. She notes that "sites are terraces and floodplains along A and B channels, in coniferous forest sites." However, the understory species noted by Smith differ from those in this guide.

Crowe et al. (2004) describe a *Spirea douglasii* plant association for central and eastern Oregon. They explain that "the dense shrub layer is dominated by Douglas spiraea, under which there is a sparse herbaceous layer. Other shrubs occasionally scattered in the shrub over- and understory are Wood's rose, Lemmon willow, common chokecherry, red-osier dogwood and Sitka willow. The scant herb layer includes species such as bluejoint reedgrass, tall mannagrass, Canada violet, common cowparsnip, arrowleaf groundsel, and asters."

Kovalchik and Clausnitzer (2004) describe a *Spirea douglasii* plant association for eastern Washington. Species with high constancy were Douglas spiraea (100%), black hawthorn (100%), common cow-parsnip

(67%), and bluejoint reedgrass (33%). They note that “the probability of finding SPDO stands increases with increasing valley width, decreasing valley gradient, and sites subject to seasonal or permanent flooding.”

Montane Wet Communities

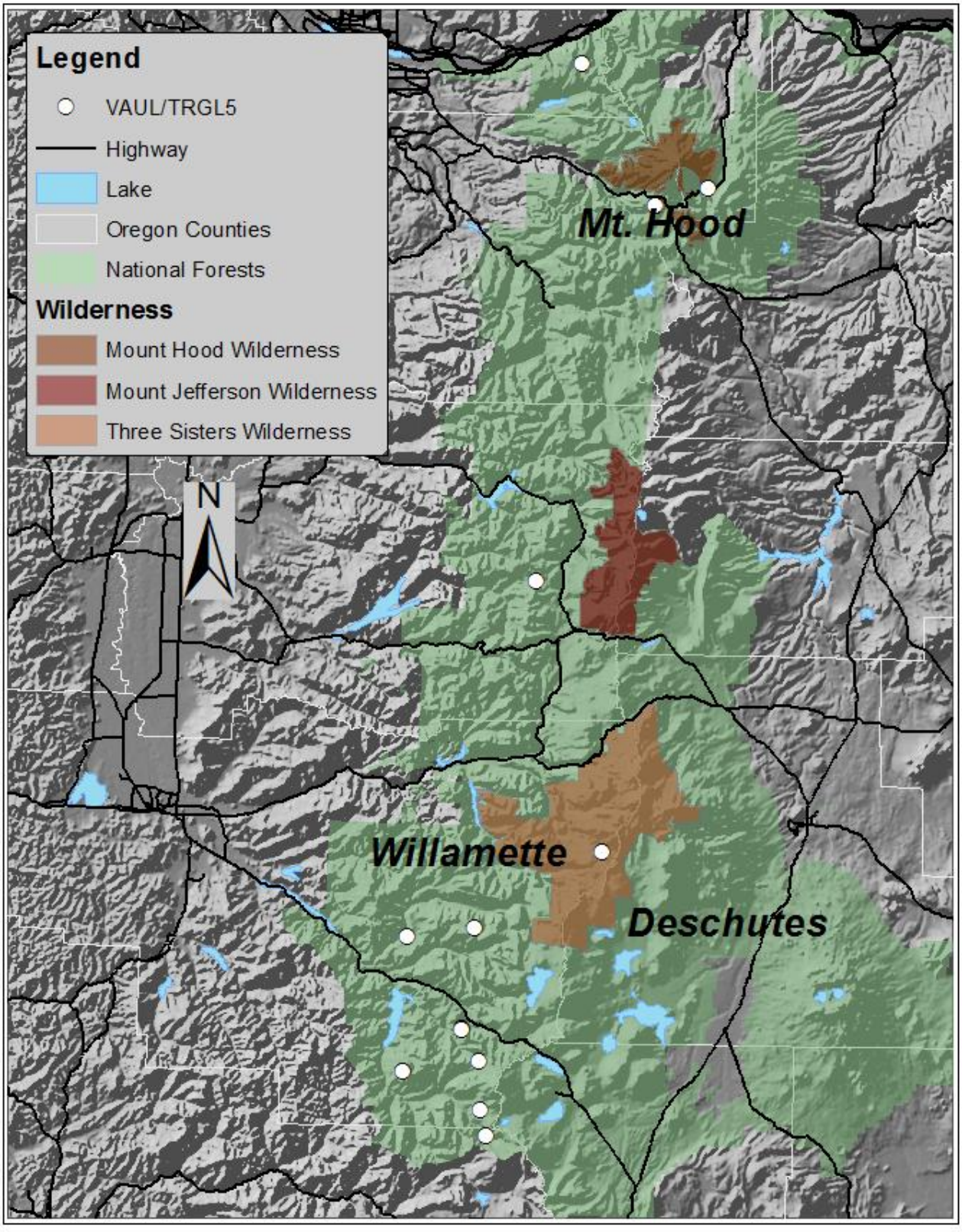
Vaccinium uliginosum/*Triantha glutinosa* (Bog blueberry/Sticky false-asphodel)
VAUL/TRGL5
Eco-class code: SW4103

VAUL/TRGL5. Environmental conditions of plots.

Number of plots	15 (4 Mt. Hood NF, 11 Willamette NF)
Elevation (ft)	Mean = 4350; Range = 3500-5000
Slope (%)	Mean = 2; Range = 0-11
Aspect (no. of plots)	FLAT = 10; NW = 1; NE = 1; SE = 1; SW = 2
Distribution	Western Cascades (73%), High Cascades (33%)
Slope position	Basins
Slope shape	Straight or undulating

Environmental conditions:

VAUL/TRGL5 is a montane fen/bog community that occurs in basins in the Western and High Cascades. Slopes are very gentle with straight to undulating topography. VAUL/TRGL5 sites are perennially moist to saturated with deep peat layers, although VAUL tends to occupy elevated microsites. Cover of bare ground is very low (average of 3%); surface rock and gravel are absent.


Legend
VAUL/TRGL5
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This wet-site community is characterized by bog blueberry (VAUL) and sticky false asphodel (TRGL5). Jeffrey's shootingstar (DOJE), Sitka sedge (CAAQD), marsh-marigold (CALEH2), and elephant's head (PEGR2) occur in greater than 65% of plots. Tufted bulrush (TRCE3) and Booth's willow (SABO2) can be abundant. Summed plant cover averages 102%.

Growth form	Mean cover (%)
Forb	47.0
Graminoid	35.4
Shrub	25.0
Tree	0.3

VAUL/TRGL5. Constancy table. Canopy cover for species in over 25% of plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
VAUL	*Vaccinium uliginosum*	Bog blueberry	100.0	18.9	17.8
TRGL5	*Triantha glutinosa*	Sticky false asphodel	93.3	2.8	2.8
DOJE	*Dodecatheon jeffreyi*	Jeffrey's shootingstar	86.7	6.4	6.9
CAAQD	*Carex aquatilis dives*	Sitka sedge	66.7	10.1	13.8
CABI2	*Caltha biflora*	Broad-leaved marsh-marigold	66.7	9.3	12.6
PEGR2	*Pedicularis groenlandica*	Elephant's head	66.7	1.6	2.1
HYAN2	*Hypericum anagalloides*	Bog St.John's-wort	60.0	11.3	17.0
CALU7	*Carex luzulina*	Woodrush sedge	53.3	1.3	2.2
PLDID	*Platanthera dilatata*	White bog-orchid	46.7	1.3	2.4
AGHU	*Agrostis humilis*	Alpine bentgrass	46.7	0.9	1.8
SPRO	*Spiranthes romanzoffiana*	Ladie's tresses	40.0	0.5	1.2
DECE	*Deschampsia cespitosa*	Tufted hairgrass	33.3	0.8	2.4
TRCE3	*Trichophorum cespitosum*	Tufted bulrush	26.7	9.3	35.0
CAUT	*Carex utriculata*	Northwest Territory sedge	26.7	3.5	13.0
SPHAG2	*Sphagnum* spp.	Sphagnum species	26.7	3.1	11.8
EQAR	*Equisetum arvense*	Common horsetail	26.7	1.4	5.3
DRRO	*Drosera rotundifolia*	Round-leaved sundew	26.7	1.3	5.0
POBI6	*Polygonum bistortoides*	American bistort	26.7	0.3	1.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 6 (5 Mt. Hood NF, 1 Willamette NF)

Upper horizons are organic peat or peat over peat-mucks averaging 16" (2-39+"). A or AC mineral horizons are silt loams, sandy loams, or loams. One AC horizon is gleyed at 10" depth. Lower horizons are silty clay loams, gleyed loam at 30", gleyed silty loam at 24". In two pits, mineral horizons are underlain by deep buried muck-peat layers. Depth to water table averages 7" depth (0-16"). Cursory soil information from Willamette NF plots indicates summer water tables on the surface of 6 plots.

Observations from plot notes:

Soils: Sulfite smells are noted on two of these plots.

Previously described plant associations:

A similar type, *Vaccinium uliginosum/Dodecatheon jeffreyi-Caltha leptosepala* ssp. *howellii* plant association, is described by Christy (2004) in northwestern Oregon. He observes that "habitat is montane fens. *Vaccinium uliginosum* plots are highly variable and indicate that numerous phases are present and need further study." *Triantha glutinosa* (Sticky false asphodel), common in the type described in this guide, is uncommon in Christy's plots (5% constancy).

Crowe et al. (2004) describes a *Vaccinium uliginosum*/*Eleocharis pauciflora* association for central and eastern Oregon that is floristically similar to the type described in this guide. Species with high constancy include *Salix eastwoodiae* (60%), *Polygonum bistortoides* (80%), *Carex utriculata* (70%), *Carex echinata* (70%), *Deschampsia cespitosa* (70%), *Pedicularis groenlandica* (70%), *Tofieldia glutinosa (*now *Triantha glutinosa)* (70%), *Habenaria dilitata* (70%), *Carex aquatilis* var. *dives* (60%), *Dodecatheon jeffreyi* (60%), and *Spiranthes romanzoffiana* (60%). They observe that "sites are poor fens (i.e. they have lower nutrient levels than other fens) developed in zones of abundant rain-fall (more than 39 inches/year). Poor fens are flat, cold, and poorly drained landforms that are conducive to peat soil development."

Kovalchik (1987) describes a *Vaccinium uliginosum*/*Eleocharis pauciflora* plant association (*V. occidentalis* in his guide) that has some similarities to the *Vaccinium uliginosum*/ *Triantha glutinosa* in this guide. It has high constancy of the following species: *Salix eastwoodiae* (90%), *Carex muricata* (80%), *Polygonum bistortoides* (80%), *Deschampsia cespitosa* (70%), *Carex aquatilis* var. *dives* (70%), *Dodecatheon* sp. (70%), *Habaneria dilitata* (70%), *Pedicularis groenlandica* (70%) and *Tofieldia glutinosa* (now *Triantha glutinosa)* (70%).

Subalpine Dry Communities

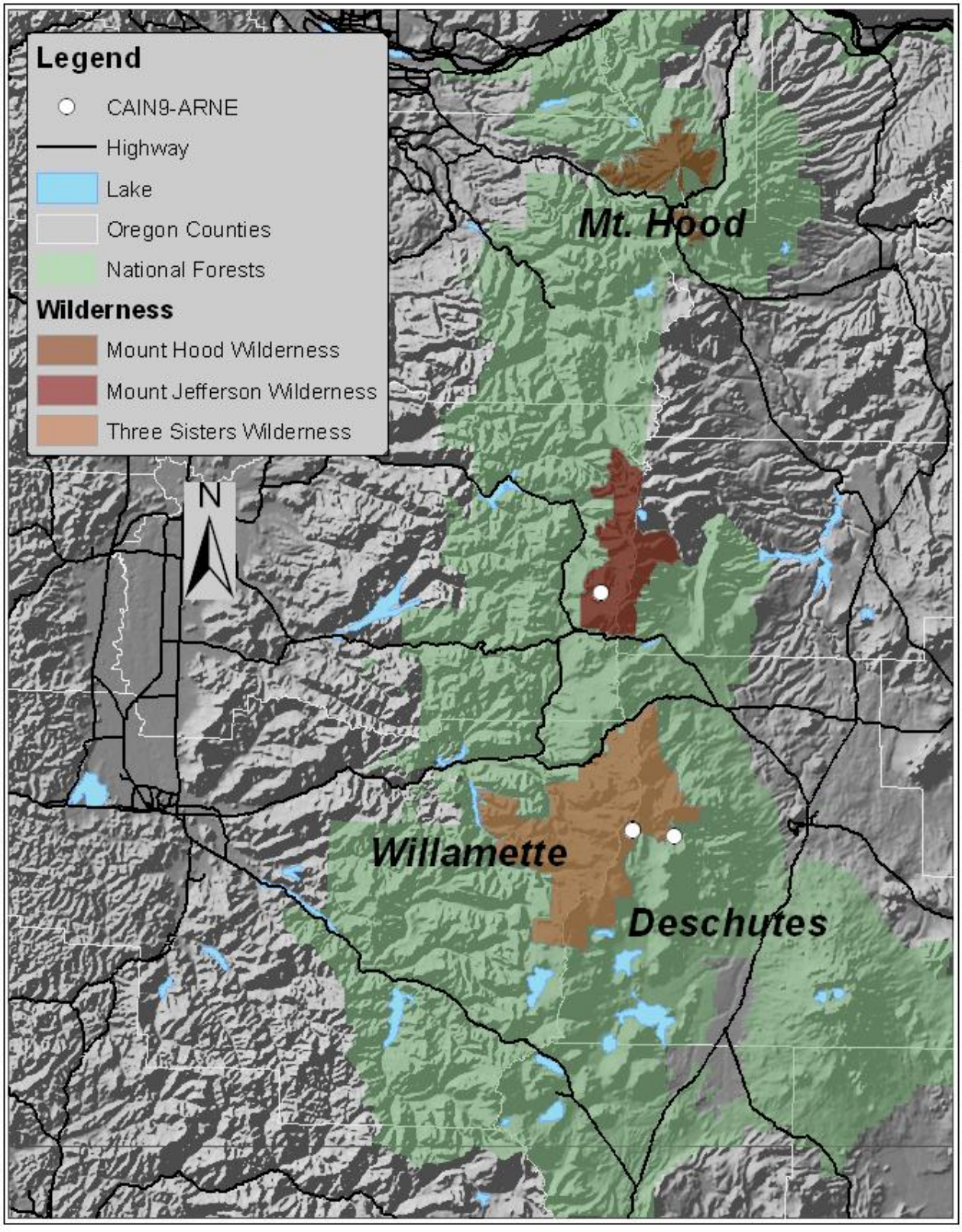
Carex inops-Arctostaphylos nevadensis (Long stolon sedge-Pinemat manzanita)
CAIN9-ARNE
Eco-class code: GS4024

CAIN9-ARNE. Environmental conditions of plots.

Number of plots	4 (1 Willamette NF, 3 Deschutes NF)
Elevation (ft)	Mean = 6770; Range = 6140-6550
Slope (%)	Mean = 74; Range = 70-80
Aspect (no. of plots)	FLAT = 0; NW = 2; NE = 0; SE = 2; SW = 0
Distribution	High Cascades (100 %)
Slope position	Ridges, also mid to upper slopes
Slope shape	Mainly convex; sometimes undulating

Environmental conditions:

CAIN9-ARNE is a sparse subalpine shrub-sedge community, growing on fractured rock or gravelly, rocky surfaces. Slopes are very steep and convex. Soils develop in sands pockets in rock or in pumice, or in rock fields. Cover of gravel, rock, and bare ground average 89%. Steep slopes and skeletal soils provide an extremely dry, harsh environment.


Legend
CAIN9-ARNE
Highway
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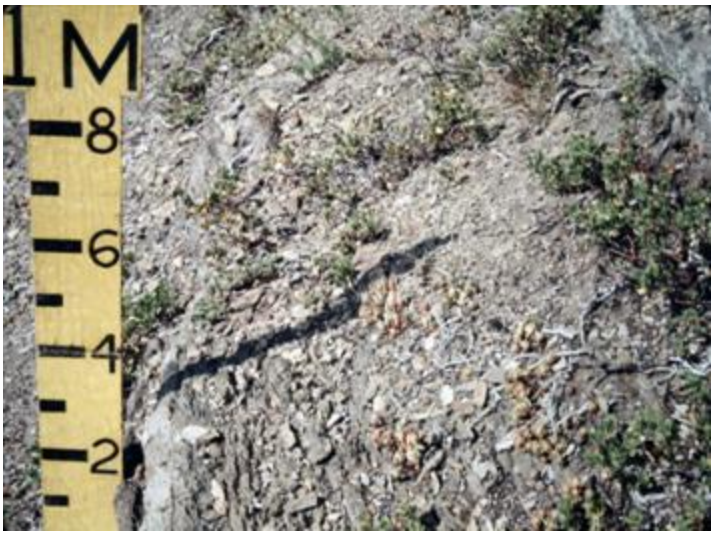
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes



Vegetation composition:

This sparse, dry subalpine community is characterized by long stolon sedge (CAIN9) and pinemat manzanita (ARNE), with small mountain hemlock (TSME). Creamy stonecrop (SEOR2), lace fern (CHGR), squirreltail (ELEL5), and oceanspray (HODI) are present in 75% of the plots. Summed plant cover averages 51%.

Growth form	Mean cover (%)
Forb	14.3
Graminoid	17.0
Shrub	13.8
Tree	5.5

CAIN9-ARNE. Constancy table. Canopy cover for species in more than 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
CAIN9	*Carex inops*	Long stolon sedge	100.0	14.0	14.0
ARNE	*Arctostaphylos nevadensis*	Pinemat manzanita	100.0	5.5	5.5
TSME	*Tsuga mertensiana*	Mountain hemlock	100.0	1.8	1.8
SEOR2	*Sedum oregonense*	Creamy stonecrop	75.0	4.0	5.3
CHGR	*Cheilanthes gracillima*	Lace fern	75.0	1.3	1.7
ELEL5	*Elymus elymoides*	Squirreltail	75.0	1.0	1.3
HODI	*Holodiscus discolor*	Oceanspray	75.0	0.8	1.0
PICO	*Pinus contorta*	Lodgepole pine	50.0	2.0	4.0
PAMY	*Pachistima myrsinites*	Oregon boxwood	50.0	1.8	3.5
PIAL	*Pinus albicaulis*	Whitebark pine	50.0	1.5	3.0
ACOC3	*Achnatherum occidentale*	Western needlegrass	50.0	1.0	2.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 1 (Deschutes NF)

The soil profile shows a soil developed in two layers of pumice. The surface A horizon is a shallow (0-4”) sandy loam over a second gravelly loamy sand A2 (4-20”). The C horizon is a sandy loam. Roots penetrate to >30” depth. Erosion pavement covers 60% of the surface.

Observations from plot notes:

Soil: Narratives for two other Deschutes NF plots are available. For those two plots, the sites are described as "solid stone with plants growing in cracks or minute soil pockets" or "largely without soil—plants growing in cracks and talus deposits."

Subalpine Dry Communities

Lupinus sericeus (Silky lupine)
LUSE4
Eco-class code: FS6023

LUSE4. Environmental conditions of plots.

Number of plots	11 (11 Mt. Hood NF)
Elevation (ft)	Mean = 5450; Range = 5050-5780
Slope (%)	Mean = 55; Range = 40-65
Aspect (no. of plots)	FLAT = 0; NW = 5; NE = 0; SE = 3; SW = 3
Distribution	High Cascades (100 %)
Slope position	Ridges to mid slopes
Slope shape	Undulating to convex

Environmental conditions:

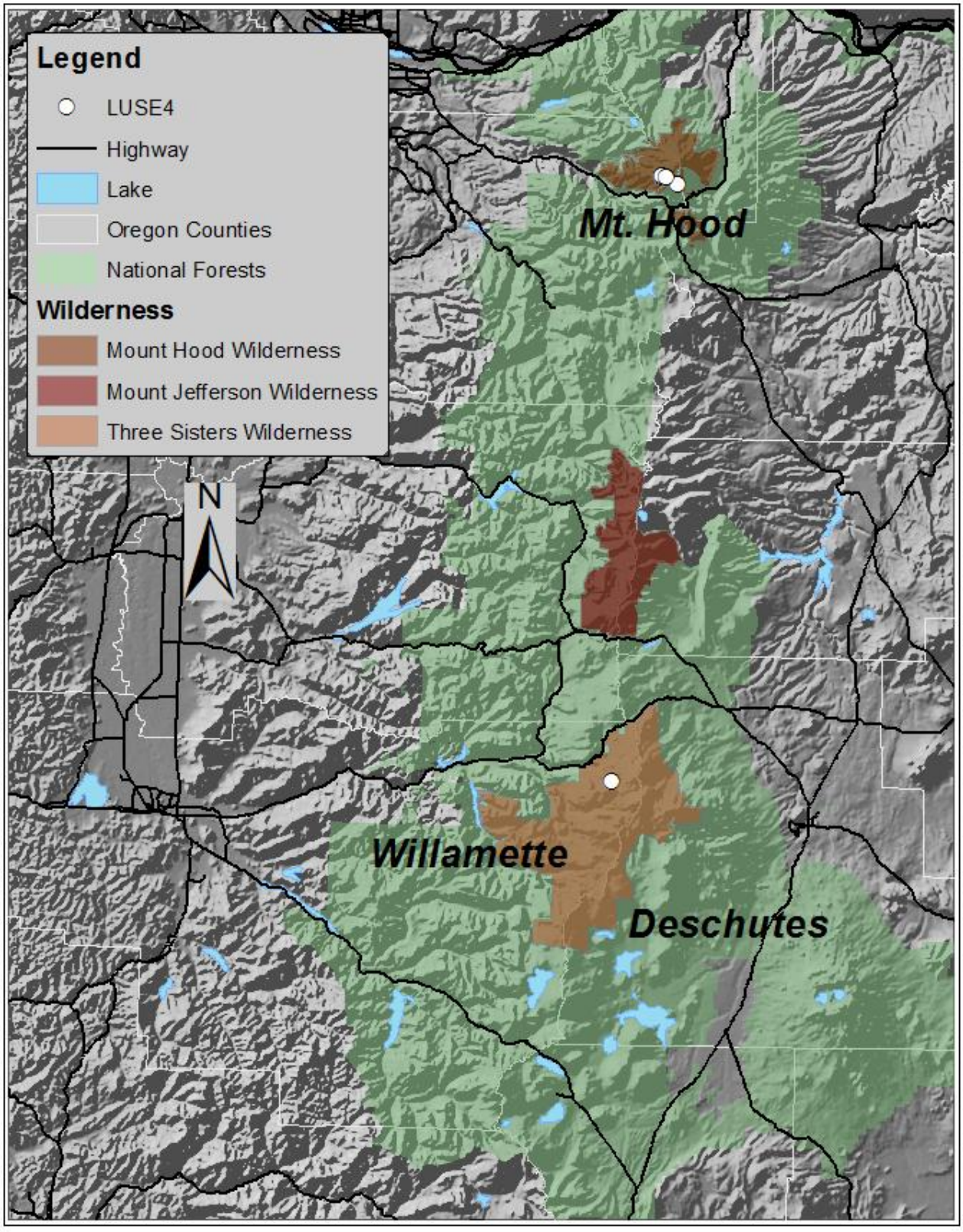
LUSE4 occurs on steep, well drained, mid-slope to ridge positions at lower elevations in the subalpine zone. Aspects were fairly evenly distributed between southeast, southwest, and northwest aspects. Topography is mainly undulating, but ranges from straight to convex. Cover of bare soil, rock, and gravel average 39%.

Vegetation composition:

This subalpine community is dominated by silky lupine (LUSE4), generally with Cascades aster (EULEL2), thin bentgrass (AGPA8), Davis' knotweed (PODA), and sulfur buckwheat (ERUM). Shrub cover is higher for this community than in other similar types. Common shrubs include common juniper (JUCO4), pinemat manzanita (ARNE), mountain ash (SOSI2), and subalpine spiraea (SPDE). When shrub cover is high, herbaceous species' covers are reduced compared to typical LUSE4 plots. Summed plant cover averages 62%.

LUSE4 is somewhat similar to PODA-EULEL2, but has higher vegetation cover, lower rock and gravel cover, and deeper rooting zones, reflecting a slightly moister growing environment.

Growth form	Mean cover (%)
Forb	33.7
Graminoid	7.3
Shrub	20.5
Tree	0.2


Legend
LUSE4
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

LUSE4. Constancy table. Canopy cover for species in over 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
LUSE4	*Lupinus sericeus*	Silky lupine	100.0	10.7	10.7
EULEL2	*Eucephalus ledophyllus* var. *ledophyllus*	Cascade aster	90.9	9.5	10.5
AGPA8	*Agrostis pallens*	Thin bentgrass	90.9	3.7	4.1
ERUM	*Eriogonum umbellatum*	Sulfur buckwheat	81.8	2.8	3.4
PODA	*Polygonum davisiae*	Davis' knotweed	81.8	2.5	3.1
ELEL5	*Elymus elymoides*	Squirreltail	54.5	0.9	1.7
ACMI2	*Achillea millefolium*	Yarrow	45.5	0.5	1.0
POPU3	*Polemonium pulcherrimum*	Showy Jacob's-ladder	36.4	2.9	8.0
BRCA5	*Bromus carinatus*	California brome	36.4	0.5	1.5
CASU2	*Calochortus subalpinus*	Subalpine mariposa lily	27.3	0.4	1.3
LOMA5	*Lomatium martindalei*	Martindale's lomatium	27.3	0.3	1.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 2 (2 Mt. Hood NF)

Soils are coarse sands or sandy loams over cobbly C horizons, without developed B horizons. Profiles typically include two or more A horizons or an AC horizon of gravelly sands or sandy loams, with cobbly C horizons about 30” depth.

Observations from plot notes:

Small and large mammal disturbance: No deer browse or pocket gopher evidence is recorded on the plots.

Subalpine Dry Communities

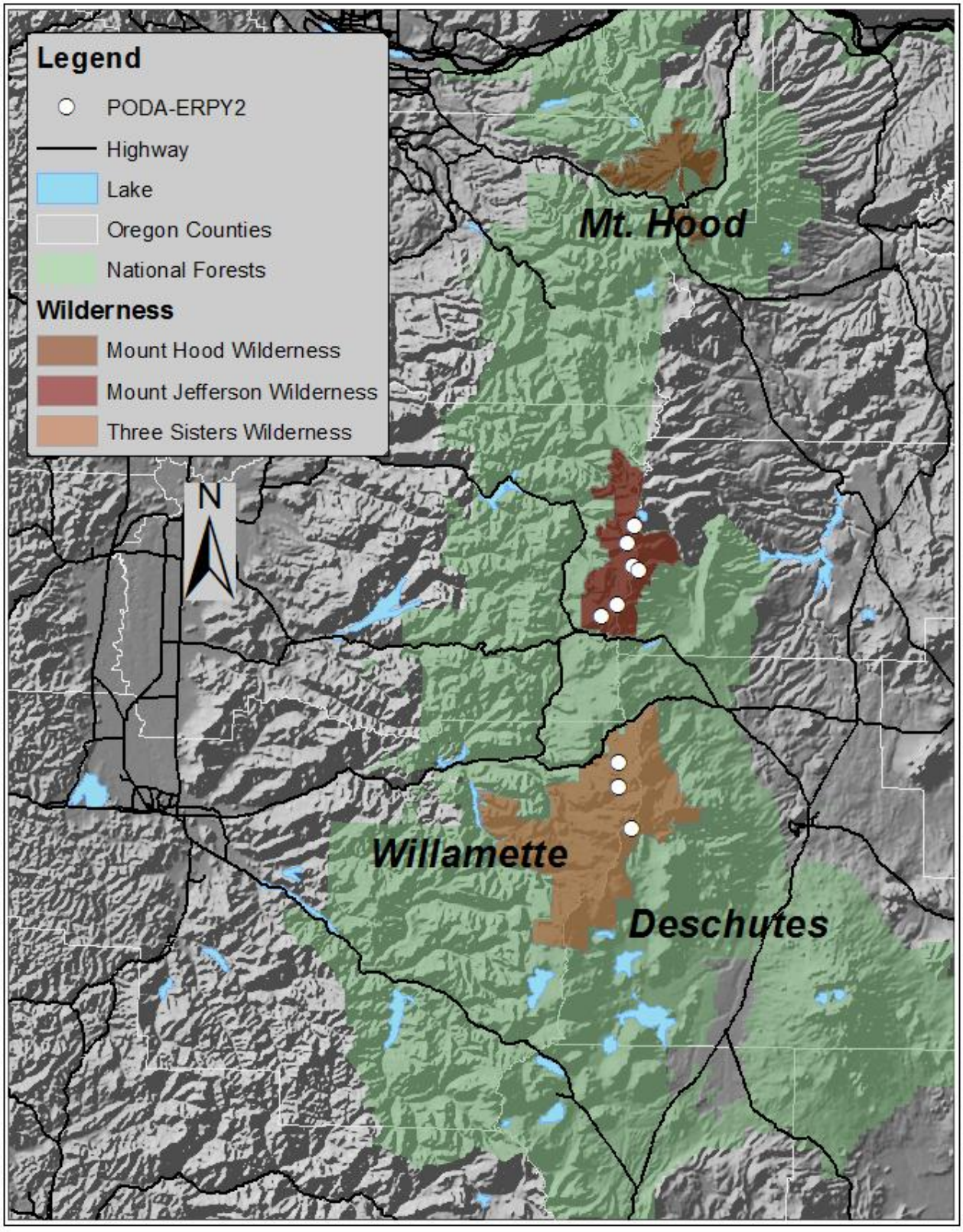
Polygonum davisiae-Eriogonum pyrolaefolium (Davis' knotweed-Alpine buckwheat)
PODA-ERPY2
Eco-class code: FS4102

PODA-ERPY2. Environmental conditions of plots.

Number of plots	9 (6 Willamette NF, 3 Deschutes NF)
Elevation (ft)	Mean = 6050; Range = 5250-6625
Slope (%)	Mean = 18; Range = 0-65
Aspect (no. of plots)	FLAT = 3; NW = 1; NE = 0; SE = 4; SW = 1
Distribution	High Cascades (100 %)
Slope position	Various (ridges, slopes, basins, draws)
Slope shape	Concave (4), convex (2), straight (2), undulating (1)

Environmental conditions:

PODA-ERPY2 is tightly associated with extremely harsh sites on substrates of volcanic sands or scoria. Erosion pavement (surface gravels where fines are winnowed by erosion) is characteristic. Slopes can be flat to steep, with all topographic shapes. Cover of bare ground, rock, and gravel average 96%. The soils are extremely dry and shallow, with high coarse fragment content and very limited effective rooting depths. Frost heaving, wind, and water erosion are constant disturbance agents. Substrate is a major limiting factor.


Legend
PODA-ERPY2
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This dry, sparse subalpine community is co-dominated by Davis' knotweed (PODA) and alpine buckwheat (ERPY2). Martindale's lomatium (LOMA5) and alpine lake false dandelion (NOAL2) are found in over 66% of the plots. Summed plant cover averages 24%. The low plant cover and shallow rooting zones reflect the drier conditions this community occupies, compared to the similar PODA-EULEL2 type.

Growth form	Mean cover (%)
Forb	22.1
Graminoid	1.9
Tree	1.9

PODA-ERPY2. Constancy table. Canopy cover for species in at least 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
PODA	*Polygonum davisiae*	Davis' knotweed	100.0	9.7	9.7
ERPY2	*Eriogonum pyrolaefolium*	Alpine buckwheat	100.0	5.9	5.9
LOMA5	*Lomatium martindalei*	Martindale's lomatium	66.7	0.7	1.0
NOAL2	*Nothocalais alpestris*	Alpine lake false dandelion	66.7	0.6	0.9
ELEL5	*Elymus elymoides*	Squirreltail	55.6	0.7	1.2
CIUMU	*Cistanthe umbellata* var. *umbellata*	Pussypaws	44.4	1.0	2.3
LULA4	*Lupinus latifolius*	Broadleaf lupine	44.4	0.9	2.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 5 (2 Willamette NF, 3 Deschutes NF)

Soils are extremely coarse textured gravelly sands from cinders, scoria, or fresh volcanic sands. A horizons are gravelly sands or sands. Profiles typically include two or more AC horizons over a series of C horizons. Massive structure in some horizons is noted. Platy structure in one pit restricts rooting. Rooting depth averages 9" (4-16"), and total depth averages 18" (4-24+").

Observations from plot notes:

Vegetation: On one plot, mountain hemlock occur as island colonies on rock outcrops, not on the cinders. Pedestalling of pussypaws, broadleaf lupine, and grasses is noted, associated with wind erosion of soil fines and frost heaving.

Soil: Observations on one plot describe a "gravel mulch on surface. ERPY2 (alpine buckwheat) roots run horizontal under mulch."

Previously described plant associations:

There are very few similar plant associations, although Douglas and Bliss (1977) describe an *Eriogonum pyrolaefolium/Luzula piperi* association in their snowbed community type for the North Cascade Range of Washington. Other plants with relatively low prominence values were *Carex pyrenacia*, *Erigeron aureus* and the moss *Polytrichum piliferum*. Rather than use cover and constancy, they calculated a prominence value by multiplying the average percentage cover by the square root of the species frequency in each stand.

Subalpine Dry Communities

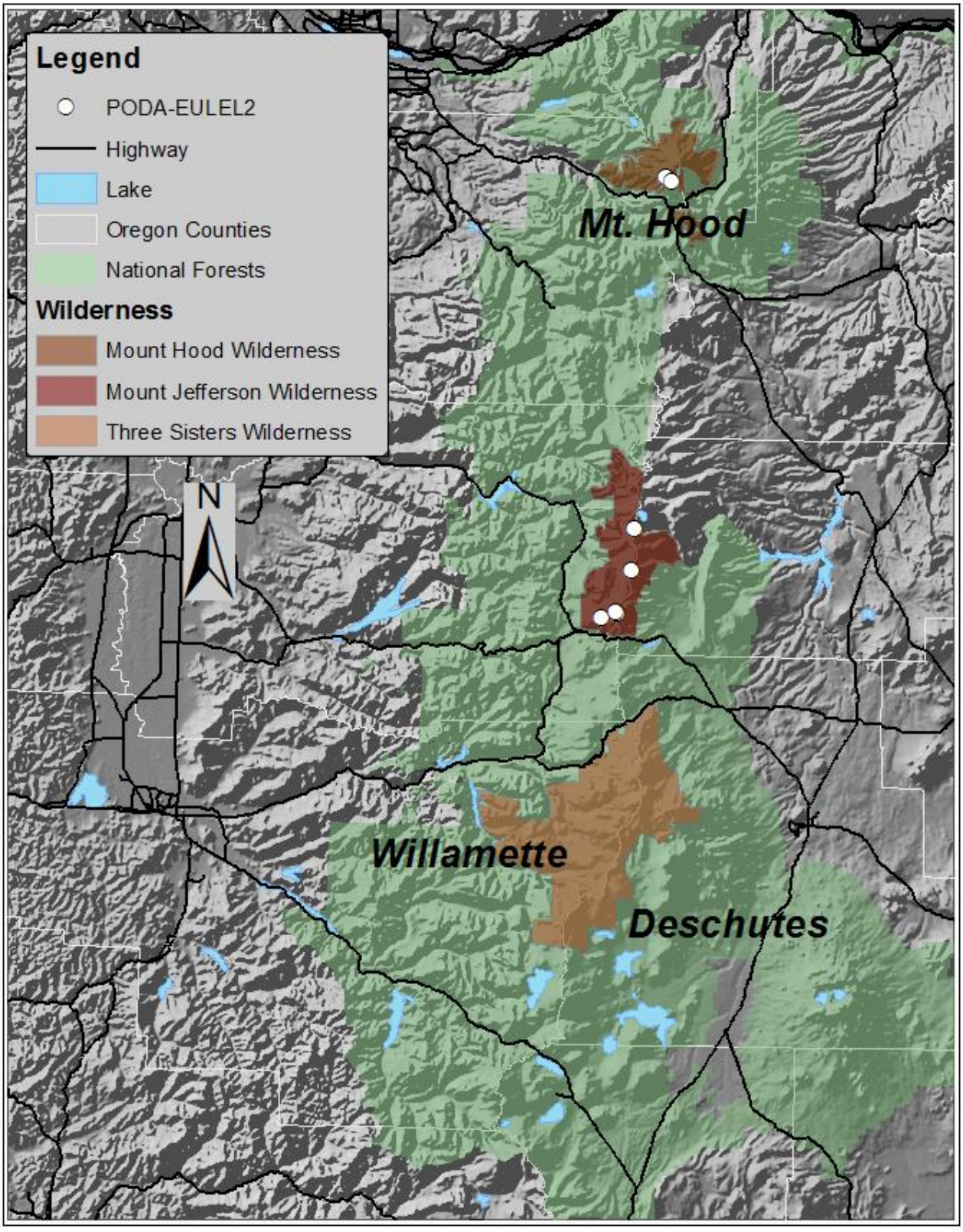
Polygonum davisiae-Eucephalus ledophyllus var. *ledophyllus* (Davis polygonum-Cascades aster)
PODA-EULEL2
Eco-class code: FS4203

PODA-EULEL2. Environmental conditions of plots.

Number of plots	10 (5 Mt. Hood NF, 4 Willamette NF, 1 Deschutes NF)
Elevation (ft)	Mean = 6000; Range = 5270-6450
Slope (%)	Mean = 40; Range = 3-67
Aspect (no. of plots)	FLAT = 0; NW = 1; NE = 2; SE = 1; SW = 6
Distribution	High Cascades (100 %)
Slope position	Mid to upper slopes
Slope shape	Undulating to convex

Environmental conditions:

PODA-EULEL2 is associated with harsh sites, most often on warm aspects on steep mid to upper slopes. It occurs frequently on talus or scree slopes, in scoria (volcanic cinders) colluvium. Erosion pavement is significant. Surfaces are easily eroded, evidenced by pedestalled plants, cupping, root exposure, and bare soil. Cover of bare ground, rock, and gravel average 81%. Slopes are generally steep, with undulating to convex topography. The soils are extremely dry but deeper than PODA-ERPY2. Soils show multiple erosion and deposition events.


Legend
PODA-EULEL2
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This dry subalpine community is dominated by Davis' knotweed (PODA) and Cascades aster (EULEL2), generally with broadleaf lupine (LULA4). Rabbitbrush (ERBL2) is the only shrub species that occurs with more than trace cover on one plot. Summed plant cover averages 39%.

PODA-EULEL2 is similar to PODA-ERPY2, but has higher vegetation cover, lower rock and gravel cover, and deeper rooting zones, reflecting a slightly moister growing environment.

Growth form	Mean cover (%)
Forb	33.0
Graminoid	5.8
Shrub	0.8
Tree	1.1

PODA-EULEL2. Constancy table. Canopy cover for species in over 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
PODA	*Polygonum davisiae*	Davis' knotweed	100.0	13.1	13.1
EULEL2	*Eucephalus ledophyllus*	Cascade aster	100.0	6.3	6.3
LULA4	*Lupinus latifolius*	Broadleaf lupine	70.0	6.7	9.6
CIUMU	*Cistanthe umbellata*	Pussypaws	50.0	1.0	2.0
ELEL5	*Elymus elymoides*	Squirreltail	50.0	0.6	1.2
LUPE	*Luetkea pectinata*	Partridge foot	40.0	0.9	2.3
FEVI	*Festuca viridula*	Greenleaf fescue	40.0	0.4	1.0
LOMA5	*Lomatium martindalei*	Martindale's lomatium	40.0	0.4	1.0
TSME	*Tsuga mertensiana*	Mountain hemlock	30.0	0.5	1.7
ABLA	*Abies lasiocarpa*	Subalpine fir	30.0	0.4	1.3

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 5 (1 Mt. Hood, 3 Willamette NF, 1 Deschutes NF)

Soils are extremely coarse textured sands or gravelly sands from cinders, scoria, or fresh volcanic sands. Profiles typically include two or more gravelly sand or sand AC horizons over a series of C horizons. Cobble sized colluvium or compacted platy sand are noted in the lower horizons. Rooting depth averages 19" (11-32"), and total depth averages 27" (24-36+").

Observations from plot notes:

Vegetation: Mountain hemlock and/or white bark pine occur as island colonies on nearby rock outcrops or ridges, but not within this community.

Soil: Notes from one plot in the Mt. Jefferson Wilderness record that stone lines run vertically down slope (typical of fell-fields); most recent rock lines are associated with Davis' knotweed (PODA) and broadleaved lupine (LULA4). More stabilized talus support Cascade aster (EUEL2) and other species such as smallflowered woodrush (LUPA4), thick-headed sedge (CAPA14), and western bluegrass (POSU10).

Small mammal disturbance: Deer browse and some pocket gopher disturbance are noted on several plots.

Subalpine Mesic Communities

Festuca viridula (Greenleaf fescue): Group description
FEVI group

FEVI [AGPA8 phase]

FEVI [CAIN9 phase]

FEVI [CASP5-LULA4 phase]

FEVI [EULEL2 phase]

FEVI [PODA phase]

Greenleaf fescue group:

The FEVI communities are bunchgrass -forb meadows on well drained subalpine or upper montane slopes. Forbs are important in these communities, and can dominate. Species composition (described below as phases) and overall plant cover vary with the moisture gradient from dry to mesic.

FEVI group. Environmental conditions of plots.

Number of plots	68 (45 Mt. Hood NF, 18 Willamette NF, 5 Deschutes NF)
Elevation (ft)	Mean = 5900; Range = 5075-7375
Slope (%)	Mean = 31; Range = 0-98
Aspect (no. of plots)	FLAT = 2; NW = 16; NE = 11; SE = 14; SW = 25
Distribution	Western Cascades (3%), High Cascades (97%)
Slope position	Mid to upper slope
Slope shape	Straight, undulating, to convex topography

Deep soils develop in volcanic deposits: sandy loams to loamy sands over sands and gravels. Slopes are generally moderate to steep, with straight, undulating or convex topography. Pocket gopher mixing contributes to meadow maintenance and bare ground.

Environmental conditions:

Well-drained growing conditions are due to slopes, mid-to upper slope positions, and topography that do not concentrate water. Alluvial erosion and deposition are associated with snow melt, resulting in multiple horizons of sandy loams and loamy sands. Some phases are characterized by gravelly soils, and other lusher phases characterized by deeper, more developed fine soils. Conditions are mesic to dry during the growing season. Cover of bare ground, rock, and gravel average 23%. The phases appear to span a moisture gradient from dry to moist: PODA (driest), CAIN9, EULEL2, AGPA8, CASP5-LULA4 (moistest).

FEVI [CASP5-LULA4 phase] vegetation

Vegetation composition:

This subalpine meadow group is dominated by greenleaf fescue (FEVI). Broadleaf lupine (LULA4), Cascades aster (EULEL2), and showy sedge (CASP5) are found in at least half the plots. Other important species in these meadows include subalpine mariposa lily (CASU2), Davis' knotweed (PODA), and alpine lake false dandelion (NOAL2). Summed plant cover averages 81%. Species composition of the meadows varies with soil texture and aspect. Species distributions are determined by patchy soil development resulting from complex erosional/ depositional patterns.

FEVI group. Constancy table. Canopy cover for species in at least 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
FEVI	*Festuca viridula*	Greenleaf fescue	98.5	23.4	23.8
LULA4	*Lupinus latifolius*	Broadleaf lupine	73.5	10.9	14.8
EULEL2	*Eucephalus ledophyllus* var. *ledophyllus*	Cascade aster	66.2	7.5	11.3
CASP5	*Carex spectabilis*	Showy sedge	51.5	6.0	11.7
CASU2	*Calochortus subalpinus*	Subalpine mariposa lily	39.7	1.2	3.1
PODA	*Polygonum davisiae*	Davis' knotweed	38.2	1.9	5.1
NOAL2	*Nothocalais alpestris*	Alpine lake false dandelion	38.2	0.6	1.7
HIGR	*Hieracium gracile*	Slender hawkweed	32.4	0.4	1.4
PUOC	*Pulsatilla occidentalis*	Western pasqueflower	30.9	4.1	13.3
LIGR	*Ligusticum grayi*	Gray's lovage	29.4	0.4	1.4
ELEL5	*Elymus elymoides*	Squirreltail	26.5	0.8	3.0
CAIN9	*Carex inops*	Long stolon sedge	25.0	1.8	7.1
AGAU2	*Agoseris aurantiaca*	Orange agoseris	25.0	0.4	1.5

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 29 (17 Mt. Hood NF, 9 Willamette NF, 1 Deschutes NF)

Soils are well drained, coarse textured deposits derived from volcanic sands, pumice, and ash. Profiles are moderately to very deep sandy loams or loamy sands, with series of A over C horizons. B horizons are uncommon, but characterize the FEVI [CASP5-LULA4 phase]. Surface rock and gravel are most important for the dry PODA phase, and distinguish the EULEL2 phase from the floristically similar CASP5-LULA4 phase.

Previously described plant associations:

Douglas and Bliss (1977) describe a *Festuca viridula* community in their mesic herb community type for the North Cascade Range of Washington. They note that "this community type is apparently restricted to lower elevations (1,850 m to 2,150 m) on southern, well-drained slopes in the central North Cascades. These slopes become free of snow about the same time as in the *Lupinus* habitats but soils become drier during late summer. This community is floristically similar to those in the subalpine. Because of its occurrence only in the lower alpine zone, it may best be considered a high subalpine community. This community is closely related to the *Lupinus* type with a large number of species common to both. Total vascular plant cover is much lower, however, and the average number of species per stand is greater in the *Festuca viridula* type. *Festuca* has a relatively high average cover and frequency. Other important plants are *Antennaria*

lanata, *Arenaria capillaris*, *Agoseris glauca* var. *dasycephala*, *Lupinus latifolius* var. *subalpinus*, *Potentilla flabellifolia*, *Juncus parryi*, and *Arnica rydbergi*."

Johnson and Hall (1990) describe a *Festuca viridula* community for the Blue Mountains of Oregon. Plants with high constancy were Idaho fescue (100%), yarrow (100%) and Sandberg's bluegrass (75%). Although sedges are not listed among the species with high constancy, they note that sedges such as *Carex rossii* and *C. geyeri* are components of the high elevation fescue-dominated communities.

Johnson (2004) describes a *Festuca viridula* series for the alpine and subalpine vegetation of the Wallowa, Seven Devils and Blue Mountains of Oregon. He notes that "green fescue communities at high elevations in the Wallowa Mountains reflect a cold, moist climate where green fescue is more adapted than Idaho fescue. In late seral stands, green fescue forms dense mats with relatively few breaks in the continuous sod. If pristine stands were available, a basically forb-free grassland would be achievable." He adds later that overgrazing results in the exposure of bare ground, and through wind and water erosion these communities can look hummocky. The plant associations described in Johnson's guide are: *F. viridula*; *F. viridula-Lupinus laxiflorus*; *F. viridula-Juncus parryi*; *F. viridula-Carex rossii*; *F. viridula-Carex hoodii*; *F. viridula-Penstemon*; and *F. viridula-Stipa occidentalis*.

Subalpine Mesic Communities

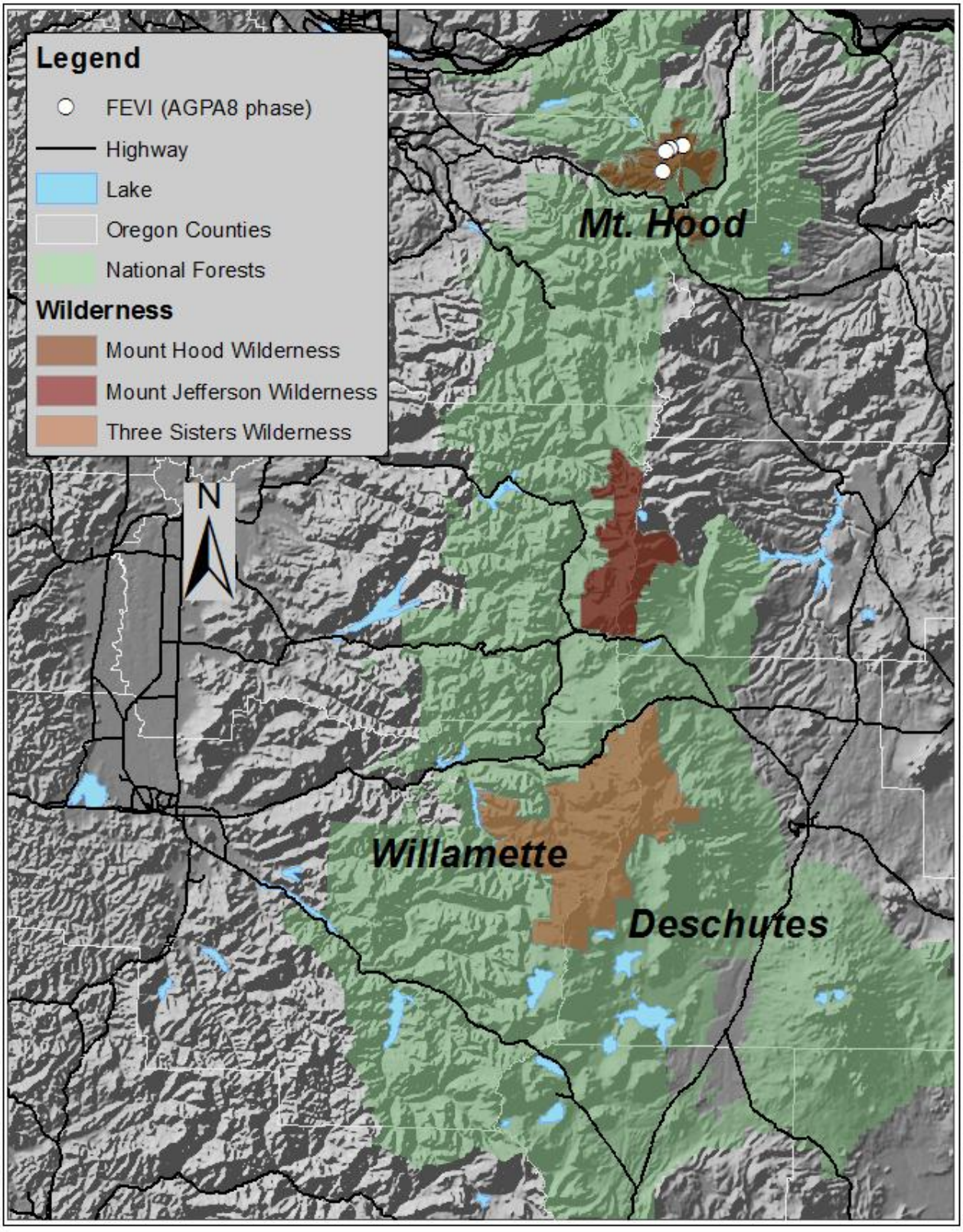
Festuca viridula [*Agrostis pallens* phase] (Greenleaf fescue [Thin bentgrass phase])
FEVI [AGPA8 phase]
Eco-class code: GS1120

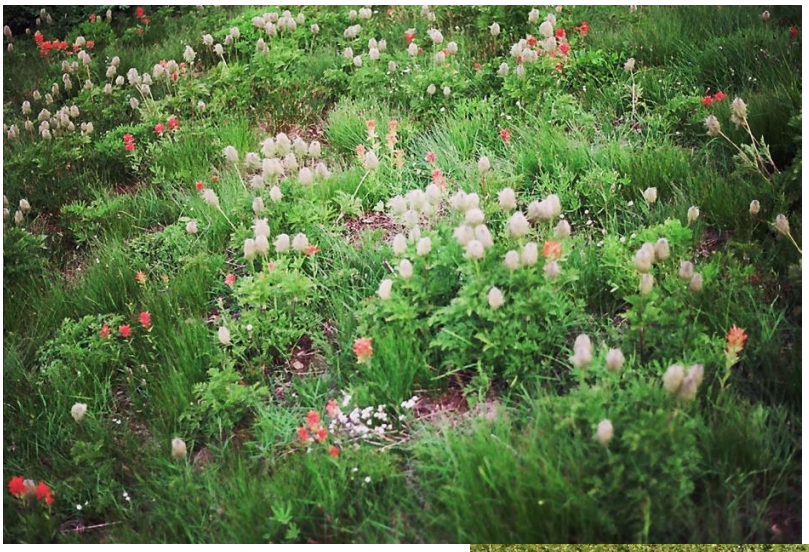
FEVI [AGPA8 phase]. Environmental conditions of plots.

Number of plots	7 (7 Mt. Hood NF)
Elevation (ft)	Mean = 6200; Range = 5525-7375
Slope (%)	Mean = 37; Range = 17-58
Aspect (no. of plots)	FLAT = 0; NW = 4; NE = 1; SE = 1; SW = 1
Distribution	High Cascades (100 %)
Slope position	Upper to mid slopes
Slope shape	Straight or undulating

Environmental conditions:

In FEVI [AGPA8 phase], slopes are moderate to steep, with straight to undulating topography. Well-drained growing conditions are a product of mid- to upper-slope position, coarse soils, and steep slopes. Cover of bare ground, rock, and gravel average 12%.


Legend
FEVI (AGPA8 phase)
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes



Vegetation composition:

This subalpine grass-forb meadow community is dominated by greenleaf fescue (FEVI), with thin bentgrass (AGPA8) always present at lower cover. Showy sedge (CASP5), broadleaf lupine (LULA4), thread-leaved sandwort (ARCA7), and slender hawkweed (HIGR) are found in over 70% of the plots. Overall summed plant cover averages 90%.

Growth form	Mean cover (%)
Forb	39.3
Graminoid	42.9
Shrub	7.6

FEVI [AGPA8 phase]. Constancy table. Canopy cover for species in at least 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
FEVI	*Festuca viridula*	Greenleaf fescue	100.0	25.0	25.0
AGPA8	*Agrostis pallens*	Thin bentgrass	100.0	9.6	9.6
CASP5	*Carex spectabilis*	Showy sedge	85.7	4.4	5.2
LULA4	*Lupinus latifolius*	Broadleaf lupine	71.4	5.7	8.0
ARCA7	*Arenaria capillaris*	Thread-leaved sandwort	71.4	1.4	2.0
HIGR	*Hieracium gracile*	Slender hawkweed	71.4	0.7	1.0
PUOC	*Pulsatilla occidentalis*	Western pasqueflower	57.1	3.0	5.3
CAPA26	*Castilleja parviflora*	Small-flowered paintbrush	57.1	1.4	2.5
ACMI2	*Achillea millefolium*	Yarrow	57.1	1.1	2.0
LIGR	*Ligusticum grayi*	Gray's lovage	57.1	1.1	2.0
AGAU2	*Agoseris aurantiaca*	Orange agoseris	57.1	1.0	1.8

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
PEPR2	*Penstemon procerus*	Small-flowered penstemon	57.1	0.6	1.0
EULEL2	*Eucephalus ledophyllus*	Cascade aster	42.9	4.0	9.3
LUPE	*Luetkea pectinata*	Partridge foot	42.9	2.4	5.7
VASI	*Valeriana sitchensis*	Sitka valerian	28.6	4.7	16.5
POBI6	*Polygonum bistortoides*	American bistort	28.6	2.9	10.0
JUPA	*Juncus parryi*	Parry's rush	28.6	2.3	8.0
PHEM	*Phyllodoce empetriformis*	Red mountain heather	28.6	2.3	8.0
CAMI12	*Castilleja miniata*	Giant red Indian paintbrush	28.6	2.1	7.5
ERPE3	*Erigeron peregrinus*	Subalpine daisy	28.6	1.6	5.5
XETE	*Xerophyllum tenax*	Beargrass	28.6	1.3	4.5
POFL3	*Potentilla flabellifolia*	Fan-leaved cinquefoil	28.6	1.0	3.5
CASU2	*Calochortus subalpinus*	Subalpine mariposa lily	28.6	0.3	1.0
NOAL2	*Nothocalais alpestris*	Alpine lake false dandelion	28.6	0.3	1.0
SOSI2	*Sorbus sitchensis*	Sitka mountain ash	28.6	0.3	1.0
TRSP2	*Trisetum spicatum*	Spike trisetum	28.6	0.3	1.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 3 (3 Mt. Hood NF)

Soils are deep, coarse textured sandy loams to loamy sands, with high coarse fragment contents (25% to 90%) increasing with depth. The 3 pits all show a series of buried A over C horizons. A horizons are sandy loam or loamy sands. Only one of the pits contains a B horizon. All C horizons are stony or cobbly loamy sands.

Observations from plot notes:

Small mammal disturbance: Gopher mounds are noted at two sites, suggesting small mammal mixing in the top layers of soil may be significant in this community.

Subalpine Mesic Communities

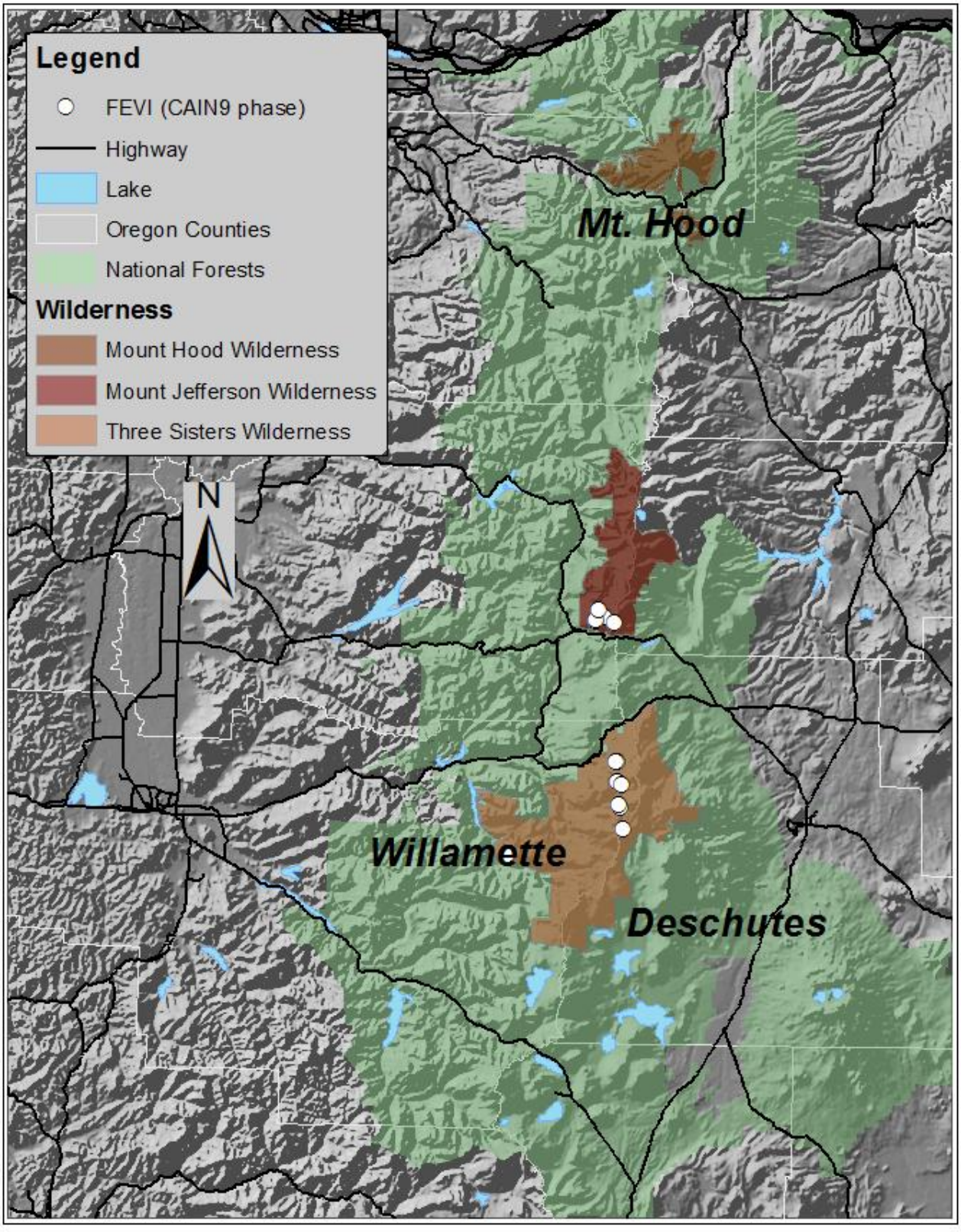
Festuca viridula [*Carex inops* phase] (Greenleaf fescue [Long stolon sedge phase])
FEVI [CAIN9 phase]
Eco-class code: GS1121

FEVI [CAIN9 phase]. Environmental conditions of plots.

Number of plots	14 (13 Willamette NF, 1 Deschutes NF)
Elevation (ft)	Mean = 5700; Range = 5075-6500
Slope (%)	Mean = 28; Range = 10-55
Aspect (no. of plots)	FLAT = 0; NW = 3; NE = 0; SE = 3; SW = 8
Distribution	Western Cascades (14%), High Cascades (86%)
Slope position	Upper to mid slope
Slope shape	Convex to straight vertically, straight to convex horizontally

Environmental conditions:

In FEVI [CAIN9 phase], slopes are moderate to steep, and largely convex to straight in shape. Slope, mid- to upper-slope position, topographic shape, and mainly warm southern aspects contribute to dry conditions.


Legend
FEVI (CAIN9 phase)
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This upper-montane to subalpine grass-forb community is dominated by greenleaf fescue (FEVI), with long stolon sedge (CAIN9) always present at lower cover. Broadleaf lupine (LULA4), squirreltail (ELEL5), and alpine lake false dandelion (NOAL2) are found in more than 70% of the plots. Summed plant cover averages 77%.

Growth form	Mean cover (%)
Forb	22.6
Graminoid	48.6
Shrub	4.8
Tree	2.7

FEVI [CAIN9 phase]. Constancy table. Canopy cover for species in at least 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
FEVI	*Festuca viridula*	Greenleaf fescue	100.0	30.5	30.5
CAIN9	*Carex inops*	Long stolon sedge	100.0	8.4	8.4
LULA4	*Lupinus latifolius*	Broadleaf lupine	71.4	10.6	14.9
ELEL5	*Elymus elymoides*	Squirreltail	71.4	1.6	2.3
NOAL2	*Nothocalais alpestris*	Alpine lake false dandelion	71.4	0.8	1.1
CASU2	*Calochortus subalpinus*	Subalpine mariposa lily	64.3	1.1	1.8
ACOC3	*Achnatherum occidentale*	Western needlegrass	57.1	1.8	3.1
PODA	*Polygonum davisiae*	Davis' knotweed	57.1	1.1	1.9
CAHA2	*Carex halliana*	Hall's sedge	50.0	2.4	4.9

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
EULEL2	*Eucephalus ledophyllus*	Cascade aster	50.0	2.3	4.6
ERBL2	*Ericameria bloomeri*	Rabbitbush	42.9	4.8	11.2
TSME	*Tsuga mertensiana*	Mountain hemlock	35.7	0.9	2.2
ABLA	*Abies lasiocarpa*	Subalpine fir	35.7	0.8	1.9
BRCA5	*Bromus carinatus*	California brome	35.7	0.6	1.8
SYFOF	*Symphyotrichum foliaceum*	Alpine leafybract aster	28.6	0.7	2.5
IPAGF	*Ipomopsis aggregata*	Scarlet gilia	28.6	0.4	1.5

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n= 9 (9 Willamette NF)

Soils are deep and coarse textured, derived from recent volcanic deposits. Pits are dominated by loamy sands in the Mt. Jefferson Wilderness, developed from volcanic sands from sources such as Nash Crater. Pits from the Three Sisters Wilderness have developed in pumice and ash, and are generally multiple layers of sandy loams. Some pits have layers of sands; some have stones or cobbles.

All pits show a series of buried A over C horizons, evidence of erosion and deposition. In the Mt. Jefferson Wilderness plots, A horizons are loamy sands. Most pits have massive structure in the lower layers, often sands or cobbly sands. All C horizons are stony or cobbly loamy sands. Pits from the Three Sisters generally have A1 and A2

that are loams or sandy loams over gravelly sandy loams, with stone or cobble layers at the lowest level.

Observations from plot notes:

Soil: Surface soil can show active erosion due to snowmelt. Some species act to stabilize soil.

Small mammal disturbance: Extensive mounding by gophers is recorded on almost all sites. Surface bare soil is often associated with small mammal activity. Krotovinas (animal burrows filled with material from another soil horizon) into the C horizons are noted on two plots.

Subalpine Mesic Communities

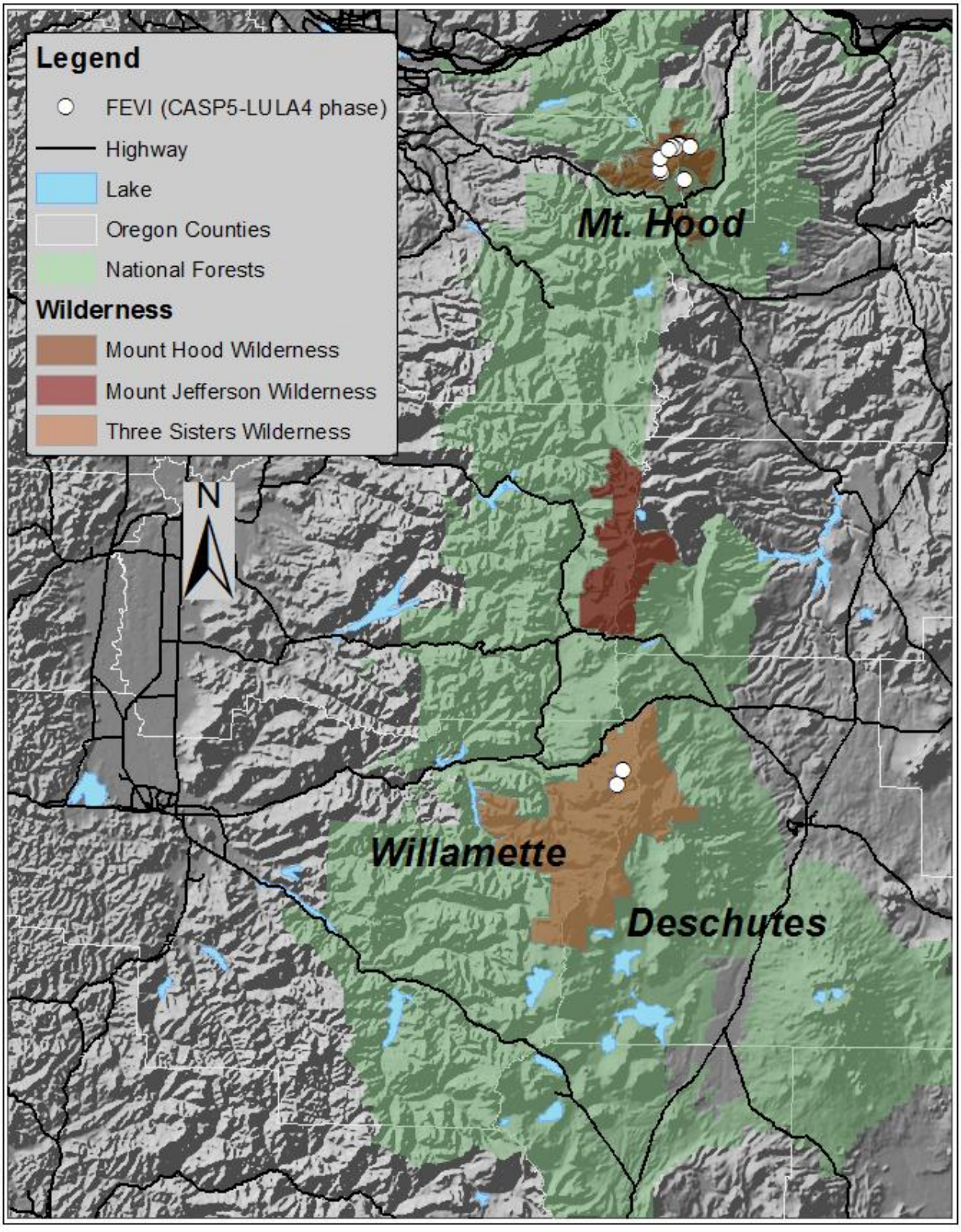
Festuca viridula [*Carex spectabilis-Lupinus latifolius* phase] (Greenleaf fescue [Showy sedge-broadleaf lupine phase])
FEVI [CASP5-LULA4 phase]
Eco-class code: GS1122

FEVI [CASP5-LULA4 phase]. Environmental conditions of plots.

Number of plots	17 (15 Mt. Hood NF, 2 Willamette NF)
Elevation (ft)	Mean = 5900; Range = 5470-6750
Slope (%)	Mean = 31; Range = 5-61
Aspect (no. of plots)	FLAT = 0; NW = 4; NE = 5; SE = 4; SW = 4
Distribution	High Cascades (100 %)
Slope position	Upper to mid slopes
Slope shape	Straight or undulating slopes, often convex microtopography

Environmental conditions:

FEVI [CASP5-LULA4 phase] occurs on moderate to steep slopes, with straight, undulating, to occasionally convex, topography. Slope, mid- to upper-slope position, and slope shape do not concentrate moisture. Cover of bare ground, rock, and gravel average 15%.


Legend
FEVI (CASP5-LULA4 phase)
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This lush subalpine grass-forb community is co-dominated by greenleaf fescue (FEVI), broadleaf lupine (LULA4) and showy sedge (CASP5). Cascade aster (EULEL2) and Gray's lovage (LIGR) are found in more than half of the plots. Summed plant cover averages 93%.

Growth form	Mean cover (%)
Forb	50.4
Graminoid	41.7
Shrub	0.2
Tree	0.7

FEVI [CASP5-LULA4 phase]. Constancy table. Canopy cover for species in at least 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
FEVI	*Festuca viridula*	Greenleaf fescue	100.0	20.2	20.2
LULA4	*Lupinus latifolius*	Broadleaf lupine	100.0	19.8	19.8
CASP5	*Carex spectabilis*	Showy sedge	100.0	16.1	16.1
EULEL2	*Eucephalus ledophyllus*	Cascade aster	58.8	6.5	11.1
LIGR	*Ligusticum grayi*	Gray's lovage	52.9	0.7	1.3
PUOC	*Pulsatilla occidentalis*	Western pasqueflower	47.1	7.4	15.8
VERAT	*Veratrum* spp.	False hellebore species	41.2	1.6	3.9
SETR	*Senecio triangularis*	Arrowleaf groundsel	35.3	2.4	6.7
LUGLH	*Luzula hitchcockii*	Hitchcock's wood-rush	29.4	2.5	8.6
AGAU2	*Agoseris aurantiaca*	Orange agoseris	29.4	0.6	2.0
NOAL2	*Nothocalais alpestris*	Alpine lake false dandelion	29.4	0.5	1.8
POFL3	*Potentilla flabellifolia*	Fan-leaved cinquefoil	29.4	0.5	1.6

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 7 (7 Mt. Hood NF)

Soils are very deep, coarse textured materials developed in volcanic ash deposits. Most pits are sandy loams, with an A1 and A2 horizon over a B horizon. Buried A and C horizons indicate multiple erosion/deposition sequences. Coarse fragments increase in the deepest horizons, to stony fine sandy loams. The soils in this phase are finer than the other phases in this group: more sandy loams rather than loamy sands. The presence of B horizons also suggests more stable conditions for this type.

Observations from plot notes:

Small mammal disturbance: While gopher activity is noted on half of the plots, it is less pervasive for this phase within the FEVI group.

Subalpine Mesic Communities

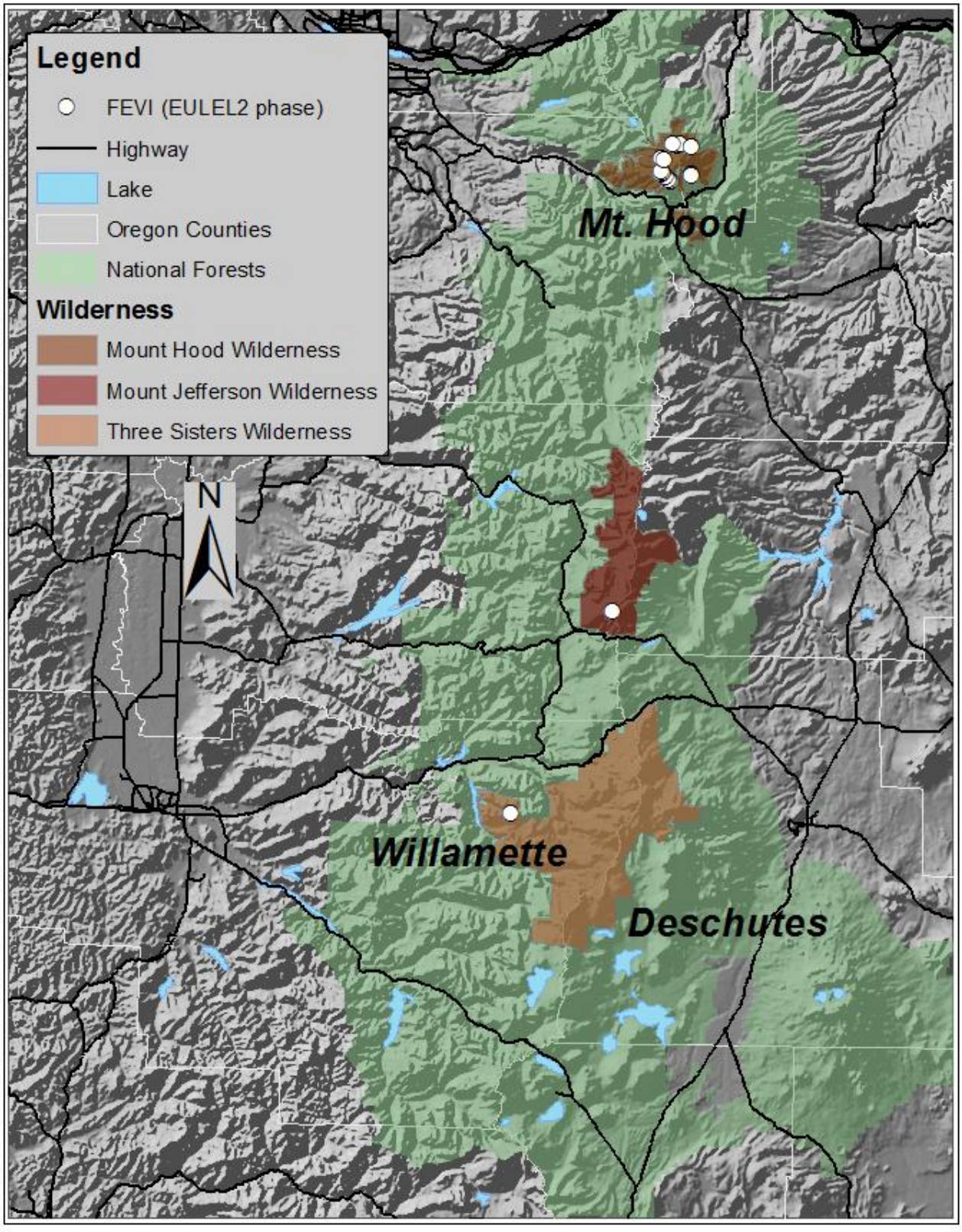
Festuca viridula [*Eucephalus ledophyllus* var. *ledophyllus* phase] (Greenleaf fescue [Cascade aster phase])
FEVI [EULEL2 phase]
Eco-class code: GS1124

FEVI [EULEL2 phase]. Environmental conditions of plots.

Number of plots	25 (23 Mt. Hood NF, 2 Willamette NF)
Elevation (ft)	Mean = 5900; Range = 5460-6280
Slope (%)	Mean = 33; Range = 4-98
Aspect (no. of plots)	FLAT = 0; NW = 5; NE = 4; SE = 6; SW = 10
Distribution	High Cascades (100 %)
Slope position	Mainly mid slope or upper slope
Slope shape	Undulating or straight slopes, frequently convex topography

Environmental conditions:

FEVI [EULEL2 phase] occurs on moderate to very steep slopes, with straight shape, undulating, or occasionally convex topography. Cover of bare ground, rock, and gravel average 21%. Slope, mid to upper slope position, and slope shape do not retain moisture.


Legend
FEVI (EULEL2 phase)
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This grass-forb community is co-dominated by greenleaf fescue (FEVI) and Cascade aster (EULEL2). Broadleaf lupine (LULA4) and subalpine mariposa lily (CASU2) are found in more than half of the plots. Summed plant cover averages 81 %.

The overall species composition is similar to FEVI [CASP5-LULA4 phase], but cover is lower.

Growth form	Mean cover (%)
Forb	45.4
Graminoid	31.2
Shrub	2.4
Tree	0.6

FEVI [EULEL2 phase]. Constancy table. Canopy cover for species in at least 25% of the plots).

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
EULEL2	*Eucephalus ledophyllus*	Cascade aster	100.0	13.6	13.6
FEVI	*Festuca viridula*	Greenleaf fescue	96.0	23.0	24.0
LULA4	*Lupinus latifolius*	Broadleaf lupine	64.0	8.4	13.2
CASU2	*Calochortus subalpinus*	Subalpine mariposa lily	52.0	2.5	4.8
CASP5	*Carex spectabilis*	Showy sedge	48.0	4.3	8.9
HIGR	*Hieracium gracile*	Slender hawkweed	40.0	0.4	1.0
PUOC	*Pulsatilla occidentalis*	Western pasqueflower	36.0	5.3	14.7
PODA	*Polygonum davisiae*	Davis' knotweed	36.0	3.0	8.2
POBI6	*Polygonum bistortoides*	American bistort	32.0	2.3	7.3
SETR	*Senecio triangularis*	Arrowleaf groundsel	28.0	0.4	1.4

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 8 (7 Mt. Hood NF, 1 Willamette NF)

Soils are moderately deep and coarse textured, developed in volcanic ash deposits. They are often gravelly sandy loam over cobbly or stony loamy sand or sand. Most pits have an A1 and A2 horizon over a C horizon over buried A and C horizons indicating multiple erosion/deposition sequences. Few pits show a B horizon. Compared to the similar CASP5-LLULA4 phase, the soils in this community are coarser, there is more exposure of bare ground and surface rock, and roots do not extend as deep.

Observations:

Vegetation: Density of vegetation and the species there depend on the development of the soil within the first 12" of the profile. Observers speculated that the more recent deposits favor Cascades aster, while the more developed soils favor the greenleaf fescue.

Small mammal disturbance: Gopher activity is reported on only 4 of the plots.

Subalpine Mesic Communities

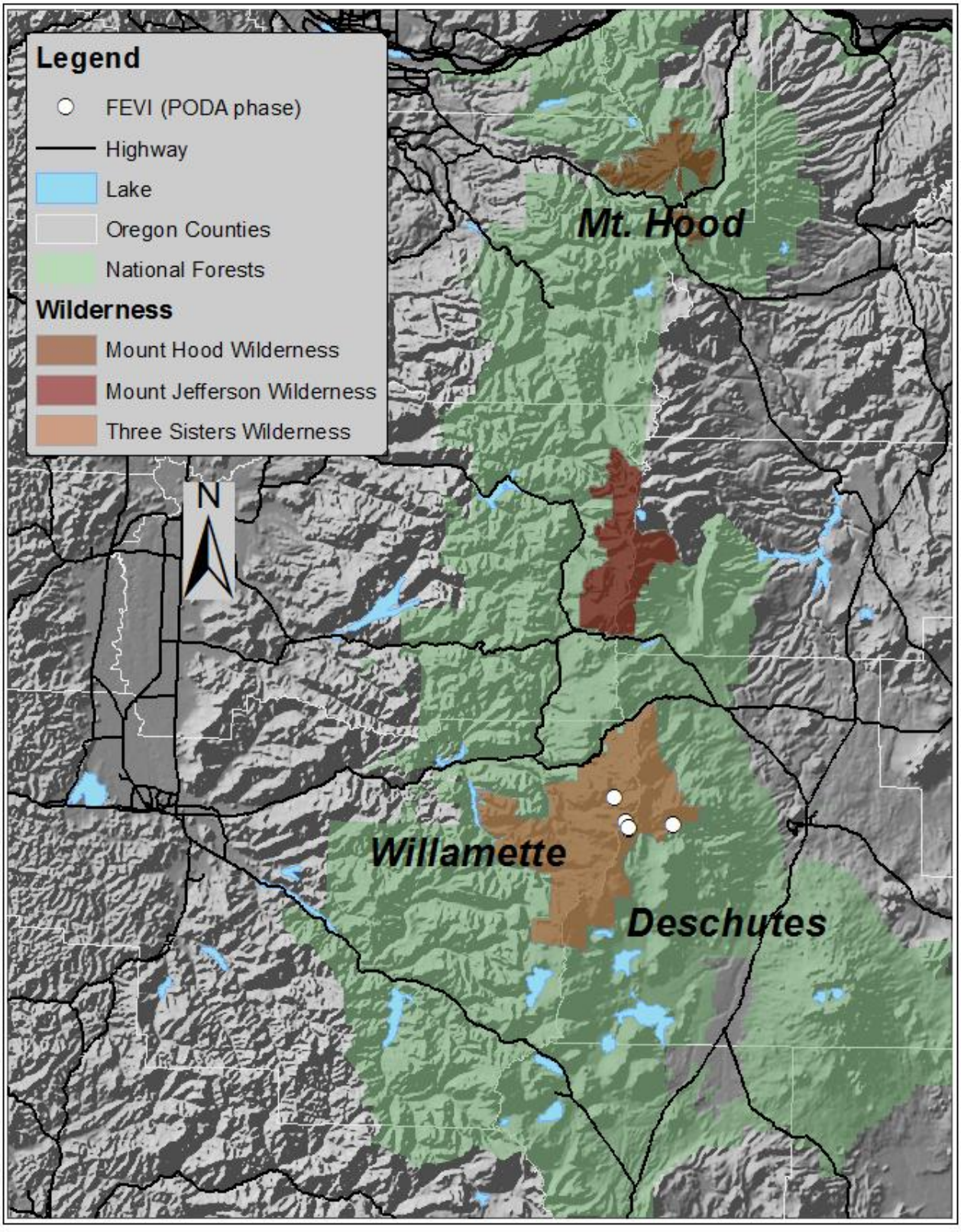
Festuca viridula [*Polygonum davisiae* phase] (Greenleaf fescue [Davis' knotweed phase])
FEVI [PODA phase]
Eco-class code: GS1123

FEVI [PODA phase]. Environmental conditions of plots

Number of plots	5 (1 Willamette NF, 4 Deschutes NF)
Elevation (ft)	Mean = 6300; Range = 5760-6960
Slope (%)	Mean = 20; Range = 0-70
Aspect (no. of plots)	FLAT = 2; NW = 0; NE = 1; SE = 0; SW = 2
Distribution	High Cascades (100 %)
Slope position	Mid slopes or basins
Slope shape	Undulating, generally convex

Environmental conditions:

FEVI [PODA phase] occurs on flat to steep slopes, with undulating and/or convex topography. Cover of bare ground, rock, and gravel average 51%.


Legend
FEVI (PODA phase)
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This fairly sparse subalpine community is dominated by greenleaf fescue (FEVI), with Davis' knotweed (PODA) always present at lower cover. Squirreltail (ELEL5), western needlegrass (ACOC3), alpine buckwheat (ERPY2), and alpine lake false dandelion (NOAL2) are found in over half the plots. Summed plant cover averages 44%.

Growth form	Mean cover (%)
Forb	14.2
Graminoid	29.5
Tree	1.0

FEVI [PODA phase]. Constancy table. Canopy cover for species in at least 25% of the plots).

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
FEVI	*Festuca viridula*	Greenleaf fescue	100.0	14.6	14.6
PODA	*Polygonum davisiae*	Davis' knotweed	100.0	4.6	4.6
ELEL5	*Elymus elymoides*	Squirreltail	80.0	5.0	6.3
ACOC3	*Achnatherum occidentale*	Western needlegrass	60.0	1.6	2.7
ERPY2	*Eriogonum pyrolaefolium*	Alpine buckwheat	60.0	1.6	2.7
NOAL2	*Nothocalais alpestris*	Alpine lake false dandelion	60.0	0.8	1.3
JUDR	*Juncus drummondii*	Drummond's rush	40.0	2.2	5.5
EROV	*Eriogonum ovalifolium*	Oval-leaved buckwheat	40.0	1.6	4.0
CABR12	*Carex breweri*	Brewer's sedge	40.0	1.4	3.6
ERUM	*Eriogonum umbellatum*	Sulfur buckwheat	40.0	1.2	3.0
LULE2	*Lupinus lepidus*	Prairie lupine	40.0	1.0	2.5
PICO	*Pinus contorta*	Lodgepole pine	40.0	0.8	2.1
ERMA4	*Eriogonum marifolium*	Marumleaf buckwheat	40.0	0.8	2.0
LULA4	*Lupinus latifolius*	Broadleaf lupine	40.0	0.8	2.0
CARO5	*Carex rossii*	Ross's sedge	40.0	0.6	1.5
CIUMU	*Cistanthe umbellata*	Pussypaws	40.0	0.6	1.5

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 2 (2 Deschutes NF)

Soils are coarse textured loamy sands and gravels derived from multiple pumice deposits. A horizons are sandy loam or loamy sands. Lower horizons often contain pumice gravel. Roots are abundant in the top 7-16" and scarce lower. The coarse textured soil and very high erosion pavement/gravel cover confirm the overall dry character of this phase.

Observations:

Vegetation: Fred Hall speculated that greenleaf fescue communities with high Drummond's rush cover, as in this FEVI [PODA phase], represent areas impacted by sheep grazing and associated erosion.

Soil: Erosion pavement/gravel cover of 60% to 80% is noted on three plots.

Small and large mammal disturbance: Gopher mounds and elk browse are often noted. According to plot notes, elk use focuses on greenleaf fescue. Small lodgepole pines or mountain hemlock can be scattered on the edges of this community. Rodent damage to terminals and branches at the ground line is recorded in plot notes.

Subalpine Mesic Communities

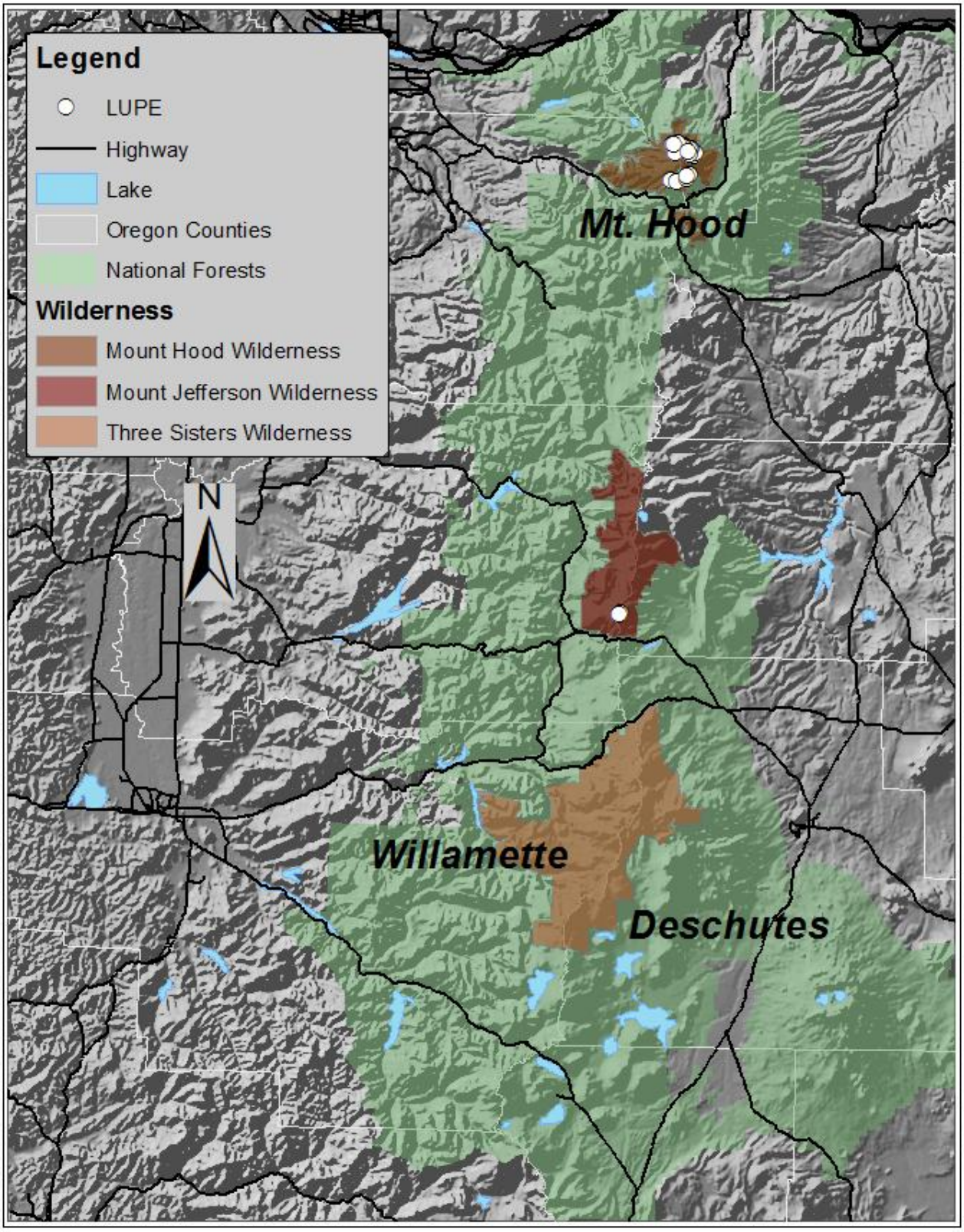
Luetkea pectinata (Partridge foot)
LUPE
Eco-class code: FS4101

LUPE. Environmental conditions of plots.

Number of plots	34 (32 Mt. Hood NF, 2 Willamette NF)
Elevation (ft)	Mean = 6200; Range = 5440-6980
Slope (%)	Mean = 33; Range = 1-80
Aspect (no. of plots)	FLAT = 1; NW = 7; NE = 19; SE = 6; SW = 1
Distribution	High Cascades (100 %)
Slope position	Mid to lower slopes, basin, and drainages
Slope shape	Mainly undulating, but also straight and concave

Environmental conditions:

LUPE is associated with rockfields: harsh sites most often with cool aspects on mid- to lower-slopes or in drainages or basins. This community is typical of late snowmelt sites developing in unconsolidated glacio-volcanic rubble in subalpine outwash plains, talus slopes, and cracks on rock faces. Boulders, sandy pockets or sandy mounds associated with snowmelt drainages are noted on many plots. Cover of bare ground, rock, and gravel average 51%.


Legend
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Highway
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Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
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Mt. Hood
Willamette
Deschutes

Vegetation composition:

This cold subalpine community is dominated by partridgefoot (LUPE). Showy sedge (CASP5), small-flowered paintbrush (CAPA26), and Davis' knotweed (PODA) occur in over 50% of the plots. Summed plant cover averages 49%.

Growth form	Mean cover (%)
Forb	41.0
Graminoid	7.5
Shrub	1.4
Tree	1.1

LUPE. Constancy table. Canopy cover for species in over 25% of the plots).

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
LUPE	*Luetkea pectinata*	Partridge foot	100.0	25.1	25.1
CAPA26	*Castilleja parviflora*	Small-flowered paintbrush	55.9	2.1	3.8
PODA	*Polygonum davisiae*	Davis' knotweed	55.9	1.5	2.6
CASP5	*Carex spectabilis*	Showy sedge	52.9	2.5	4.8
CANI2	*Carex nigricans*	Black alpine sedge	38.2	1.0	2.7
TSME	*Tsuga mertensiana*	Mountain hemlock	38.2	0.7	1.7
JUDR	*Juncus drummondii*	Drummond's rush	32.4	1.9	5.8
ARCA7	*Arenaria capillaris*	Thread-leaved sandwort	29.4	0.9	3.1
SETR	*Senecio triangularis*	Arrowleaf groundsel	29.4	0.4	1.5
ORALA2	*Oreostemma alpigenum*	Alpine aster	26.5	2.5	9.3

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 16 (16 Mt. Hood NF)

The soils are generally stratified outwash: deep, coarse, gravelly or stony sands, loamy sands, or sandy loams. Several buried A and C horizons indicate multiple erosion and deposition sequences.

Upper horizons are typically one or two A horizons of gravelly sands, sandy loams or loamy sands. C horizons in the lower layers are gravelly, cobbly, or extremely stony sands. Mottles are noted in two pits. One plot notes saturated soil at 5"; one other shows the water table at 24". Rooting depth is shallow, averaging about 9" (2-18").

Observations from plot notes:

Vegetation: In some sites, the community occupies a drainage channel or gully.

This type usually has clumpy low plants in stabilized soil between rocks. Notes from one plot show that Tolmie's saxifrage (SATO2) is associated with rock in drainages. Plot notes from Mt. Jefferson Wilderness sites (Willamette NF) record that individual mountain hemlock or white bark pines grow on the north side of boulders, and often have evidence of snow creep damage after they are 4 feet tall. Scattered mountain hemlock seedlings could establish, but not grow to mature trees. One Mt. Hood plot, mountain hemlocks show the effects of the harsh environment by developing the krumholtz form.

Small mammal disturbance: Small mammal disturbance is noted on only 8% of the plots.

Previously described plant associations:

Douglas (1972) describes a *Luetkea Pectinata* (Residual or Regosolic Phase) Community in his "Typical Meadow Habitat" type which is between 1,250 m and 1,950 m (4,100 to 6,400 ft) elevation on the Western North Cascades of Washington. He notes that "this phase of the *Luetkea* community occurs on moist, relatively poorly drained slopes and flat areas. It reaches its best development adjacent to the *Carex nigricans* community type." Douglas' *L. Pectinata* community is floristically rich, where *L. pectinata* has a mean cover of 50% and a frequency of 100%. Other important species are *Deschampsia atropurpurea*, *Valeriana sitchensis*, *Carex spectabilis*, *C. nigricans*, *Hieracium gracile*, and *Vaccinium*

deliciosum. Frequent mosses in the community are *Polytrichadelphus lyallii*, *Pogonatum alpinum*, and *Dicranum* spp.

In the same study, Douglas (1972) describes a *Luetkea Pectinata* (Rawmark Phase) Community in his Rawmark Meadow Habitat type (rawmark meadow is characterized by short snow-free periods, moist soils, and the lack of a closed vegetative cover). He notes that "Northerly, fairly well drained, steep to moderate slopes are the typical site of this phase of the *Luetkea* community type in the western North Cascades." Total vegetative cover is 83%, of which 46% is *Luetkea pectinata*. Other important species are *Carex spectabilis* and *Luzula wahlenbergii*. He adds that "conspicuous mosses in the community are *Dicranella heteromalla*, *Rhacomitrium canescens* var. *epilosum*, and *Polytrichum norvegicum"*.

Subalpine Moist Communities

Carex nigricans (Black alpine sedge): Group description
CANI2 group

CANI2

CANI2 [CASP5 phase]

CANI2 [LUPE phase]

CANI2 [ORALA2 phase]

CANI2 [PHEM phase]

CANI2 [POFL3 phase]

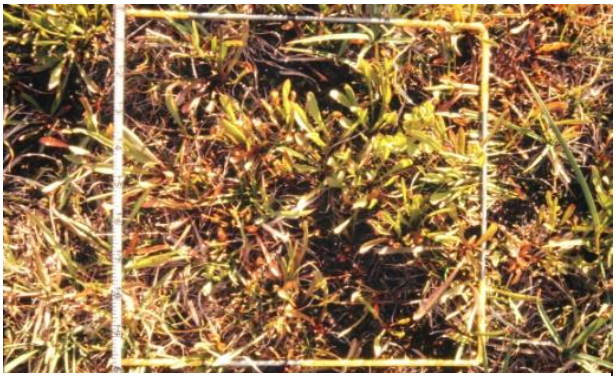
Black sedge meadows: these are sedge-dominated turf communities of late snow-melt basins in the subalpine zone. They are often found near heather communities with scattered trees, tree islands, and near forest stringers. A typical landscape pattern progresses from red mountain heather (PHEM) on slopes, descends through blueleaf huckleberry (VADE), down to black sedge (CANI2 types) in basins. Species composition of the CANI2 group (described below as phases) correlates with depth to the water table and soil texture. Complex topography concentrates woody plants on small ridges and hummocks, especially where soils are saturated. Where conditions are drier, moisture availability in drainages and depressions can increase abundance of herbs in concave microsites.

CANI2 group. Environmental conditions of plots.

Number of plots	95 (55 Mt. Hood NF, 25 Willamette NF, 13 Deschutes NF, 2 Warm Springs Reservation)
Elevation (ft)	Mean = 6100; Range = 5290-7500
Slope (%)	Mean = 12; Range = 0-58
Aspect (no. of plots)	FLAT = 31; NW = 14; NE = 25; SE = 12; SW = 13
Distribution	High Cascades (100%)
Slope position	Basins, drainages
Slope shape	Hummocky microtopography on straight or concave slopes

Environmental conditions:

These communities are characterized by persistent snow banks, cold wet soils, and short growing seasons. They occupy flat to gentle topography, typically in basins and/or drainages that concentrate soil moisture. The CANI2 group occurs on alluvial sands and gravels. The microtopography is generally complex: seeps, water channels, hummocks, and small ridges change substrate, drainage, and productivity at a very fine scale. Late-lying snow and flat to concave topography are important environmental influences. Soils are seasonally wet. Depth to the water table varies among phases, but is generally below the rooting zone by mid-summer. Cover of bare ground, rock, and gravel average 14%. The phases span a moisture gradient from dry to moist: LUPE (driest), and POFL3, PHEM, CASP5, ORALA2 (wettest).



Detail: CANI2 [ORALA2 phase] vegetation

Vegetation composition:

This subalpine meadow group is dominated by black alpine sedge (CANI2). Alpine aster (ORALA2) and Gray's lovage (LIGR), showy sedge (CASP5), and red heather (PHEM) are found in over half the plots. Other important species in these meadows include fan-leaved cinquefoil (POFL3), Drummond's rush (JUDR), and partridge foot (LUPE). Summed plant cover averages 81%.

CANI2 group. Constancy table. Canopy cover for species in at least 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
CANI2	*Carex nigricans*	Black alpine sedge	100.0	33.3	33.3
ORALA2	*Oreostemma alpigenum*	Alpine aster	58.9	5.5	9.3
LIGR	*Ligusticum grayi*	Gray's lovage	54.7	2.1	3.8
CASP5	*Carex spectabilis*	Showy sedge	51.6	7.3	14.2
PHEM	*Phyllodoce empetriformis*	Red mountain heather	51.6	2.7	5.3
POFL3	*Potentilla flabellifolia*	Fan-leaved cinquefoil	45.3	4.3	9.5
JUDR	*Juncus drummondii*	Drummond's rush	37.9	1.1	2.8
LUPE	*Luetkea pectinata*	Partridge foot	32.6	3.4	10.6
CAPA26	*Castilleja parviflora*	Small-flowered paintbrush	26.3	0.8	2.9
HIGR	*Hieracium gracile*	Slender hawkweed	25.3	0.4	1.6

*Characteristic cover: mean cover for plots in which a species occurs.

CANI2 [PHEM phase] soil

Soil description:

n = 51 (23 Mt. Hood NF, 20 Willamette NF, 6 Deschutes NF, 2 Warm Springs Reservation)

Soils are coarse textured alluvial deposits.

All profiles show many layers of sands interspersed with finer layers – alluvial deposits leaving buried A horizons – which were generally directly over C horizons. A horizons are of fine to very fine sandy loam. C horizons are generally loamy sands or sands developed from volcanic sands/pumice. Evidence of anaerobic conditions is noted in pits from the wetter ORALA2 and CASP5 phases, and to some degree in the PHEM phase. Some profiles showed gravels and cobbles in the lowest horizon. Water tables are more often observed to be close to or at soil surface during late summer in the ORALA2 and CASP5 phases than in the other phases. Surface rock and gravel are abundant only in the LUPE phase.

Fred Hall documented an erosion sequence in the Three Sisters Wilderness Area where a CABR12 community developed from a CANI2 meadow with loss of half the A horizon (top 8”). Loss of the entire A horizon (top 16-18”) resulted in a CIUMU community. See Appendix F.

Observations from plot notes:

Small mammal disturbance: Small mammal disturbance is often noted.

Previously described plant associations:

Kovalchik and Clausnitzer (2004) describe a *Carex nigricans* plant association that does not fit neatly into one of the phases. Plants with high constancy were black alpine sedge (100%), red mountain-heath (63%), fanleaf cinquefoil (57%), and alpine willow-weed (47%). They note that "black alpine sedge occurs in moist uplands as well as moist riparian and wetland zones. This high-elevation species is found throughout the mountains of western North America, extending south to California and Colorado."

Douglas and Bliss (1977) describe a *Carex nigricans* association in their snowbed community type. They note that "*Carex nigricans* forms a low, dominant mat with a high average cover and frequency. Other prominent species are *Luetkea pectinata* and *Deschampsia atropurpure*."

Subalpine Moist Communities

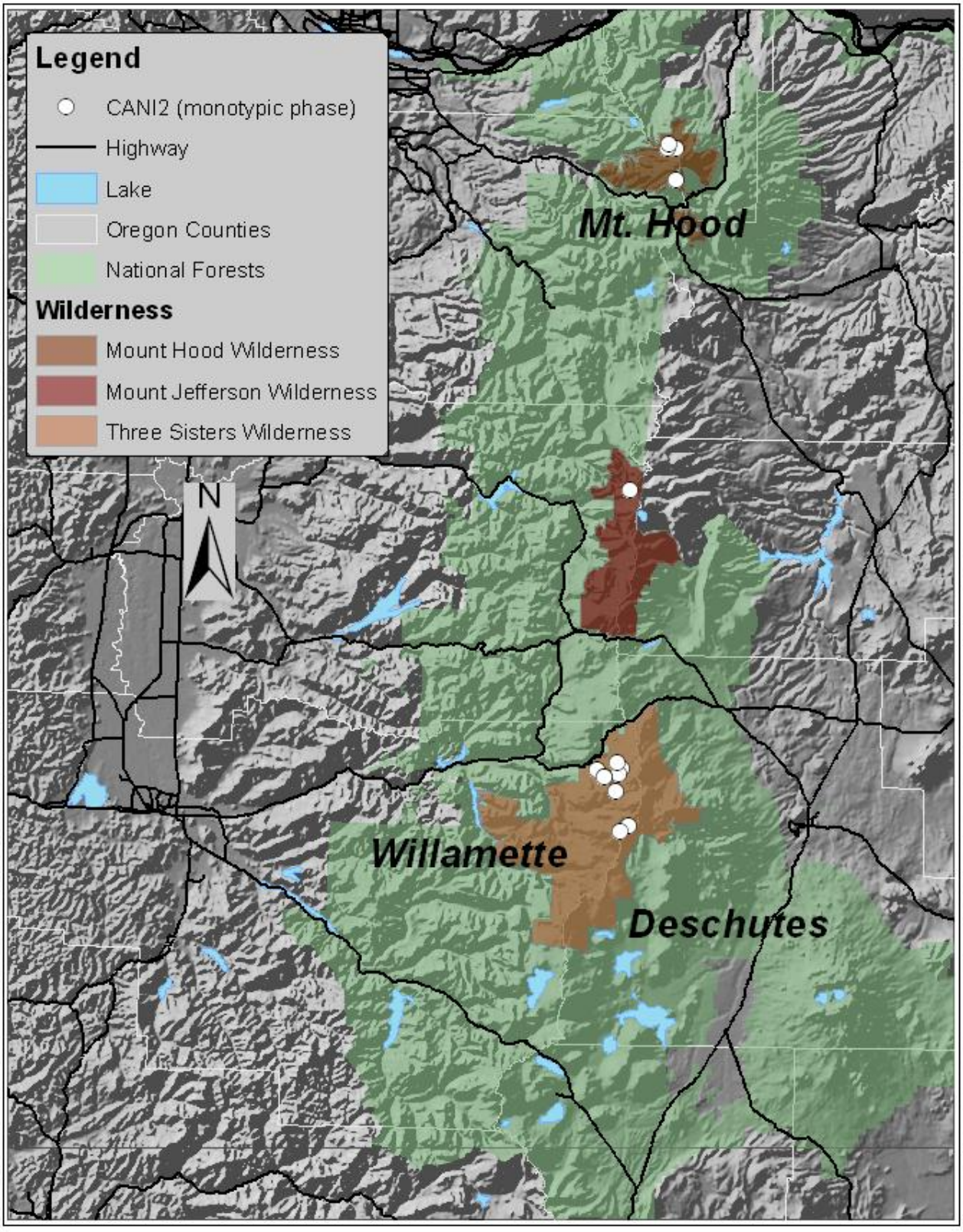
Carex nigricans (Black alpine sedge)
CANI2
Eco-class code: MS2126

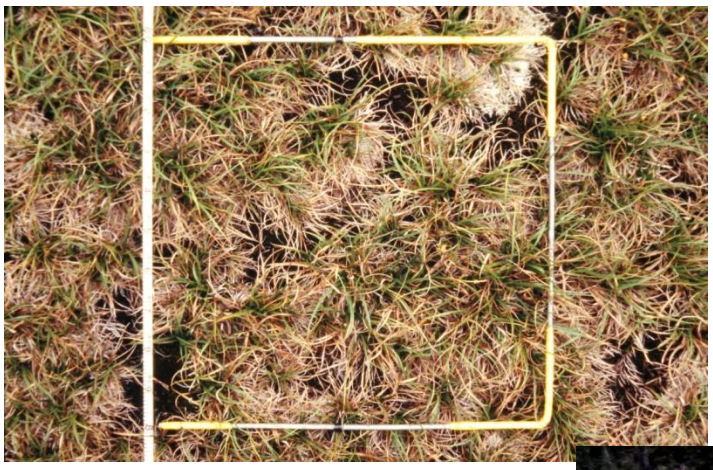
CANI2. Environmental conditions of plots.

Number of plots	13 (4 Mt. Hood NF, 7 Willamette NF, 2 Deschutes NF)
Elevation (ft)	Mean = 6200; Range = 5290-7100
Slope (%)	Mean = 6; Range = 0-30
Aspect (no. of plots)	FLAT = 4; NW = 1; NE = 1; SE = 1; SW = 6
Distribution	High Cascades (100%)
Slope position	Drainages, basins, benches, lower slopes
Slope shape	Undulating concave topography

Environmental conditions:

CANI2 occurs on very gentle slopes, generally in drainages, but also in basins, benches or lower slopes with mainly undulating to concave slope shapes. The phase develops in alluvial deposits of sands and gravels. The microtopography is generally complex with seeps and water channels, hummocks and small ridges each occupied by different species, phases, or communities. For example, hummocks and small ridges provide microhabitats for shrubs such as red heather and blueleaf huckleberry, and may have higher cover of herbs. Cover of surface rock, gravel, and bare ground average 15%. Late snow fields and snow melt are important environmental influences, indicating a short growing season. Water tables are generally below the rooting zone by late summer.


Legend
CANI2 (monotypic phase)
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes



Vegetation composition:

This subalpine community is completely dominated by black alpine sedge (CANI2). Drummond's rush (JUDR) is found in over half the plots, though at very low cover. Summed plant cover averages 72%.

Growth form	Mean cover (%)
Forb	5.0
Graminoid	65.1
Shrub	1.1
Tree	0.5

CANI2. Constancy table. Canopy cover for species in at least 25% of the plots.

Plants symbol	Common name	Scientific name	Const (%)	Mean cover (%)	Charact cover* (%)
CANI2	*Carex nigricans*	Black alpine sedge	100.0	60.7	60.7
JUDR	*Juncus drummondii*	Drummond's rush	69.2	1.5	2.2
ANAL4	*Antennaria alpina*	Woolly pussytoes	46.2	1.0	2.2
POFL3	*Potentilla flabellifolia*	Fan-leaved cinquefoil	38.5	0.4	1.0
NOAL2	*Nothocalais alpestris*	Alpine lake false dandelion	30.8	1.2	3.8

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 8 (1 Mt. Hood NF, 6 Willamette NF, 1 Deschutes NF).

Soils are coarse textured alluvial deposits, mainly in pumice and ash. Concave microtopography and frequent presence of adjacent streams, ponds, lakes, and snow beds suggest soils are wet much of the year.

Profiles show layers of loamy sand or sandy loam from successions of alluvial deposits leaving buried A, AC, and C horizons. A horizons are loam, loamy sand or sand. C horizons are generally sand or loamy sand. Mottles (evidence of fluctuating anaerobic conditions) are noted in the Deschutes NF pit; most pits appear well-drained. Water tables are below pit depth by late summer, although one pit has a water table at 14” depth. Rooting zones average 14” deep (6-26”).

Subalpine Moist Communities

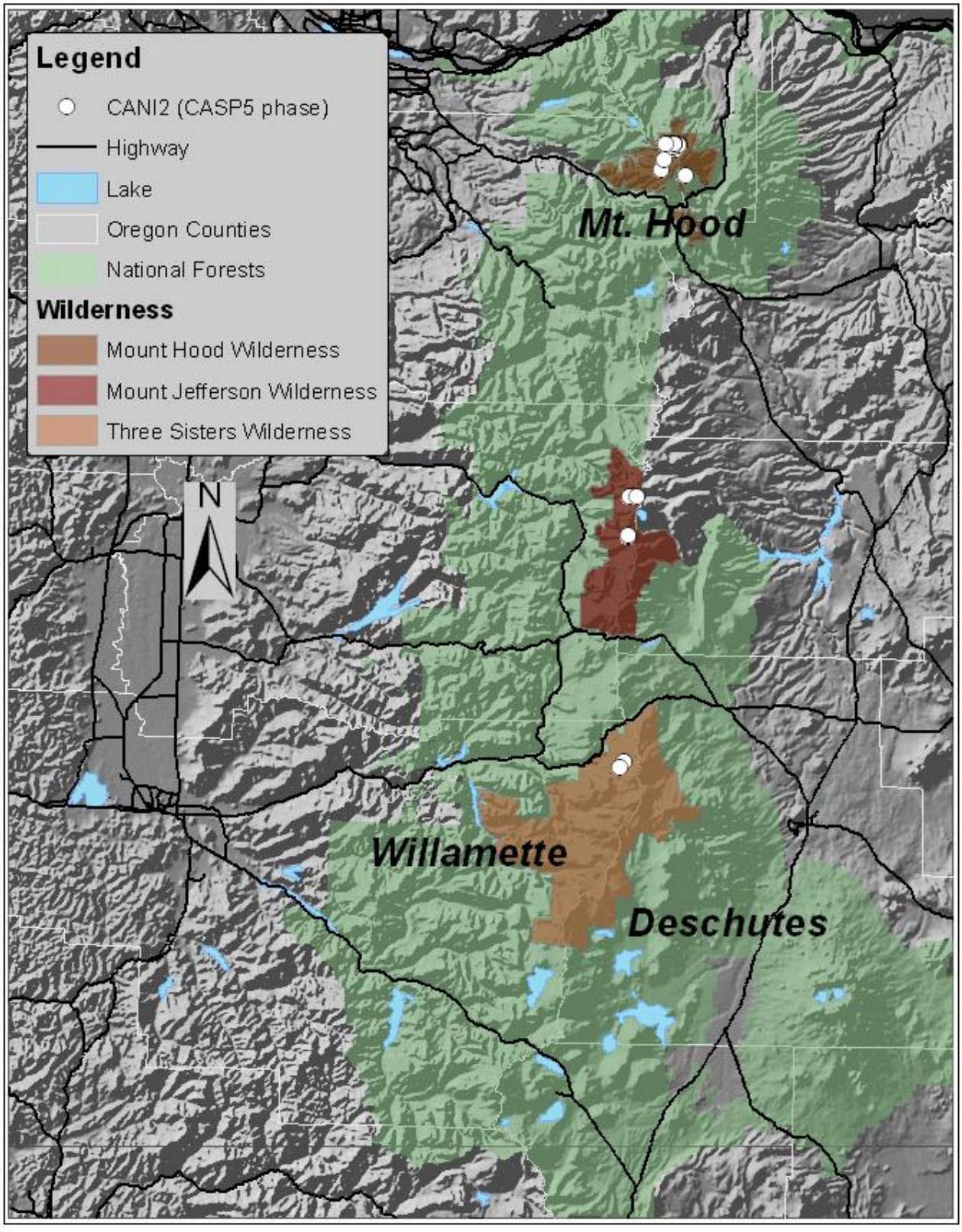
Carex nigricans [*Carex spectabilis* phase] (Black alpine sedge [Showy sedge phase])
CANI2 [CASP5 phase]
Eco-class code: MS2121

CANI2 [CASP5 phase]. Environmental conditions of plots.

Number of plots	24 (16 Mt. Hood NF, 7 Willamette NF, 1 Warm Springs Reservation)
Elevation (ft)	Mean = 5940; Range = 5320-7425
Slope (%)	Mean = 14; Range = 0-50
Aspect (no. of plots)	FLAT = 5; NW = 7; NE = 7; SE = 2; SW = 3
Distribution	High Cascades (100%)
Slope position	Basins, lower slopes
Slope shape	Hummocky microtopography on straight or horizontally concave slopes

Environmental conditions:

CANI2 [CASP5 phase] occurs on gentle slopes in basins or on lower slopes with straight to horizontally concave topography that concentrates moisture. It develops in deposits of sands and gravels on outwash plains and cirque basins. The microtopography is generally complex with seeps and water channels, hummocks and small ridges, each occupied by different species, phases, or communities. Plots have very little exposed rock, gravel or bare ground. Late snow fields and snow melt are important environmental influences, indicating a short growing season. Soils are seasonally wet with evidence of anaerobic conditions present in soil profiles. Water tables can still be near the surface by late summer. Cover of bare soil, rock, and gravel average 6%.


Legend
CANI2 (CASP5 phase)
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This subalpine community is dominated by two sedges, black alpine sedge (CANI2) and showy sedge (CASP5). Gray's lovage (LIGR) and alpine aster (ORALA2) are found in at least half of the plots. Summed plant cover averages 87%.

Showy sedge can be more common in concave sites. Drier convex topography often supports more Gray's lovage (LIGR) and fan-leaved cinquefoil (POFL3). CANI2 [CASP5 phase] is often found near heather communities, scattered trees, tree islands, and forest stringers. Wet communities such as marsh marigold-shooting star (CALEH2-DOJE) can be found in drainages.

Growth form	Mean cover (%)
Forb	22.9
Graminoid	61.3
Shrub	2.8
Tree	0.1

CANI2 [CASP5 phase]. Constancy table. Canopy cover for species in at least 25% of the plots).

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
CANI2	*Carex nigricans*	Black alpine sedge	100.0	30.8	30.8
CASP5	*Carex spectabilis*	Showy sedge	100.0	25.5	25.5
LIGR	*Ligusticum grayi*	Gray's lovage	70.8	2.2	3.1

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
ORALA2	*Oreostemma alpigenum*	Alpine aster	50.0	3.5	7.0
POFL3	*Potentilla flabellifolia*	Fan-leaved cinquefoil	45.8	2.9	6.4
PHEM	*Phyllodoce empetriformis*	Red mountain heather	41.7	1.1	2.8
JUDR	*Juncus drummondii*	Drummond's rush	37.5	1.1	2.9
HIGR	*Hieracium gracile*	Slender hawkweed	37.5	0.6	1.7
LULA4	*Lupinus latifolius*	Broadleaf lupine	33.3	2.0	6.1
DOJE	*Dodecatheon jeffreyi*	Jeffrey's shootingstar	33.3	1.9	5.6
EPAL	*Epilobium alpinum*	Alpine willowherb	29.2	0.3	0.9
JUME3	*Juncus mertensianus*	Mertens' rush	25.0	0.3	1.2

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 11 (6 Mt. Hood NF, 5 Willamette NF)

Soils are coarse textured alluvial deposits. All profiles show many layers of coarse sand interspersed with finer layers (alluvial deposits leaving buried A horizons, generally directly over C horizons). A horizons are of fine to very fine sandy loam. C horizons are generally loamy sands. Soil profiles from the Mt. Jefferson Wilderness developed from volcanic sands/pumice. Gleying (evidence of anaerobic conditions) is noted in a C horizon in the six Mt. Hood NF pits.

Significant cementation of a C layer is noted in two pits. Most of the profiles have few coarse fragments, although some show gravels and cobbles in the lowest horizon in the pit. Three of the eleven pits have water tables within 4-16" of the ground surface. A perched water table is in one Mt. Jefferson Wilderness plot at 16".

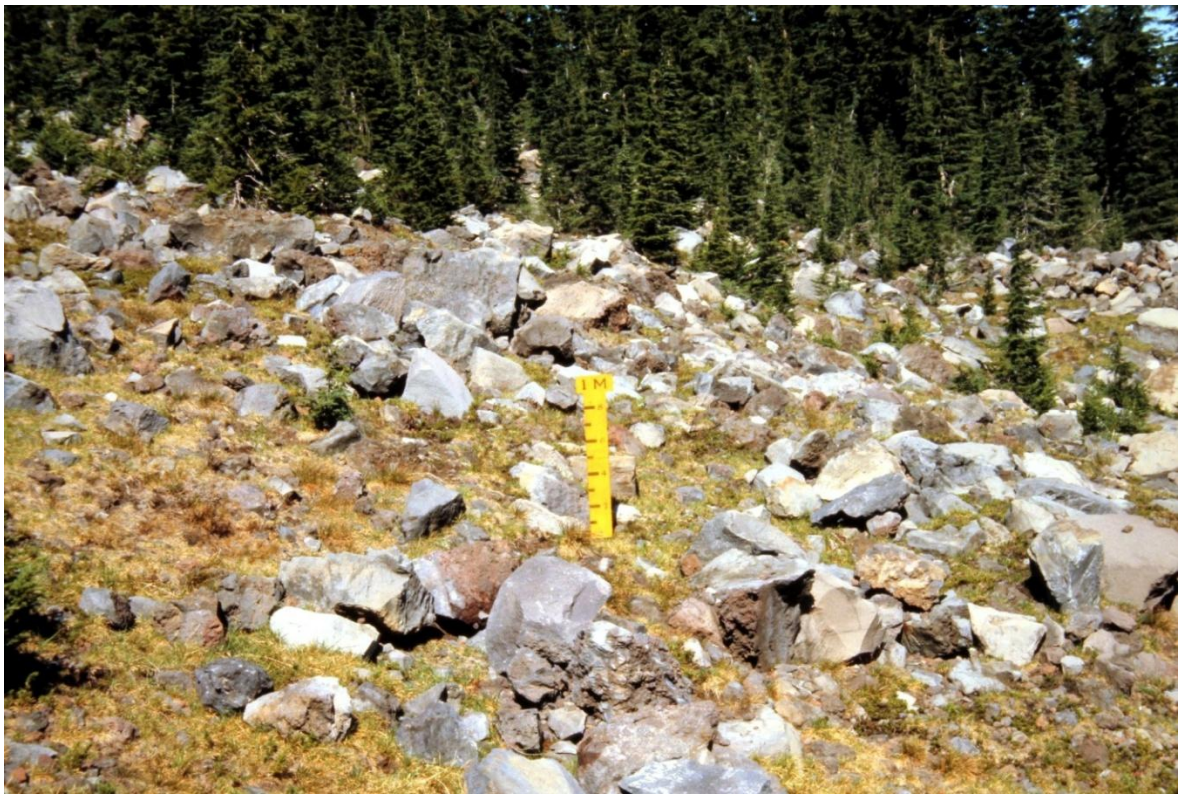
Average rooting depth from the Mt. Jefferson Wilderness profiles is 15-16".

Observations from plot notes:

Small mammal disturbance: Small mammal (gopher) disturbance is often noted.

Subalpine Moist Communities

Carex nigricans [*Luetkea pectinata* phase] (Black alpine sedge [Partridge foot phase])
CANI2 [LUPE phase]
Eco-class: MS2120

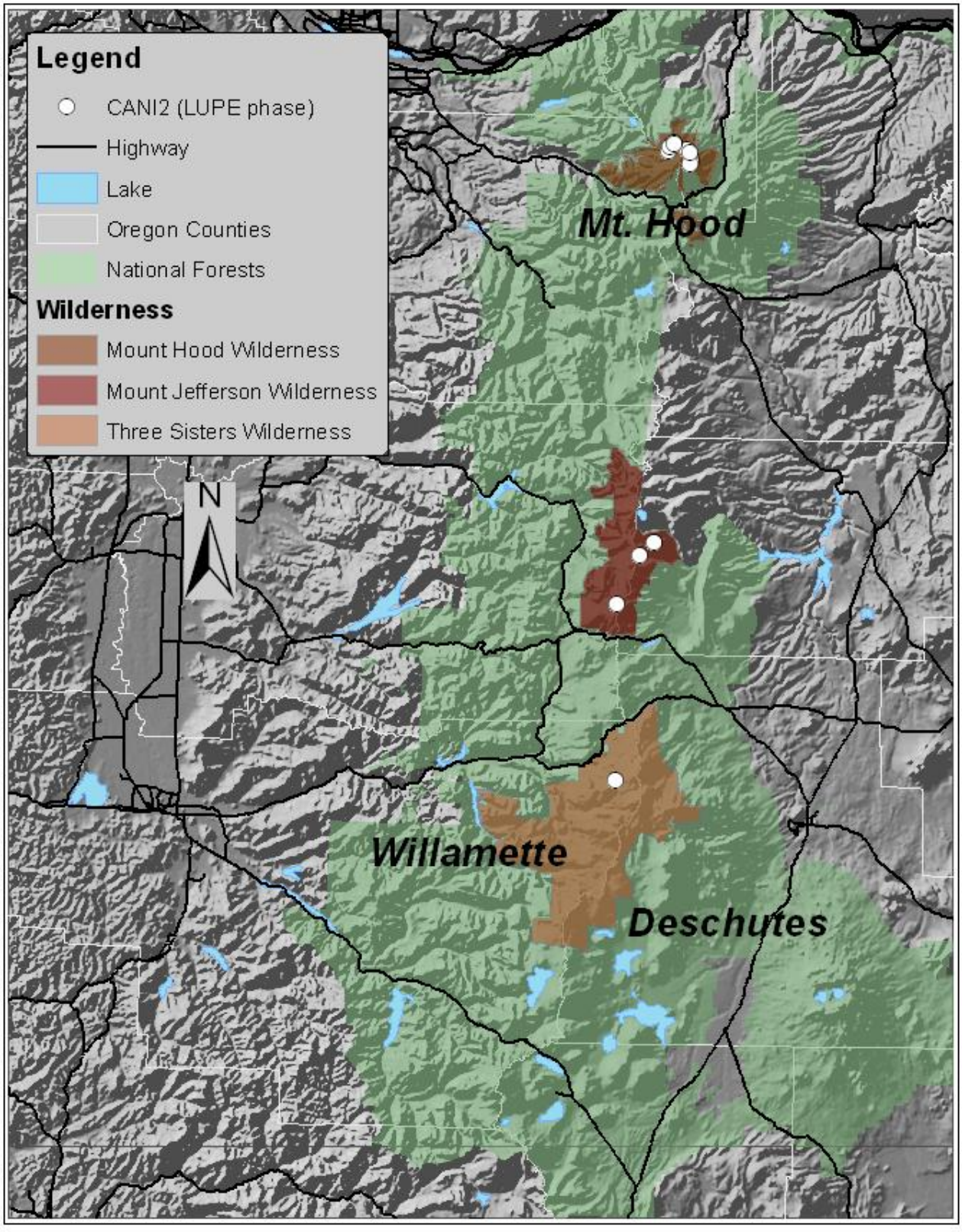


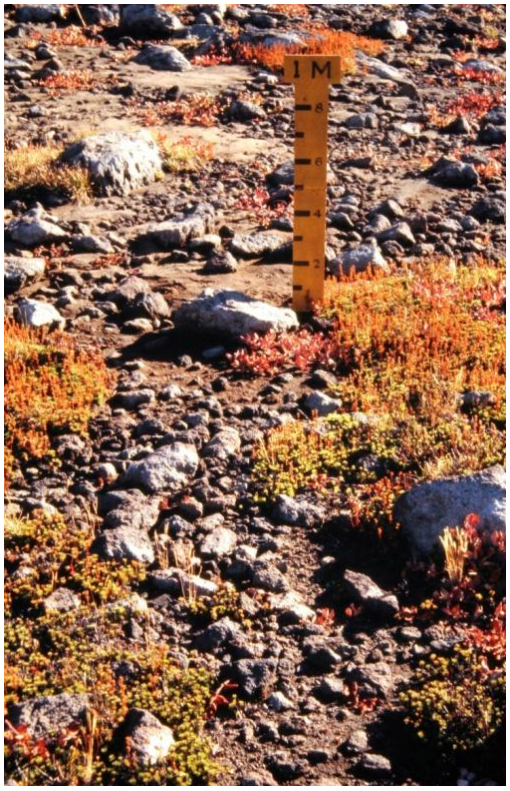
CANI2 [LUPE phase]. Environmental conditions of plots.

Number of plots	15 (10 Mt. Hood NF, 2 Willamette NF, 3 Deschutes NF)
Elevation (ft)	Mean = 6400; Range = 5730-7500
Slope (%)	Mean = 26; Range = 0-50
Aspect (no. of plots)	FLAT = 1; NW = 1; NE = 8; SE = 5; SW = 0
Distribution	High Cascades (100%)
Slope position	Basins, mid slopes
Slope shape	Straight or undulating slopes

Environmental conditions:

CANI2 [LUPE phase] occurs on gentle to moderate slopes in basins or on mid slopes with straight to undulating topography, often in basins adjacent to subalpine tree stringers or islands. The community develops in rock fields and cobbly and/or gravelly terrain on deposits of sands and gravels on outwash plains, near the toe slopes of scree slopes, and cirque basins. Microtopography includes combinations of flats and small channels. Surface rock and gravel is most common in this phase of the CANI2 group. Late snow fields and snow melt are important environmental influences, indicating a short growing season. The coarse soils do not retain moisture. Cover of bare soil, rock, and gravel average 33%.


Legend
CANI2 (LUPE phase)
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes



Vegetation composition:

This subalpine community is dominated by black alpine sedge (CANI2) and partridge foot (LUPE). Red mountain heather (PHEM) and slender hawkweed (HIGR) are found in most of the plots. Summed plant cover averages 73. This phase is often found at lower topographic positions than adjacent heather communities, with scattered trees, tree islands, and near forest stringers. Mountain hemlocks, often associated with heather, are found in one third of the plots. Vegetation is often clumpy. Boulder cover facilitates establishment of herbs, shrubs and trees.

Growth form	Mean cover (%)
Forb	34.2
Graminoid	36.5
Shrub	1.9
Tree	0.8

CANI2 [LUPE phase]. Constancy table. Canopy cover for species in at least 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
CANI2	*Carex nigricans*	Black alpine sedge	100.0	24.3	24.3
LUPE	*Luetkea pectinata*	Partridge foot	100.0	17.6	17.6
PHEM	*Phyllodoce empetriformis*	Red mountain heather	60.0	1.2	2.0
HIGR	*Hieracium gracile*	Slender hawkweed	60.0	0.7	1.1
CAPA26	*Castilleja parviflora*	Small-flowered paintbrush	46.7	2.7	5.7
CASP5	*Carex spectabilis*	Showy sedge	46.7	1.4	3.0
JUPA	*Juncus parryi*	Parry's rush	40.0	3.3	8.3
SATO2	*Saxifraga tolmiei*	Tolmie's saxifrage	40.0	2.2	5.4
JUDR	*Juncus drummondii*	Drummond's rush	40.0	1.5	3.8
LIGR	*Ligusticum grayi*	Gray's lovage	40.0	1.3	3.3
ORALA2	*Oreostemma alpigenum*	Alpine aster	40.0	1.0	2.6
TSME	*Tsuga mertensiana*	Mountain hemlock	33.3	0.7	2.2

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 2 (1 Mt. Hood, 1 Willamette)

Soils are coarse textured loamy sands, sands, or sandy loams. One pit has cobbly sand in the lowest horizon; the other pit has a clay layer with mottles over a sand layer above a buried A horizon. Buried A to C horizon sequences indicate erosional/depositional events. Summer water tables are beneath rooting depths.

Observations from plot notes:

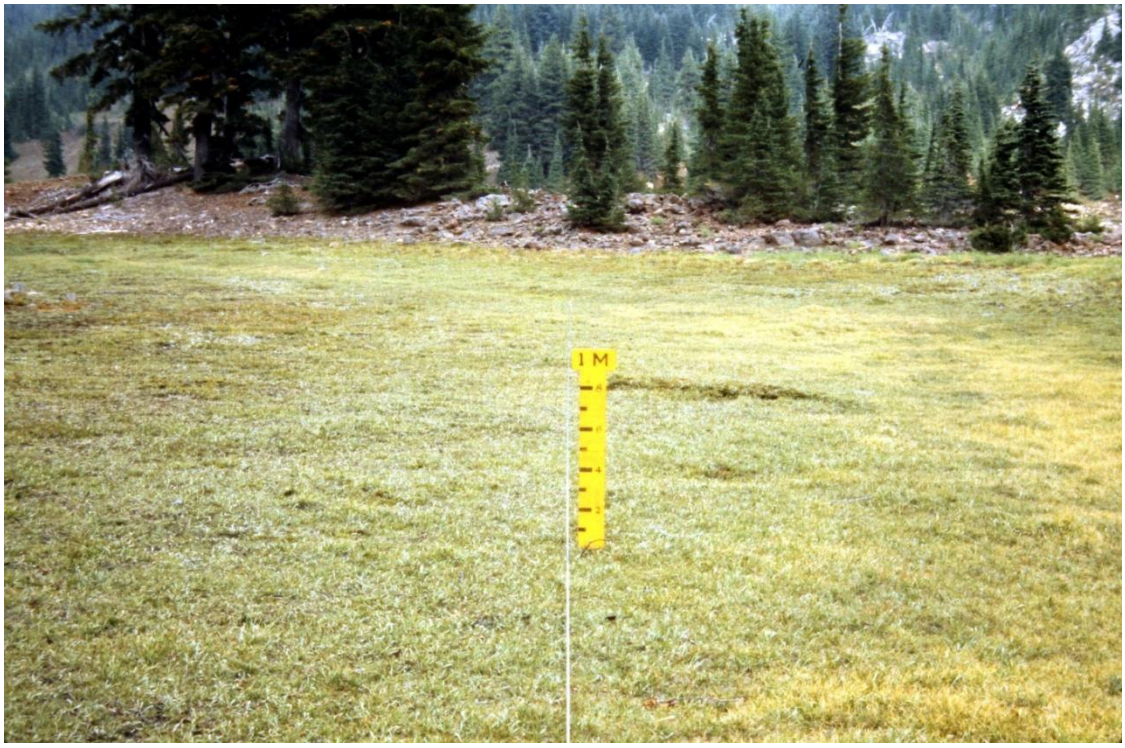
Erosion, wind damage, and some small mammal (gopher) impacts are noted on some plots.

Previously described plant associations:

Douglas (1972) describes a *Carex nigricans* Community on the Western North Cascades of Washington in his Typical Meadow Habitat type, which is between 1,250 m and 1,950 m (4,100 to 6,400 ft) elevation. He notes that "filled-in or partially filled-in lakes, and relatively poorly drained depressions and level areas are typical sites of this community. These snowbed sites often remain covered with snow until late July or mid-August. In areas where there is abundant surface runoff from the slopes above, snow may disappear by June although surface water remains well into the summer." Other important species in this community are *Epilobium alpinum* var. *alpinum* and *Luetkea pectinata*. Important bryophytes in the community are *Pogonatum alpinum* and *Polytrichadelphus lyallii*.

Subalpine Moist Communities

Carex nigricans [*Oreostemma alpigenum* phase] (Black alpine sedge [alpine aster phase])
CANI2 [ORALA2 phase]
Eco-class code: MS2119

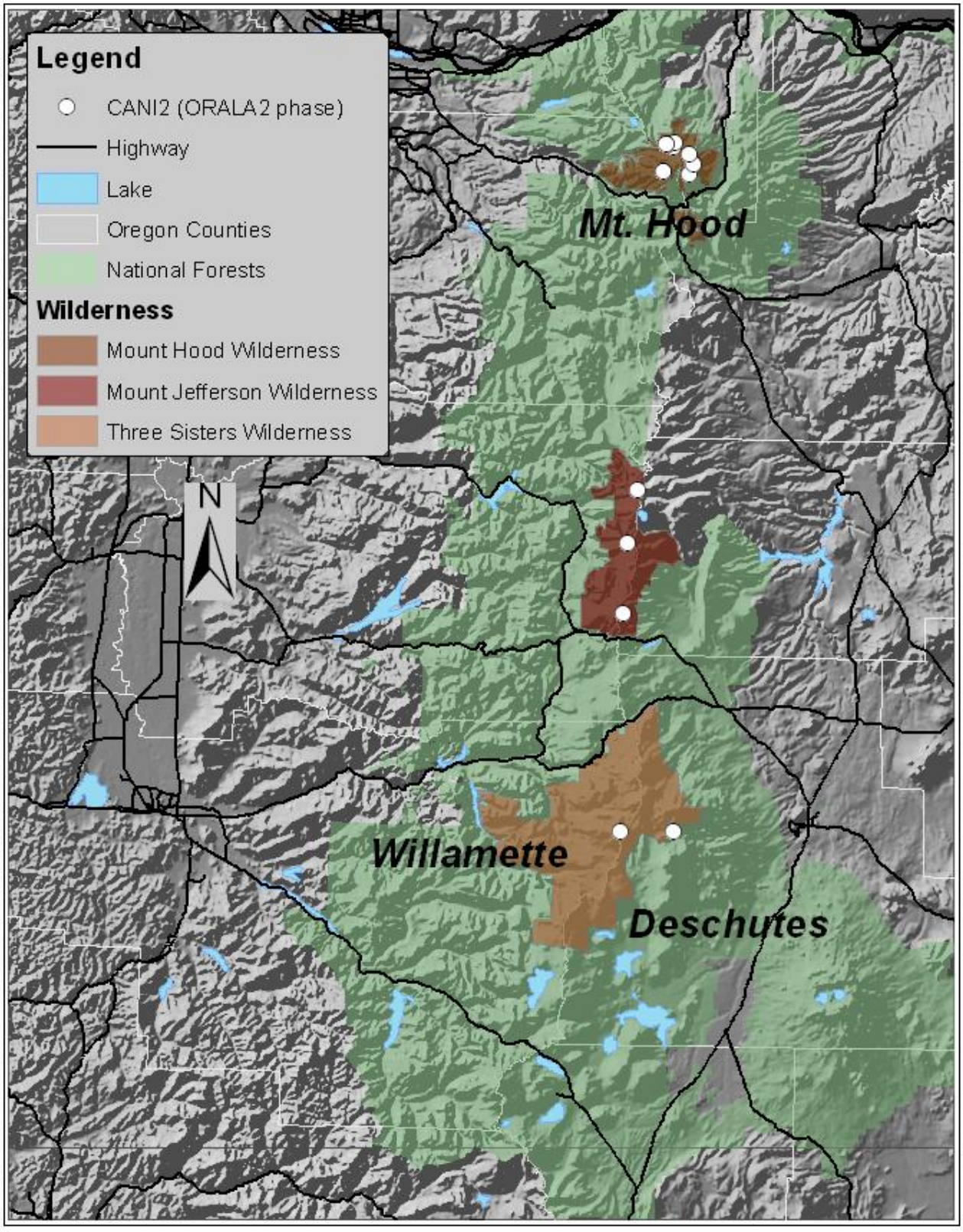


CANI2 [ORALA2 phase]. Environmental conditions of plots.

Number of plots	16 (11 Mt. Hood NF, 3 Willamette NF, 1 Deschutes NF, 1 Warm Springs Reservation)
Elevation (ft)	Mean = 6100; Range = 5290-7320
Slope (%)	Mean = 10; Range = 0-58
Aspect (no. of plots)	FLAT = 9; NW = 2; NE = 1; SE = 2; SW = 2
Distribution	High Cascades (100%)
Slope position	Basins and drainages
Slope shape	Straight horizontal slopes; straight to undulating vertical topography

Environmental conditions:

CANI2 [ORALA2 phase] occurs on gentle slopes or flats in basins or drainages with mainly straight slope shapes. This phase develops in deposits of sand and gravel in cirques, often beside minor drainages within the basins. The microtopography is generally complex; seeps and channels of water, hummocks and small ridges are occupied by different communities. Cover of bare ground, rock, and gravel average 15%. Late snow fields and snow melt are important environmental influences, indicating a short growing season. The soils are seasonally wet; water tables are generally just below the rooting zone by late summer. High water tables may restrict root depth in this community. Some plots had muck layers, indicating markedly anaerobic conditions.


Legend
CANI2 (ORALA2 phase)
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This subalpine community is dominated by black alpine sedge (CANI2) and alpine aster (ORALA2). Fan-leaved cinquefoil (POFL3), Gray's lovage (LIGR) and red mountain heather (PHEM) are found in over half the plots. Summed plant cover averages 78%.

Growth form	Mean cover (%)
Forb	33.1
Graminoid	40.4
Shrub	2.6
Tree	0.1

CANI2 [ORALA2 phase]. Constancy table. Canopy cover for species in at least 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
CANI2	*Carex nigricans*	Black alpine sedge	100.0	30.3	30.3
ORALA2	*Oreostemma alpigenum*	Alpine aster	100.0	20.5	20.5
POFL3	*Potentilla flabellifolia*	Fan-leaved cinquefoil	56.3	3.6	6.4
LIGR	*Ligusticum grayi*	Gray's lovage	56.3	1.9	3.4
PHEM	*Phyllodoce empetriformis*	Red mountain heather	56.3	1.3	2.3
ANAL4	*Antennaria alpina*	Woolly pussytoes	31.3	0.4	1.4
CASP5	*Carex spectabilis*	Showy sedge	25.0	1.0	4.0
CAPA26	*Castilleja parviflora*	Small-flowered paintbrush	25.0	0.9	3.5

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 6 (3 Mt. Hood NF, 2 Willamette NF, 1 Warm Springs Reservation)

Soils are coarse textured alluvial deposits. Profiles show layers of loamy sand or sandy loam sometimes interspersed with finer layers (alluvial deposits leaving buried A horizons, generally directly over C horizons). A horizons are of loamy sand or sandy loam. C horizons are generally loamy sand. Soil profiles from the Mt. Jefferson Wilderness developed from volcanic sands/pumice. Gleying (evidence of anaerobic conditions) is noted in two of the three Mt. Hood NF pits. One pit had surface muck as well as a buried muck horizon. All three of the Mt. Hood pits showed gravels and cobbles in the lowest horizon in the pit. Five of the six pits had water tables within 0-26" of the ground in late summer. Rooting depths from three plots average 10".

Observations from plot notes:

Vegetation: CANI2 [ORALA2 phase] is often found near heather communities with scattered trees on basin margins or on slopes or hummocks, and near tree islands supporting communities such as mountain hemlock/blueleaf huckleberry.

Soil: The single rocky plot is located in a swale between a moraine and a minor ridge.

Small mammal disturbance: Winter tunnels from gophers are occasionally noted.

Previously described plant associations:

Kovalchik (1987) describes a *Carex nigricans* plant association in central Oregon with high constancy of *Aster alpigenus* (81%) (*Oreostemma alpigenum* var. *alpigenus* was formerly called *Aster alpigenus*). Other plants with high constancy are *Juncus drummondii* (81%), *Potentilla flabellifolia* (69%), *Carex scopulorum* (63%), and *Ligusticum grayi* (50%).

Henderson (1973) reports a *Carex nigricans*/*Aster alpigenus* community from Mt. Rainier National Park which occurs on moist to wet habitats with a warmer and longer growing season than his pure *Carex nigricans* community.

Subalpine Moist Communities

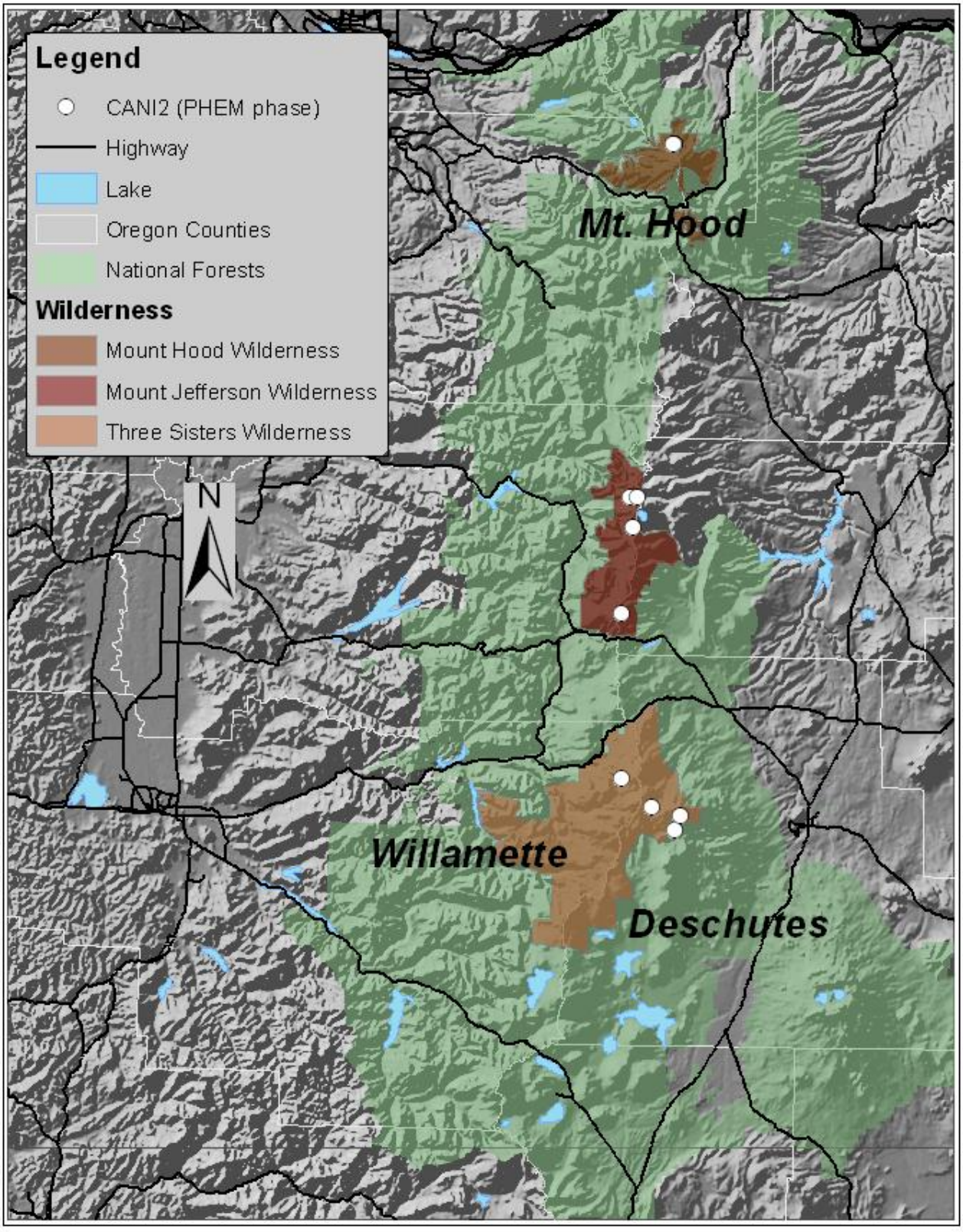
Carex nigricans [*Phyllodoce empetriformis* phase] (Black alpine sedge [red heather phase])
CANI2 [PHEM phase]
Eco-class code: MS2118

CANI2 [PHEM phase]. Environmental conditions of plots.

Number of plots	13 (5 Mt. Hood NF, 5 Willamette NF, 3 Deschutes NF)
Elevation (ft)	Mean = 6100; Range = 5320-7150
Slope (%)	Mean = 10; Range = 0-30
Aspect (no. of plots)	FLAT = 4; NW = 0; NE = 5; SE = 2; SW = 2
Distribution	High Cascades (100%)
Slope position	Drainages, basins, lower slopes to toe slopes
Slope shape	Straight to undulating topography; 1/3 plots had convex microtopography

Environmental conditions:

CANI2 [PHEM phase] occurs on gentle slopes generally in drainages, but also in basins, or lower- to toe-slopes with mainly straight to convex slope shapes. This phase develops in deposits of sand and gravel, often beside minor drainages within cirques basins. The microtopography is generally complex; seeps and channels of water, hummocks and small ridges are occupied by different communities. Cover of bare ground, rock, and gravel average 10%. Late snow fields and snow melt are important environmental influences, indicating a short growing season. Water tables are generally in or just below the rooting zone by late summer, restricting rooting zones. Several plots are described as in, or beside, seeps. Hummocks and small ridges provide microhabitats for shrubs and trees.


Legend
CANI2 (PHEM phase)
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This subalpine community is dominated by black alpine sedge (CANI2) and red heather (PHEM). Alpine aster (ORALA2), western bog-laurel (KAMI), Gray's lovage (LIGR), Jeffrey's shootingstar (DOJE) and blueleaf huckleberry (VADE) are found in over half the plots. White mountain heather (CAME7) and showy sedge (CASP5) are also important species. Mountain hemlock is found in one third of the plots. Summed plant cover averages 90%.

Growth form	Mean cover (%)
Forb	13.3
Graminoid	37.7
Shrub	33.2
Tree	0.3

CANI2 [PHEM phase]. Constancy table. Canopy cover for species in at least 25% of the plots.

Plants symbol	Common name	Scientific name	Const (%)	Mean cover (%)	Charact cover* (%)
CANI2	*Carex nigricans*	Black alpine sedge	100.0	25.9	25.9
PHEM	*Phyllodoce empetriformis*	Red mountain heather	100.0	13.0	13.0
ORALA2	*Oreostemma alpigenum*	Alpine aster	92.3	5.0	5.4
KAMI	*Kalmia microphylla*	Western bog-laurel	76.9	13.5	17.5
LIGR	*Ligusticum grayi*	Gray's lovage	61.5	1.8	3.0
VADE	*Vaccinium deliciosum*	Blueleaf huckleberry	53.8	2.8	5.3
DOJE	*Dodecatheon jeffreyi*	Jeffrey's shootingstar	53.8	0.8	1.4
CASP5	*Carex spectabilis*	Showy sedge	46.2	1.8	3.8
CAME7	*Cassiope mertensiana*	White mountain heather	38.5	2.5	6.4
LUPE	*Luetkea pectinata*	Partridge foot	38.5	1.5	4.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 5 (3 Willamette NF, 2 Deschutes NF)

Soils are seasonally wet, coarse textured alluvial deposits. Profiles show layers of loamy sand or sandy loam (alluvial deposits leaving buried A, AC, and C horizons). A horizons are of loamy sands or sandy loams. C horizons are generally loamy sands. Mottles (typically evidence of fluctuating anaerobic conditions) are noted in the Deschutes NF pit. Plot notes show the water table at the surface in one plot, and fairly saturated conditions in a second plot. Two pits have summer water tables at 10-31" below the ground surface.

Previously described plant associations:

Christy (2004) describes a similar plant association in the NW Oregon Cascade Range, *Carex nigricans*, which is most similar to the CANI2 [PHEM phase] community described in this guide. He observes that "it also intergrades with the *Carex scopulorum* association and upland *Phyllodoce empetriformis* heath. Stands on alluvial fans occur below springs and seeps and may be laced with rivulets or irrigated by sheet flow. Trees are absent and shrubs are confined to hummocks." Like the CANI2 [PHEM phase] in this guide, Christy's *Carex nigricans* association has high constancy of *Kalmia microphylla*, *Phyllodoce empetriformis*, and *Ligusticum grayi*, but lacks *Oreostemma alpigenum*, *Vaccinium deliciosum* and *Dodecatheon jeffreyi*.

Subalpine Moist Communities

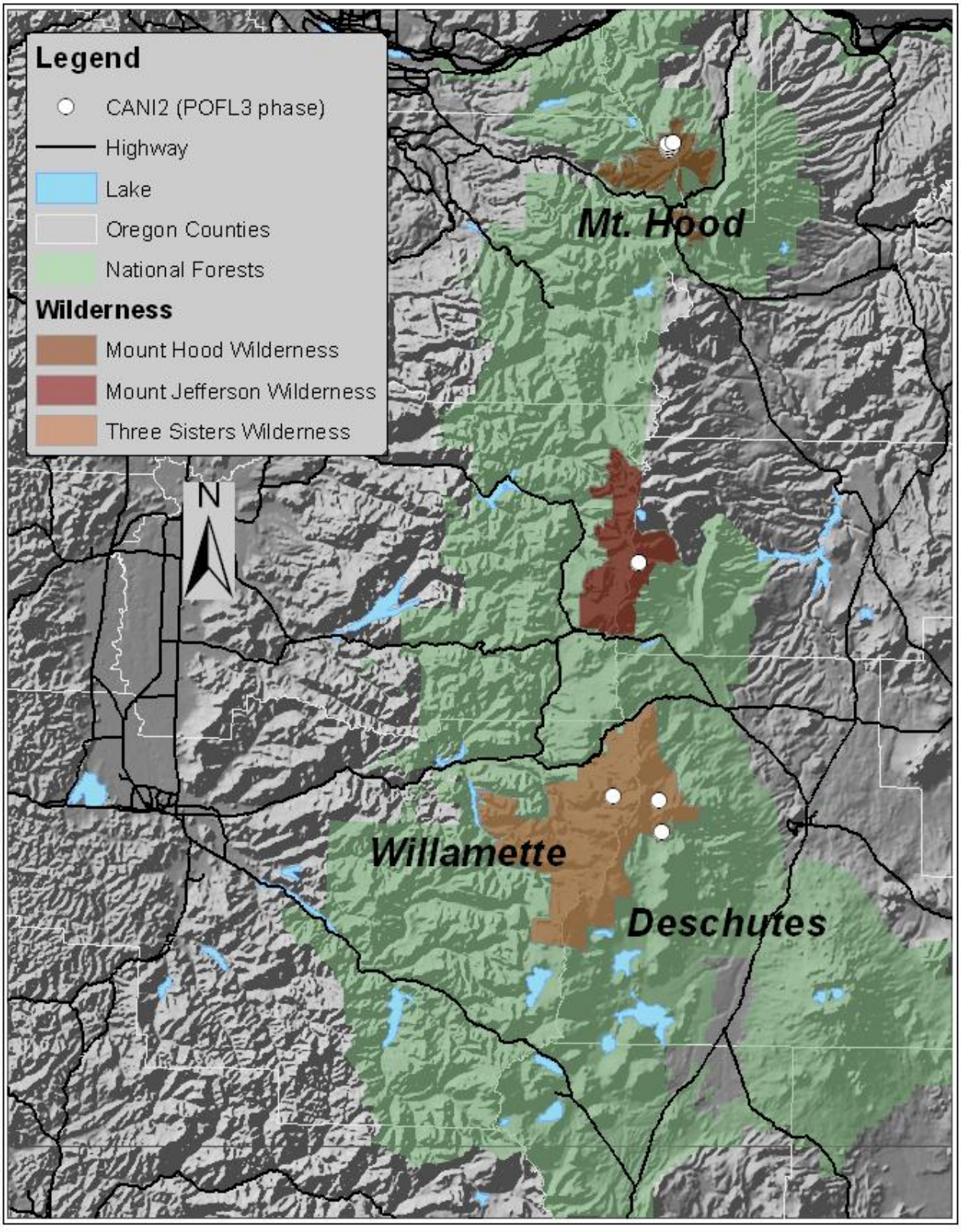
Carex nigricans [*Potentilla flabellifolia* phase] (Black alpine sedge [Fan-leaved cinquefoil phase])
CANI2 [POFL3 phase]
Eco-class code: MS2117

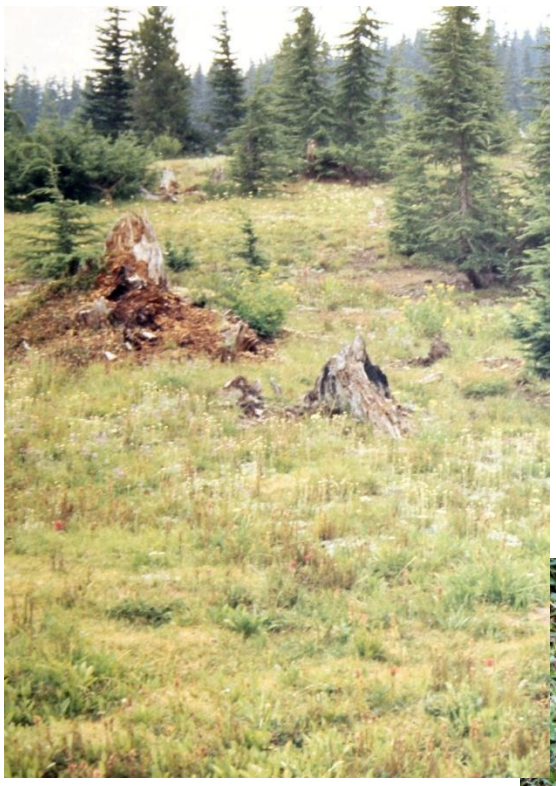
CANI2 [POFL3 phase]. Environmental conditions of plots.

Number of plots	14 (9 Mt. Hood NF, 1Willamette NF, 4 Deschutes NF)
Elevation (ft)	Mean =5900; Range = 5290-7300
Slope (%)	Mean = 6; Range = 0-21
Aspect (no. of plots)	FLAT = 8; NW = 3; NE = 3; SE = 0; SW = 0
Distribution	High Cascades (100%)
Slope position	Basins, drainages, benches
Slope shape	Straight

Environmental conditions:

CANI2 [POFL3 phase] occurs on flat to gentle slopes in basins or drainages with straight or flat topography. This phase develops in deposits of sands and gravels in cirque basins or depressions, often near drainages. The microtopography is characterized by combinations of flats and small channels. Late snow fields and snow melt are important environmental influences, indicating a short growing season. Soils have developed over alluvium, and buried surface horizons are evidence of repeated flooding. Frequent soil disturbance from gophers and common winter gopher tunnels are typical in this phase. Cover of bare ground, rock, and gravel average 7%.


Legend
CANI2 (POFL3 phase)
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes



Vegetation composition:

This subalpine community is dominated by black alpine sedge (CANI2) and fan-leaved cinquefoil (POFL3). Gray's lovage (LIGR) is found in 85% of the plots. Other important species, occurring in at least one third of the plots, include Drummond's rush (JUDR), alpine aster (ORALA2), small-flowered paintbrush (CAPA26), and showy sedge (CASP5). Summed plant cover averages 83%.

Growth form	Mean cover (%)
Forb	37.5
Graminoid	48.6
Shrub	1.6
Tree	0.4

CANI2 [POFL3 phase]. Constancy table. Canopy cover for species in at least 25% of the plots.

Plants symbol	Common name	Scientific name	Const (%)	Mean cover (%)	Charact cover* (%)
CANI2	*Carex nigricans*	Black alpine sedge	100.0	32.1	32.1
POFL3	*Potentilla flabellifolia*	Fan-leaved cinquefoil	100.0	18.6	18.6
LIGR	*Ligusticum grayi*	Gray's lovage	78.6	4.9	6.3
ORALA2	*Oreostemma alpigenum*	Alpine aster	50.0	1.7	3.4
JUDR	*Juncus drummondii*	Drummond's rush	50.0	1.3	2.6
CAPA26	*Castilleja parviflora*	Small-flowered paintbrush	42.9	0.7	1.7
CASP5	*Carex spectabilis*	Showy sedge	35.7	1.4	4.0
PHEM	*Phyllodoce empetriformis*	Red mountain heather	35.7	0.9	2.6
ERPE3	*Erigeron peregrinus*	Subalpine daisy	28.6	1.6	5.5

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 6 (2 Mt. Hood, 1 Willamette NF, 3 Deschutes NF)

Soils are medium to coarse textured silt loams or sandy loams over loamy sands or sands. Some pits contain gravelly and cobbly horizons. Buried A horizons are noted in all plots. One pit had 5 A to C sequences within 25", indicating frequent disturbance. CANI2 [POFL3 phase] soils are intermediate for the CANI2 group: less well drained or rocky than the LUPE phase and better drained than the ORALA2 and CASP5 phases.

Observations from plot notes:

Vegetation: This community is often found in meadows with rims of red heather communities, and near tree islands supporting plant associations such as mountain hemlock/red heather.

Previously described plant associations:

Wells (2006) describes a *Carex nigricans* plant association in northeast Oregon that is similar to the CANI2 [POFL3 phase] in this guide. It has high constancy of *Carex scopulorum* (90%), *Potentilla flabellifolia* (81%), *Senecio cymbalariodides* (72%), *Gentiana calycosa* (72%), and *Juncus drummondii* (63%).

Crowe et al. (2004) describe a *Carex nigricans* plant association that is most similar to the *Carex nigricans* [POFL3 phase] in this guide. They note that "the black alpine sedge association is locally abundant in subalpine and alpine settings in the Wallowa and Cascade Mountains." The association described by Crowe et al has high constancy of *Phyllodoce empetriformis* (54%), *Carex scopulorum*(75%), *Juncus drummondii* (75%), *Potentilla flabellifolia* (71%) and *Oreostemma alpigenus* (54%) *Packera cymbalarioides* (46%) and *Ligusticum grayi* (38%).

Subalpine Moist Communities

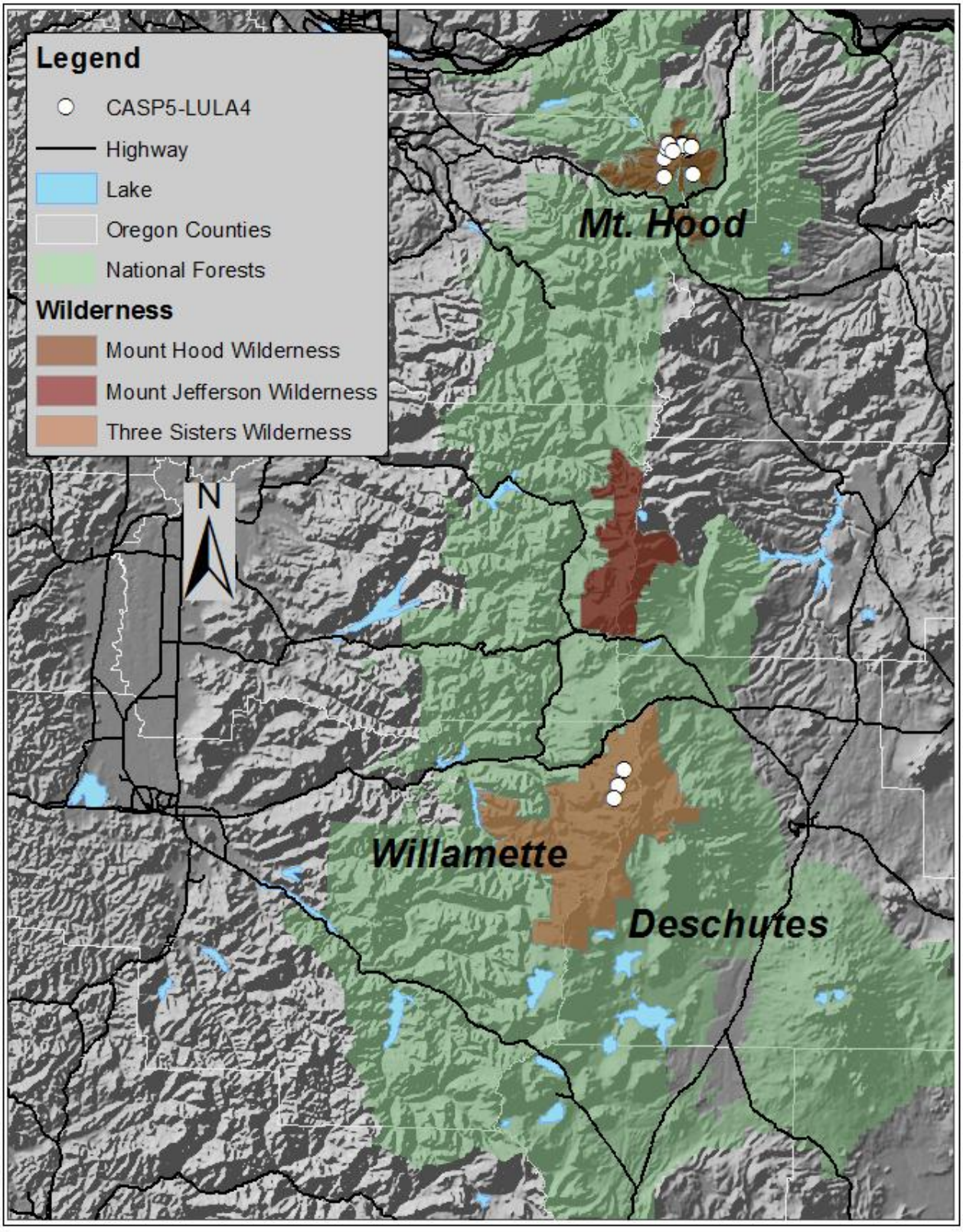
Carex spectabilis-Lupinus latifolius (Showy sedge-Broadleaved lupine)
CASP5-LULA4
Eco-class code: MS3118

CASP5-LULA4. Environmental conditions of plots.

Number of plots	26 (23 Mt. Hood NF, 3 Willamette NF)
Elevation (ft)	Mean = 5850; Range = 5290-7200
Slope (%)	Mean = 31; Range = 0-76
Aspect (no. of plots)	FLAT = 5; NW = 3; NE = 11; SE = 4; SW = 3
Distribution	High Cascades (100 %)
Slope position	Mid slopes, basins, and draws
Slope shape	Straight to undulating slopes, with 5 convex plots and 3 concave plots

Environmental conditions:

CASP5-LULA4 is a late snow-melt community, associated with flat to steep slopes with cool aspects on mid-slopes and basins. Topography ranges from undulating to straight. This community is often found adjacent to talus slopes, seeps, and melt-water channels. Cover of bare ground, gravel, and rock average 11%.


Legend
CASP5-LULA4
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This subalpine graminoid-forb community is dominated by showy sedge (CASP5) and broadleaf lupine (LULA4). Arrowleaf groundsel (SETR), an indicator of moist sites, and fan-leaved cinquefoil (POFL3) are generally present. Summed plant cover averages 99%.

Growth form	Mean cover (%)
Forb	59.1
Graminoid	35.2
Shrub	2.4
Tree	0.5

CASP5-LULA4. Constancy table. Canopy cover for species in at least 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
CASP5	*Carex spectabilis*	Showy sedge	100.0	25.1	25.1
LULA4	*Lupinus latifolius*	Broadleaf lupine	96.2	21.6	22.4
SETR	*Senecio triangularis*	Arrowleaf groundsel	69.2	2.2	3.2
POFL3	*Potentilla flabellifolia*	Fan-leaved cinquefoil	50.0	6.3	12.6
LIGR	*Ligusticum grayi*	Gray's lovage	42.3	1.5	3.5
ERPE3	*Erigeron peregrinus*	Subalpine daisy	38.5	3.1	8.0
CAPA26	*Castilleja parviflora*	Small-flowered paintbrush	38.5	2.3	5.9
JUDR	*Juncus drummondii*	Drummond's rush	34.6	1.4	4.1
CANI2	*Carex nigricans*	Black alpine sedge	30.8	1.3	4.3
EULEL2	*Eucephalus ledophyllus*	Cascade aster	26.9	1.5	5.6

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 9 (9 Mt. Hood plots)

Soils are sandy loam to loamy sand, sometimes stony or cobbly, often in alluvium or at the base of talus slopes. Multiple A to C sequences shows several episodes of deposition and erosion.

Profiles typically include one or two A horizons over multiple series of AC or C horizons. Surface A horizons (A1 and A2) are often shallow fine sandy loams or loamy sands, averaging 3" (1-17"). B horizons (indicating some stability in the profile) have developed in 4 of the 9 pits. Horizons become stony or cobbly with depth. Mottles, often indicating fluctuating anaerobic conditions, are recorded in three pits (16-19" depth). Plot notes from 2 pits record that soils have developed in pockets of deep ash amid large rocks.

Observations from plot notes:

Vegetation: The CASP5-LULA4 community is not as tall or productive as the lower elevation SETR-VERAT-VASI type (see also Franklin and Dyrness (1988)). The two appear related and may grade into lush herbaceous types such as SETR-VERAT-VASI and the FEVI group (on higher topography).

Small mammal disturbance: Small mammal disturbance is noted on a third of the plots.

Previously described plant associations:

Crowe et al. (2004) describe a *Carex spectabilis–Lupinus arcticus* ssp. *subalpinus* plant association for central and eastern Oregon (*Lupinus arcticus* ssp. *subalpinus* was formerly *Lupinus latifolius* var. *subalpinus*). Crowe et al use two plots, and refer to Kovalchik's (2001) guide to support their findings. Like the *Carex spectabilis-Lupinus latifolius* association described in this guide, their plots have high constancy of *Ligusticum grayi* and *Carex nigricans*, but contain plants that do not occur in this guide's plots, such as *Nothocalais alpestris* and *Polygonum davisiae*.

Douglas and Bliss (1977) describe a *Carex spectabilis* plant association for the alpine and high subalpine plant communities of the North Cascades Range in Washington and British Columbia. They note that "total average plant cover is one of the highest of all the alpine types in the region. *Carex spectabilis* has a high average cover and frequency." Other prominent species are *Solidago multiradiata*, *Phlox diffusa*, *Valeriana sitchensis* and *Carex breweri*. Cryptogams such *Cladonia gracilis*, *Cladina mitis*, *Cetraria ericetorum* and *Polytrichum piliferum* also had high prominence values. (Rather than use cover and constancy, they calculated a prominence value by multiplying the average percentage cover by the square root of the species frequency in each stand.)

Douglas (1972) describes a *Carex spectabilis* plant association in his Colluvial Slope Meadow Habitat of the subalpine Western North Cascades in Washington. Douglas notes that *C. spectabilis* "occurs on sites similar to those of the *Valeriana-Veratrum* community type... *Carex spectabilis* is the sole dominant and occurs with 100% frequency and 78% mean cover. Other prominent species in the type are *Lupinus latifolius* var. *subalpinlus* and *Polygonum bistortoides*."

Subalpine Moist Communities

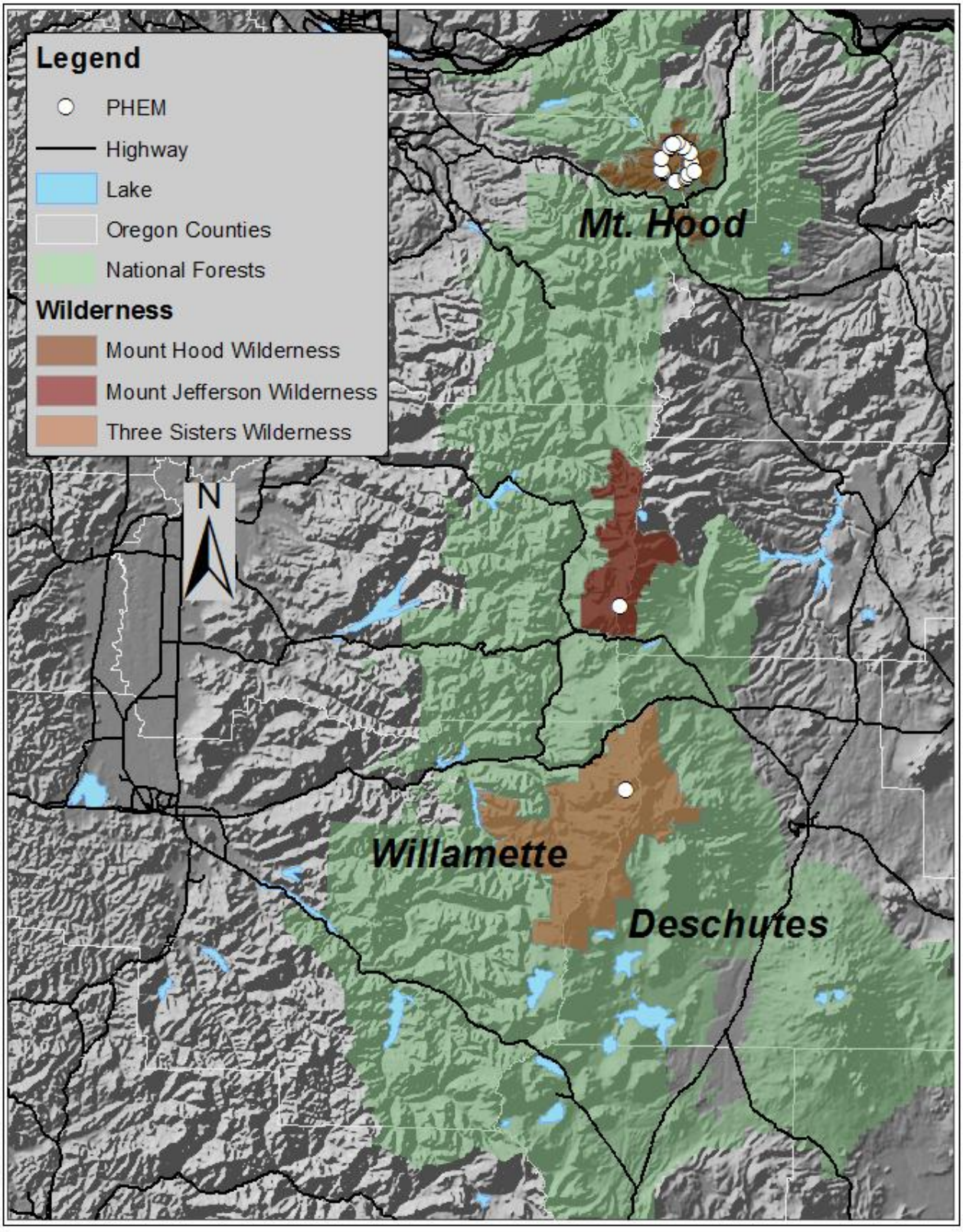
Phyllodoce empetriformis (Red mountain heather)
PHEM
Eco-class code: SS1913

PHEM. Environmental conditions of plots.

Number of plots	33 (31 Mt. Hood NF, 2 Willamette NF)
Elevation (ft)	Mean = 6100; Range = 5420-7320
Slope (%)	Mean = 30; Range = 0-80
Aspect (no. of plots)	FLAT = 4; NW = 10; NE = 11; SE = 5; SW = 3
Distribution	High Cascades (100 %)
Slope position	Mainly mid to lower slope and basin; all positions
Slope shape	Undulating to straight slopes

Environmental conditions:

PHEM is a late snow-melt low shrub (heather) community, associated with well drained, generally moderate slopes with cool aspects on mid slopes and in basins. PHEM is often found adjacent to snow melt drainages; other locations are in swales, near seeps, or close to late snowfields. Soils show multiple erosion and deposition events. Cover of bare ground, rock, and gravel average 16%.


Legend
PHEM
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This cool moist subalpine heath community is dominated by red mountain heather. Partridge foot (LUPE) is generally present. Small-flowered paintbrush (CAPA26) and Gray's lovage (LIGR) occur in over 50% of the plots. Black alpine sedge (CANI2) and showy sedge (CASP5) are important sedges in this type.

Other than heather, important shrubs include blueleaf huckleberry (VADE) (15% of plots), yellow mountain heather (PHGL2) (9% of plots) and variable willow (SACO2) (9% of plots). Summed plant cover averages 80%.

Growth form	Mean cover (%)
Forb	26.9
Graminoid	10.7
Shrub	44.8
Tree	1.2

PHEM. Constancy table. Canopy cover for species in over 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
PHEM	*Phyllodoce empetriformis*	Red mountain heather	100.0	37.3	37.3
LUPE	*Luetkea pectinata*	Partridge foot	87.9	11.5	13.1
CAPA26	*Castilleja parviflora*	Small-flowered paintbrush	51.5	1.4	2.8
LIGR	*Ligusticum grayi*	Gray's lovage	51.5	1.2	2.3
CANI2	*Carex nigricans*	Black alpine sedge	48.5	3.3	6.7
CASP5	*Carex spectabilis*	Showy sedge	42.4	2.4	5.6
ERPE3	*Erigeron peregrinus*	Subalpine daisy	39.4	2.5	6.4
TSME	*Tsuga mertensiana*	Mountain hemlock	39.4	0.6	1.5
JUDR	*Juncus drummondii*	Drummond's rush	36.4	0.9	2.5
LULA4	*Lupinus latifolius*	Broadleaf lupine	33.3	2.4	7.1
ANAL4	*Antennaria alpina*	Woolly pussytoes	30.3	0.5	1.5
ORALA2	*Oreostemma alpigenum*	Alpine aster	27.3	1.7	6.1
SETR	*Senecio triangularis*	Arrowleaf groundsel	27.3	0.6	2.1
HIGR	*Hieracium gracile*	Slender hawkweed	27.3	0.5	2.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 15 (13 Mt. Hood NF, 2 Willamette NF)

Soils are moderate to deep sandy loams over loamy sands to sands, with several buried A and C horizons indicating multiple erosional and depositional sequences.

Upper horizons are typically one or two sandy loam A horizons. Combined A1 and A2 depths average 8". C horizons in the lower layers are cobbly or gravelly loamy sands or sands. Buried B horizons in 5 of the 15 pits are evidence of previous relatively stable conditions.

Four pits show a summer water table, averaging 22" depth from surface (12-29"). Mottles are recorded in 9 of the pits, at an average depth of 6". Rooting depth is relatively deep for subalpine meadows: 18" (8-31").

Observations from plot notes:

Small mammal disturbance: Pocket gopher disturbance is noted on a quarter of the plots.

Previously described plant associations:

Douglas & Bliss (1977) describe a *Phyllodoce empetriformis* plant association for the north Cascades Range of Washington and British Columbia. They note that "*Phyllodoce empetriformis* has a mean high cover and frequency. Other prominent species are *Antennaria lanata* (occurring across the entire range), *Vaccinium deliciosum* and *Cassiope mertensiana* (both restricted to the western and central Cascades) and *Vaccinium scoparium* (found from the central to eastern Cascades)."

Douglas (1972) describes a *Cassiope Mertensiana-Phyllodoce Empetriformis* Community in his Typical Meadow Habitat, which is between 1,250 m and 1,950 m (4,100 to 6,400 ft) elevation on the western north Cascades of Washington. He notes that "this community type is found on poor to fairly well drained moist slopes and ridges." *Cassiope mertensiana* and *Phyllodoce empetriformis* form "a dense overstory and are the most prominent species in the community with average cover values of 45 and 33%, respectively." Other species that occur with high frequency, although relatively low cover, are *Vaccinium deliciosum*, *Luetkea pectinata*, *Lycopodium sitchense* and *Deschampsia atropurpurea*. Cryptogams often found in this community are *Dicrainuml fuscescens*, *Rhacomiritrium* spp. and *Cladonia* spp.

Subalpine Moist Communities

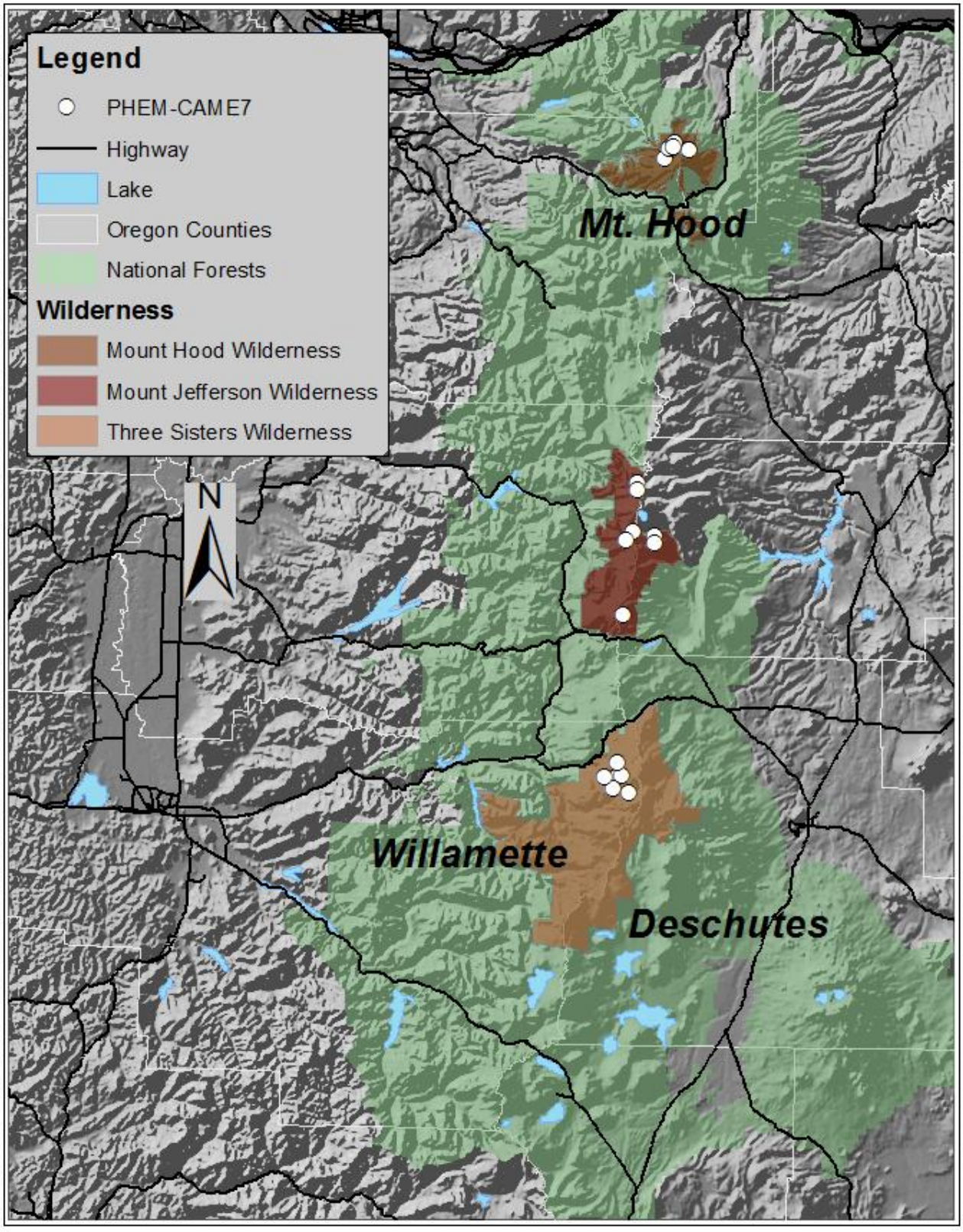
Phyllodoce empetriformis-Cassiope mertensiana (Red mountain heather-White mountain heather)
PHEM-CAME7
Eco-class code: SS1914

PHEM-CAME7. Environmental conditions of plots.

Number of plots	33 (19 Mt. Hood NF, 12 Willamette NF, 1 Deschutes NF, 1 Warm Springs Reservation)
Elevation (ft)	Mean = 6350; Range = 5570-7500
Slope (%)	Mean = 24; Range = 0-65
Aspect (no. of plots)	FLAT = 5; NW = 15; NE = 11; SE = 1; SW = 1
Distribution	High Cascades (100 %)
Slope position	Mainly mid slope and basin; all positions
Slope shape	Mainly undulating, more convex than concave

Environmental conditions:

PHEM-CAME7 is a late snow-melt community associated with well drained, flat to moderate slopes with cool aspects in basins or on mid-slopes. It is often found adjacent to talus slopes and late snowfields where rock slides and snow melt drainage create varied microrelief. A fine-scale mosaic of edges, depressions, and hummocks from erosion and frost heaving give rise to a patchy distribution of species. Soils show multiple erosion and deposition events. Cover of bare ground, rock, and gravel average 18%.


Legend
PHEM-CAME7
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This cool, moist, subalpine heath community is co-dominated by red mountain heather and white mountain heather. Partridge foot (LUPE) is generally present. Black alpine sedge (CANI2), blueleaf huckleberry (VADE) and alpine aster (ORALA2) occur in at least 50% of the plots. Grouse whortleberry (VASC) is also an important shrub species, occurring in 9% of the plots. Summed plant cover averages 84%.

Growth form	Mean cover (%)
Forb	20.1
Graminoid	8.8
Shrub	55.3
Tree	1.3

PHEM-CAME7. Constancy table. Canopy cover for species in over 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
PHEM	*Phyllodoce empetriformis*	Red mountain heather	100.0	31.5	31.5
CAME7	*Cassiope mertensiana*	White mountain heather	100.0	16.9	16.9
LUPE	*Luetkea pectinata*	Partridge foot	84.8	8.8	10.3
CANI2	*Carex nigricans*	Black alpine sedge	66.7	5.1	7.6
VADE	*Vaccinium deliciosum*	Blueleaf huckleberry	54.5	5.2	9.5
ORALA2	*Oreostemma alpigenum*	Alpine aster	51.5	2.0	3.9
LIGR	*Ligusticum grayi*	Gray's lovage	48.5	1.5	3.1
TSME	*Tsuga mertensiana*	Mountain hemlock	45.5	1.0	2.2
CASP5	*Carex spectabilis*	Showy sedge	42.4	0.9	2.1
CAPA26	*Castilleja parviflora*	Small-flowered paintbrush	42.4	0.8	1.9
LULA4	*Lupinus latifolius*	Broadleaf lupine	36.4	3.0	8.3
HIGR	*Hieracium gracile*	Slender hawkweed	33.3	0.4	1.3

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 15 plots (9 Mt. Hood NF, 5 Willamette NF)

Soils are moderately deep to deep sandy loam, with several buried A and C horizons indicating multiple erosional and depositional sequences. Upper horizons are typically one or two sandy loam A horizons. Combined A1 and A2 depths average 6". C horizons in the lower layers are gravelly loamy sands or sands. B horizons have developed in 6 of the 15 pits, indicating relatively stable conditions.

One plot has a summer water table at 24-30" depth. On another, water is moving on the surface of a compacted layer of pea-sized scoria gravels. Mottles are found in 6 pits, at an average depth of 10". Rooting depth is relatively deep for subalpine meadows: 17" (11-25").

Observations from plot notes:

Vegetation: Concave microsites have higher partridge foot (LUPE), white mountain heather (CAME7), Gray's lovage (LIGR), and slender hawkweed (HIGR). Tree seedlings (mountain hemlock or subalpine fir) are recorded on several plots, but observers speculate that survival may be limited by frost.

Soils: Plot notes indicate that convex areas (hummocks) have deeper soils associated with red mountain heather (PHEM), black alpine sedge (CANI2), and mountain sedge (CASC12) while concave areas have higher rock content and shallower soils.

Small mammal disturbance: Small mammal disturbance is noted on almost one third of the plots.

Previously described plant associations:

Kovalchik (1987) describes a *Phyllodoce empetriformis* plant association for the Deschutes, Ochoco, Fremont and Winema National Forests that does not have *Cassiope mertensiana* but does have high plant constancy for *Ligusticaum grayi*(92%), *Oreostemma alpigenum* var. *alpigenum* (*Aster alpigenus* in his guide) (85%), *Carex nigricans* (77%), *Vaccinium deliciosum* (62%), and *Potentilla flabellifolia* (54%).

Kovalchik and Clausnitzer (2004) describe a *Cassiope mertensiana-Phyllodoce empetriformis,* association in their eastern Washington guide. Plants with high constancy were red mountain-heath (100%), black alpine sedge (100%), Merten's moss-heather (86%), partridge foot (86%), fanleaf cinquefoil (71%) and Drummond's rush (71%). They note that "CAME-PHEM appears to be more common in low to very low gradient valleys, whereas PHEM-VADE is most common in very steep valleys. However, they are still present in other valley gradient classes."

Douglas and Bliss (1977) describe a *Cassiope mertensiana* plant association in their dwarf shrub community type that occurs as a codominant with the *Phyllodoce empetriformis* plant association, for the north Cascades Range of Washington and British Columbia. They compare three different phases: *Cassiope mertensiana* (alpine), *Phylodoce empetriformis* (alpine) and *Cassiope mertensiana-Phyllodoce empetriformis* (subalpine). They note that "the *Cassiope* community has a high average total plant cover. *Cassiope mertensiana* occurs with a high frequency and average cover. *Luetkea pectinata*, *Phyllodoce glanduliflora*, *Antennaria lanata*, and *Vaccinium deliciosum* are important associates; the latter is restricted mainly to the western North Cascades. In the central part of the region, *Phyllodoce empetriforinis* becomes prominent."

Subalpine Moist Communities

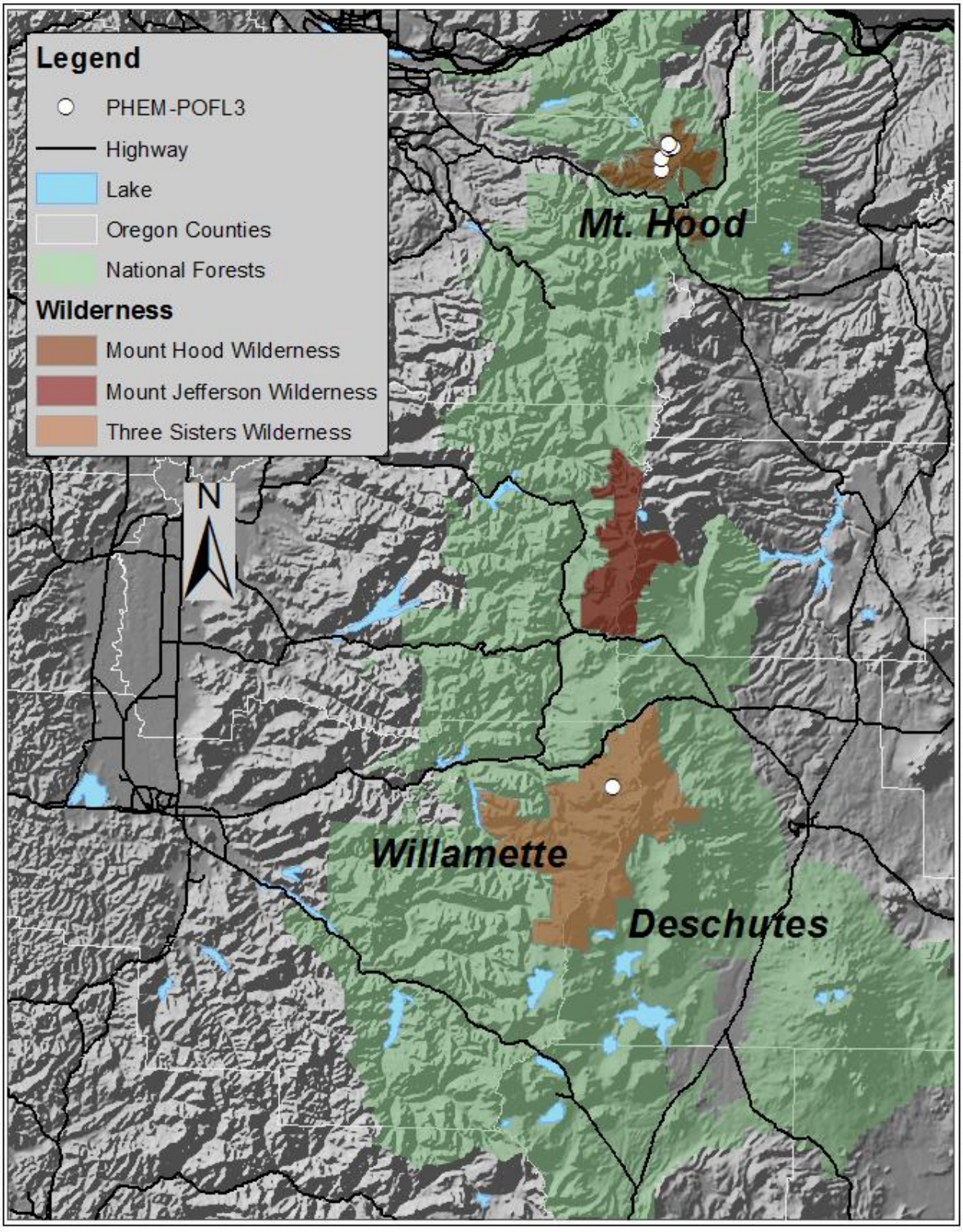
Phyllodoce empetriformis/Potentilla flabellifolia (Red mountain heather/Fan-leaved cinquefoil)
PHEM/POFL3
Eco-class code: S1915

PHEM/POFL3. Environmental conditions of plots.

Number of plots	13 (10 Mt. Hood NF, 1 Willamette NF)
Elevation (ft)	Mean = 5600; Range = 5290-6050
Slope (%)	Mean = 13; Range = 0-63
Aspect (no. of plots)	FLAT = 4; NW = 4; NE = 1; SE = 0; SW = 2
Distribution	High Cascades (100 %)
Slope position	Mainly basins; draws and mid to lower slopes
Slope shape	Undulating to straight slopes

Environmental conditions:

PHEM/POFL3 is a late snow-melt heather/herb-dominated community, associated with flat to gentle slopes with cool aspects in basins. It is often found in basins or near seeps. Cover of bare ground, gravel, and rock average 8%. The poorly drained loamy soils developed in alluvium, and show multiple erosion and deposition events. Soils can be wet in summer, with evidence of fluctuating anaerobic conditions.


Legend
PHEM-POFL3
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This cool moist subalpine community is characterized by red mountain heather and fan-leaved cinquefoil. Gray's lovage (LIGR) is typically present. Subalpine daisy (ERPE3) and small-flowered paintbrush (CAPA26) occur in over 60% of the plots. Summed plant cover averages 101%.

In addition to red mountain heather, other important shrubs include diamondleaf willow (SAPL2) (18% of plots had a characteristic cover of 60%), blueleaf huckleberry (VADE) (18% of plots had a characteristic cover of 3%), and white mountain heather (CAME7) (18% of plots, characteristic cover of 3%).

Growth form	Mean cover (%)
Forb	50.8
Graminoid	20.6
Shrub	39.4
Tree	0.5

PHEM/POFL3. Constancy table. Canopy cover for species in over 25% of the plots.

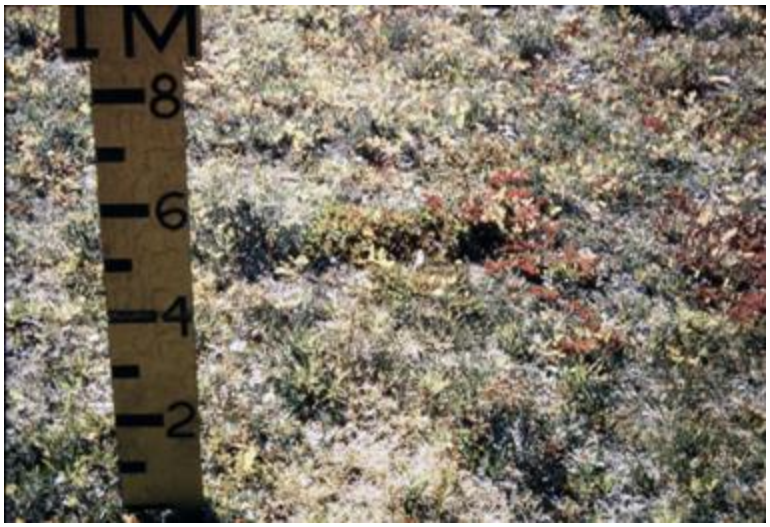
Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
PHEM	*Phyllodoce empetriformis*	Red mountain heather	100.0	26.0	26.0
POFL3	*Potentilla flabellifolia*	Fan-leaved cinquefoil	100.0	11.4	11.4
LIGR	*Ligusticum grayi*	Gray's lovage	81.8	2.5	3.0
ERPE3	*Erigeron peregrinus*	Subalpine daisy	63.6	6.4	10.0
CAPA26	*Castilleja parviflora*	Small-flowered paintbrush	63.6	4.0	6.3
CASP5	*Carex spectabilis*	Showy sedge	54.5	13.1	24.0
LULA4	*Lupinus latifolius*	Broadleaf lupine	54.5	11.5	21.0
ORALA2	*Oreostemma alpigenum*	Alpine aster	54.5	1.7	3.2
SETR	*Senecio triangularis*	Arrowleaf groundsel	45.5	3.2	7.0
CANI2	*Carex nigricans*	Black alpine sedge	36.4	1.3	3.5
JUME3	*Juncus mertensianus*	Mertens' rush	36.4	0.5	1.5
JUDR	*Juncus drummondii*	Drummond's rush	36.4	0.5	1.3
VASI	*Valeriana sitchensis*	Sitka valerian	27.3	1.6	6.0
AGHU	*Agrostis humilis*	Alpine bentgrass	27.3	1.5	5.3
POBI6	*Polygonum bistortoides*	American bistort	27.3	0.8	3.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 4 (3 Mt. Hood NF, 1 Willamette NF)

Soils are deep silty loam or sandy loam over multiple layers of silty loam to loamy sand. Pits show several buried A to C horizons, indicating multiple erosional and depositional sequences. Upper horizons are typically one or two sandy loam A horizons. C horizons in the lower layers are cobbly or gravelly loamy sands or sands (one muck). Buried B horizons in 2 of the 4 pits are evidence of previous relatively stable conditions.



A summer water table is present in two pits, one at 4" and the other at 12"depth. Mottles are recorded on 4 of the pits, at an average depth of 11" (7-13"). Rooting depth is only recorded on one plot, at 20".

Observations from plot notes:

Small mammal disturbance: Pocket gopher disturbance is noted on over half the plots.

Previously described plant associations:

Wells (2006) describes a *Phyllodoce empetriformis* plant association for northeast Oregon that is similar to the *Phyllodoce empetriformis/Potentilla flabellifolia* association described in this guide. Species with high constancy were *Potentilla flabellifolia* (100%), *Gentiana calycosa* (100%), *Sibbaldia procumbens* (100%), *Kalmia microphylla* (100%), *Vaccinium scoparium* (80%), *Viola palustris* (80%), *Carex nigricans* (80%) and *Juncus drummondii* (80%). He notes that "the pink mountain heath mounds plant association occurred in moist meadows at the upper terminus of glacial valleys above 2134 m [7,000 ft] elevation in the Eagle Cap Wilderness and Elkhorn Mountains."

Subalpine Moist Communities

Senecio triangularis-Veratrum-Valeriana sitchensis (Arrowleaf groundsel-False hellebore-Sitka valerian)
SETR-VERAT-VASI
Eco-class code: FW4255

SETR-VERAT-VASI. Environmental conditions of plots.

Number of plots	22 (22 Mt. Hood NF)
Elevation (ft)	Mean = 5950; Range = 5485-7200
Slope (%)	Mean = 47; Range = 0-99
Aspect (no. of plots)	FLAT = 1; NW = 14; NE = 6; SE = 0; SW = 1
Distribution	High Cascades (100 %)
Slope position	Slopes and ridges, occasionally draws and basins
Slope shape	Mainly undulating; also convex to straight

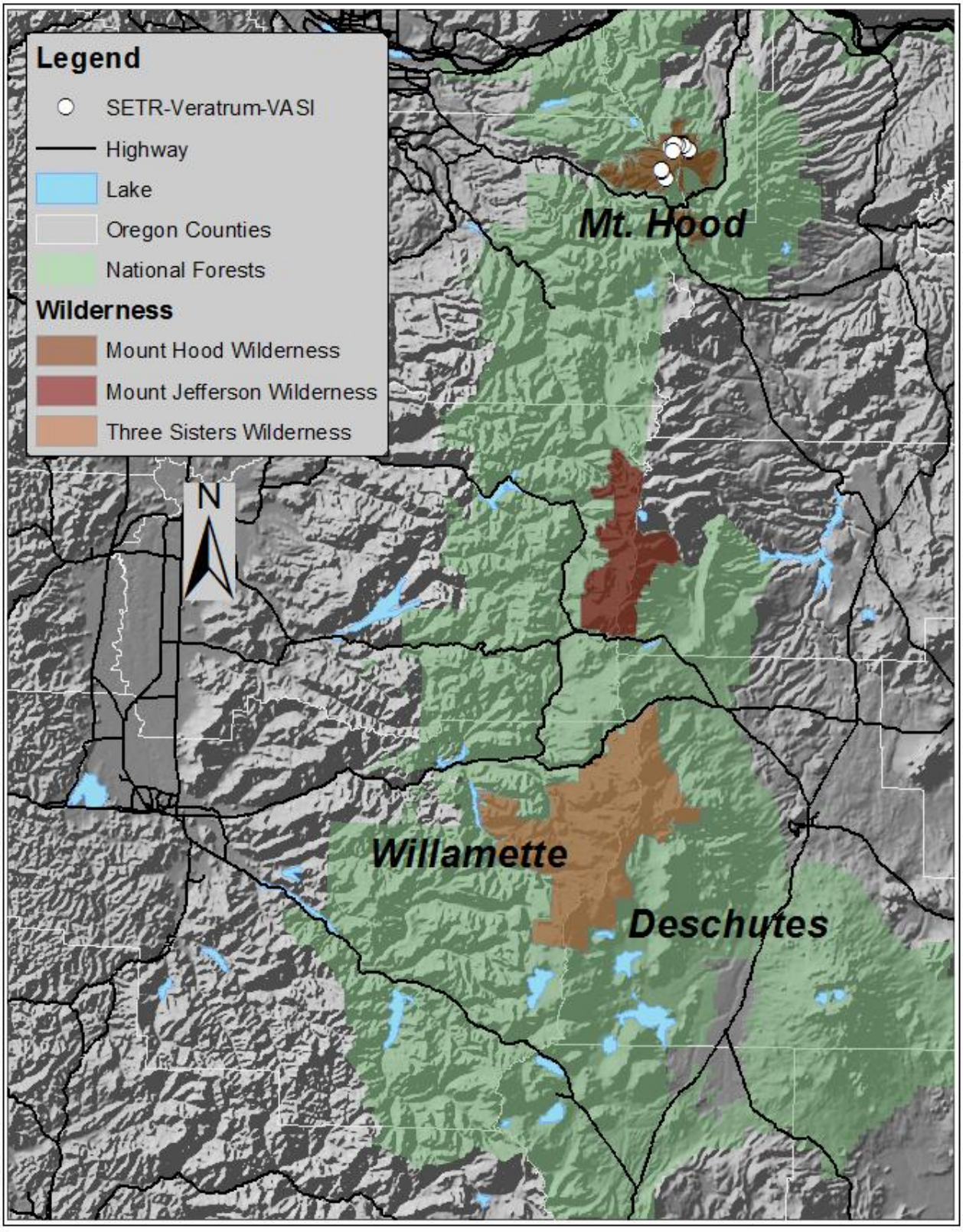
Environmental conditions:

SETR-VERAT-VASI is a late snow-melt community, mainly associated with steep slopes and ridges, with cool aspects. It is found in avalanche chutes, and between or adjacent to talus slopes. Several plots are characterized as shrub patches. Cover of bare ground, rock, and gravel average 10%.

Vegetation composition:

This cool moist subalpine forb or shrub/forb community is characterized by arrowleaf groundsel (SETR), false hellebore (VERAT), and Sitka valerian (VASI). Broadleaf lupine (LULA4) and Sitka mountain ash (SOSI2) occur at least 50% of the plots. Some SETR-VERAT-VASI sites are dominated by a variety of shrubs. Six plots had over 80% shrub cover. In addition to mountain ash (SOSI2), shrubs include mapleleaf currant (RIAC) (18% of plots, characteristic cover of 14%) and bigleaf huckleberry (VAME) (18% of plots, characteristic cover of 13%). Sitka alder (ALVIS) occurs on 2 plots and variable willow one 1 plot. Summed plant cover averages 99%.

Growth form	Mean cover (%)
Forb	60.1
Graminoid	11.4
Shrub	27.6
Tree	0.3


Legend
SETR-Veratrum-VASI
Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

SETR-VERAT-VASI. Constancy table. Canopy cover for species in over 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
SETR	*Senecio triangularis*	Arrowleaf groundsel	100.0	6.3	6.3
VERAT	*Veratrum (combined)*	False hellebore species	95.5	18.1	18.9
VASI	*Valeriana sitchensis*	Sitka valerian	86.4	9.9	11.5
LULA4	*Lupinus latifolius*	Broadleaf lupine	68.2	11.1	16.3
SOSI2	*Sorbus sitchensis*	Sitka mountain ash	50.0	15.0	30.0
LIGR	*Ligusticum grayi*	Gray's lovage	45.5	1.1	2.4
POFL3	*Potentilla flabellifolia*	Fan-leaved cinquefoil	36.4	0.7	2.0
LUGLH	*Luzula hitchcockii*	Hitchcock's wood-rush	31.8	3.0	9.4
POPU3	*Polemonium pulcherrimum*	Showy Jacob's-ladder	31.8	1.7	5.2
ARLA8	*Arnica latifolia*	Broadleaf arnica	31.8	0.5	1.6
CASP5	*Carex spectabilis*	Showy sedge	27.3	3.0	11.2
EULEL2	*Eucephalus ledophyllus*	Cascade aster	27.3	1.4	5.1
JUDR	*Juncus drummondii*	Drummond's rush	27.3	0.5	2.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 12 (12 Mt. Hood NF)

Soils are fine sandy loam over multiple layers of sandy loam to loamy sand. Pits show several buried A to C horizons series, indicating multiple erosional and depositional sequences. Notes from one pit speculate that a series of four A horizons resulted from mixing due to steepness and gopher activity. Upper horizons are typically one or two fine sandy loam A horizons. C horizons in the lower layers are cobbly, stony, or gravelly sandy loams or loamy sands or sands. B horizons in 6 pits are evidence of previous relatively stable periods. Mottles are recorded on 3 of the pits, at an average depth of 14" (9-19"), which is evidence of fluctuating anaerobic conditions. Roots are concentrated in the top 18" (7-31").

Observations from plot notes:

Small mammal disturbance: Pocket gopher disturbance is noted on 40% of the plots.

Previously described plant association:

Christy (2004) describes a *Senecio triangularis* plant associationfor northwestern Oregon, which is a similar montane wet community that lacks some of the subalpine species. He explains that "habitat is hummocks or tree-islands in peatlands, forest ecotone at edges of wetlands, or in openings on seepy slopes. It is best described as forest ecotone with at least seasonally wet soil." Christy goes on to describe a plant association that is highly diverse, with many plant species, but that "*Senecio triangularis* is the primary species, with average cover of 13 percent and ranging from 0-35 percent. It is not present

in every plot, but associated indicator species include *Aconitum columbianum*, *Veratrum viride*, *Veratrum californicum*, and *Rudbeckia occidentalis*."

Kovalchik (1987) describes a *Senecio triangularis* plant association for central Oregon without *Veratrum* spp. or *Valeriana* spp.

Hickman (1976) describes a *Veratrum viride*/*Valeriana sitchensis*/*Senecio triangularis* Wet Meadow association for the central western Cascade Mountains of Oregon. He notes that it occurs in "open areas, most frequently on east- or northwest-facing slopes, which have fairly constant sources of moisture and sufficiently gentle slopes to build up deep organic soils, [to] support a characteristic wet meadow community."

Douglas (1972) describes a *Valeriana sitchensis*-*Veratrum viride* community for the western north Cascades of Washington that has a low prominence value for *Senecio triangularis*, as part of his Rawmark Meadow Habitat (Rawmark Meadow is characterized by short snow-free periods, moist soils, and the lack of a closed vegetative cover). He notes that this is a lush herbaceous community that appears similar to a *Rubus-Epilobium* community that he describes in the same paper (also noted under the "previously described plant associations" section of *Rubus parviflorus* plant association in this guide.) Other important species in Douglas' *Valeriana sitchensis-Veratrum viride* community are *Lupinus latifolius* var. *subalpinus*, *Carex spectabilis*, *Mitella breweri* and *Polygonum bistortoides*.

Subalpine Wet Communities

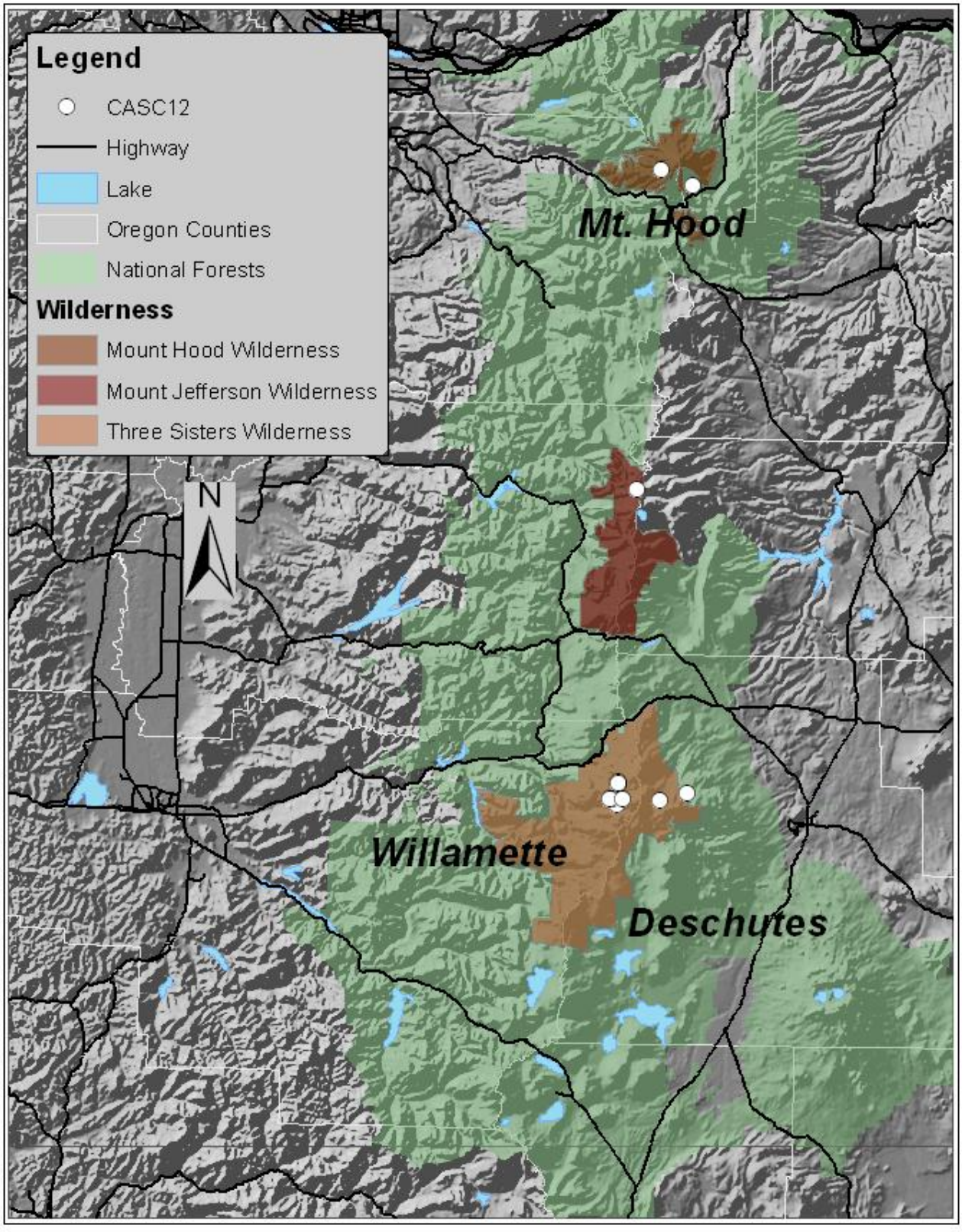
Carex scopulorum (Mountain sedge)
CASC12
Eco-class code: MS2114

CASC12. Environmental conditions of plots.

Number of plots	13 (2 Mt. Hood NF, 8 Willamette NF, 2 Deschutes NF, 1 Warm Springs Reservation)
Elevation (ft)	Mean = 5900; Range = 5200-6593
Slope (%)	Mean = 4; Range = 0-25
Aspect (no. of plots)	FLAT = 7; NW = 0; NE = 2; SE = 0; SW = 4
Distribution	High Cascades (100 %)
Slope position	Drainages and basins
Slope shape	Undulating to straight topography

Environmental conditions:

CASC12 is a subalpine wetland community found on flat to gently sloping drainage surfaces, on alluvial fans, and in basins. Cover of bare ground averages 4%. Exposed rock and gravel are mainly absent. The deep, wet soils have low coarse fragment contents. Rooting depths are fairly deep, averaging 21" (12-30"). Water tables are shallow, and water can be at the surface, even in late summer.


Legend
CASC12
Highway
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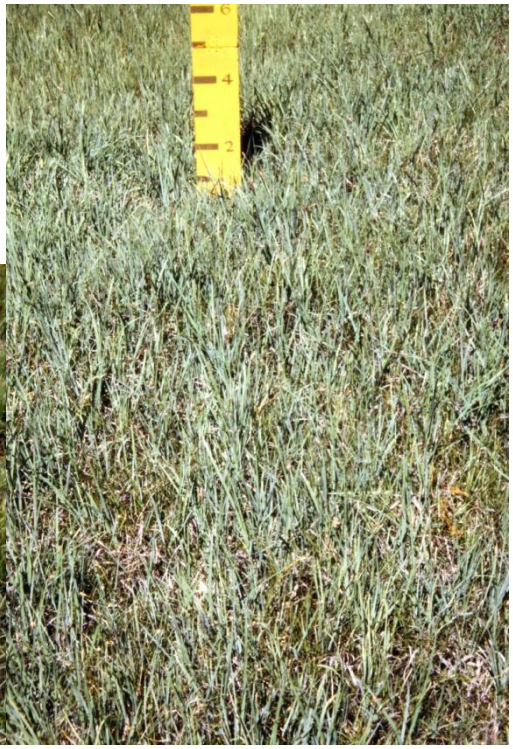
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This wet graminoid meadow community is dominated by mountain sedge (CASC2). Tufted hairgrass (DECE) and alpine aster (ORALA2) are found in over half of the plots. Summed plant cover averages 94%.

Growth form	Mean cover (%)
Forb	31.8
Graminoid	61.0
Shrub	1.1



CASC12. Constancy table. Canopy cover for species in at least 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
CASC12	*Carex scopulorum*	Mountain sedge	100.0	30.9	30.9
POFL3	*Potentilla flabellifolia*	Fan-leaved cinquefoil	69.2	5.1	7.3
DECE	*Deschampsia caespitosa*	Tufted hairgrass	61.5	11.7	18.9
CANI2	*Carex nigricans*	Black alpine sedge	53.8	7.8	14.4
ORALA2	*Oreostemma alpigenum*	Alpine aster	53.8	4.7	8.8
RAAL	*Ranunculus alismaefolius*	Water-plantain buttercup	46.2	9.8	21.3
TRLO	*Trifolium longipes*	Long-stalked clover	38.5	6.9	18.0
DOJE	*Dodecatheon jeffreyi*	Jeffrey's shootingstar	38.5	0.5	1.2
LIGR	*Ligusticum grayi*	Gray's lovage	30.8	1.2	4.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 7 (1 Mt. Hood NF, 4 Willamette NF, 1 Deschutes NF, 1 Warm Springs Reservation)

Soils often have a 0.5" surface organic horizon of leaves or roots. Profiles generally show multiple buried soils. Textures are range from fine to coarse (silts to sands). Mottles are present in three pits, indicating fluctuating anaerobic conditions. Late summer water tables are at the surface in only two pits, though soils are generally characterized as "wet". Water table depth averages 13" (0-30").

Previously described plant associations:

Wells (2006) describes a *Carex scopulorum* plant association for northeastern Oregon. He notes that "the Holm's Rocky Mountain sedge plant association is a common association throughout the upper reaches (1900 to 2600m) of the Blue Mountains Province occurring in moist/wet meadows, springs, floodplains, and swales." The species with high constancy were *Senecio cymbalarioides* (63%), *Potentilla flabelifolia* (60%) and *Eleocharis quinqueflora* (50%).

Potter (2005) describes a *Carex scopulorum* plant association for west-slope central and southern Sierra Nevada Mountains, in California. Species with high constancy include *Aster alpigenus* (*Oreostemma alpigenum* var. *alpigenum* in PLANTS National Database) (70%), *Polygonum bistortoides* (60%), and *Muhlenbergia filiformis* (60%). Other species with significant constancy described in this guide are *Deschampsia cespitosa* (40%), *Dodecatheon jeffreyi* (30%), and *Ranunculus alismaefolius* (20%).

Christy (2004) describes a *Carex scopulorum* plant association in the northwestern Oregon Cascade Range, observing that "habitat is depressions and seepy alluvial fans in subalpine heath. Stands of this association occur in transitional areas between the slightly wetter *Carex nigricans* association and slightly drier associations of *Carex spectabilis* and upland Phyllodoce heath, and intergrade with both. "Along with *C. scopulorum*, this plant association has high constancy for *Deschampsia caespitosa*, *Ligusticum grayi*, *Dodecatheon jeffreyi* and *Packera cymbalarioides*.

Crowe et al. (2004) also describe a *Carex scopulorum* plant association, observing that "this association is very common at high elevations in the Cascade, Steens, Wallowa, Elkhorn, Strawberry and Gearhardt Mountains. It occurs in headwater basins in narrow to wide, low gradient, trough-, U- and V-shaped valleys with gentle to steep side slopes. It occurs on cold, wet, poorly drained meadows, streambanks, and active channel shelves. The snow free growing season is 3 to 4 months." These plots had high constancy of *Carex nigricans*, *Deschampsia caespitosa*, *Potentilla flabellifolia*, *Ligusticum grayi* and *Dedecatheon jeffreyi*.

Kovalchik and Clausnitzer (2004) describe two *Carex scopulorum* plant associations for eastern Washingon: *Carex scopulorum* var. *bracteosa* (CASCB) and *Carex scopulorum* var. *prionophylla* (CASCP2 in their guide but CASCP in PLANTS National Database). The one closest to the *Carex scopulorum* community described in this guide is perhaps *C. scopulorum* var. *bracteosa*, which has high constancy of fanleaf cinquefoil (47%), black alpine sedge (47%), bluejoint reedgrass (41%), and alpine willow-weed (41%). They note that "only the CASCP2 association is equally distributed across all valley width classes. Between them, the CANI2, CASCB, CASCP2, and CASP associations (all high-elevation fens) represent 29 of the 35 moderate to very steep valley gradient plots."

Crowe and Clausnitzer (1997) describe a *Carex scopulorum* plant association for mid-montane wetlands of the Blue Mountains in Oregon. Plants with high constancy include tufted hairgrass (69%), alpine meadow butterweed (63%), and alpine shooting star (56%). They note that this plant association "occurs in headwater basins in narrow to wide, low gradient, trough-, U- and V-shaped valleys with gentle to steep side slopes."

Kovalchik (1987) describe a *Carex scopulorum* plant association for Deschutes, Ochoco, Fremont, and Winema National Forests. Plants with high constancy include *Carex nigricans* (82%), *Deschampsia cespitosa* (82%), *Ligusticum grayi* (64%), *Trifolium longipes* (64%), and *Dodecatheon alpinum* (55%). Kovalchik notes that "the Holm's sedge association is found at high elevations (5500-7300 or more feet) in the Cascade Mountains".

Subalpine Wet Communities

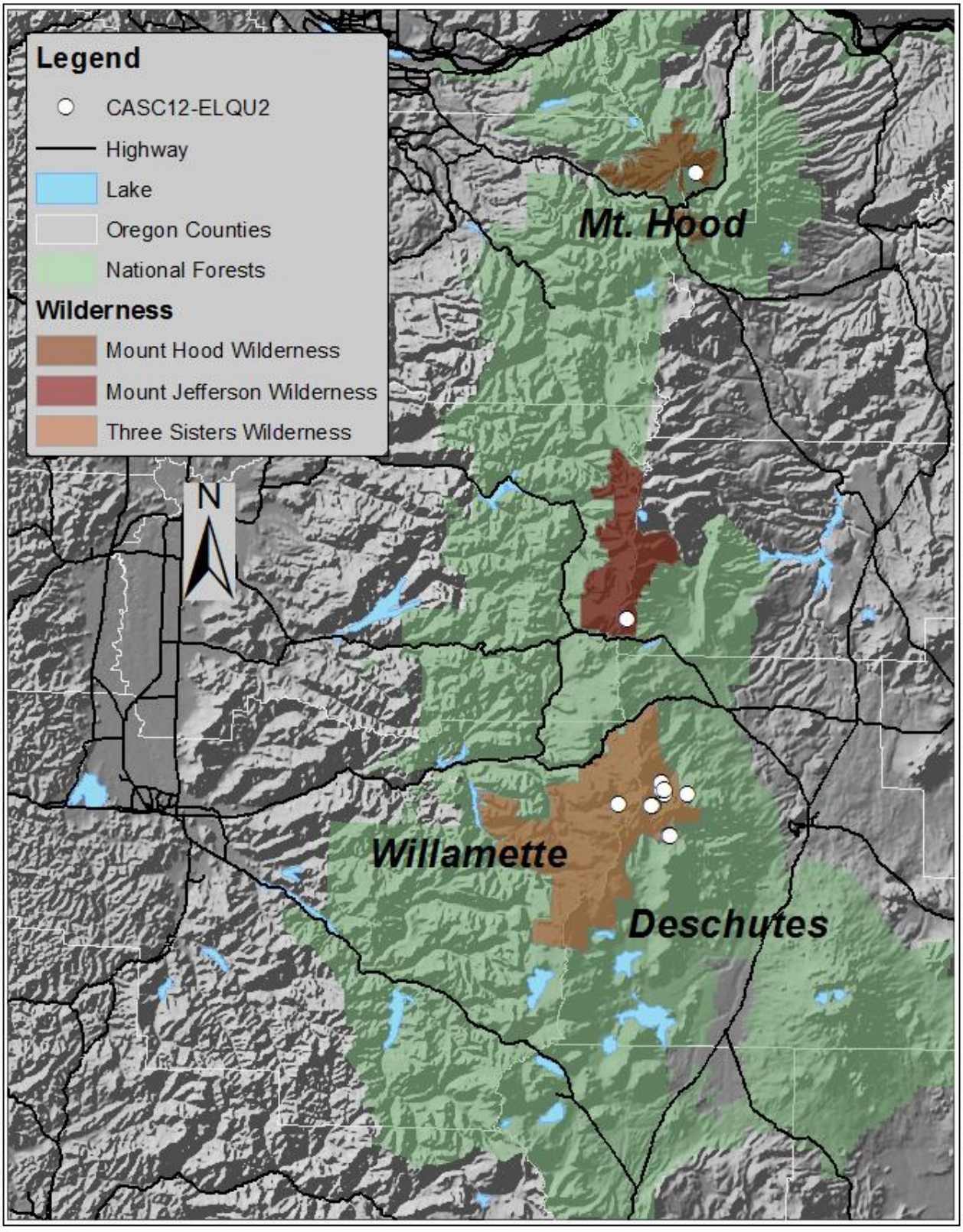
*Carex scopulorum-Eleocharis quinqueflora (*Mountain sedge-Few-flowered spikerush)
CASC12-ELQU2
Eco-class code: MS2115

CASC12-ELQU2. Environmental conditions of plots.

Number of plots	14 (1 Mt. Hood NF, 2 Willamette NF, 11 Deschutes NF)
Elevation (ft)	Mean = 6100; Range = 5175-6575
Slope (%)	Mean = 1; Range = 0-8
Aspect (no. of plots)	FLAT = 10; NW = 1; NE = 0; SE = 1; SW = 2
Distribution	High Cascades (100 %)
Slope position	Drainages and basins
Slope shape	Straight slopes

Environmental conditions:

CASC12-ELQU2 is a wetland community, found in flat to very gently sloping subalpine basins and along drainages. The soils are poorly drained, with low coarse-fragment content. Cover of bare ground, rock, and gravel average 8%. Water tables are shallow, and perched water tables occur at 14” (6-18”). Water can be at the surface, even in late summer.


Legend
CASC12-ELQU2
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Mount Jefferson Wilderness
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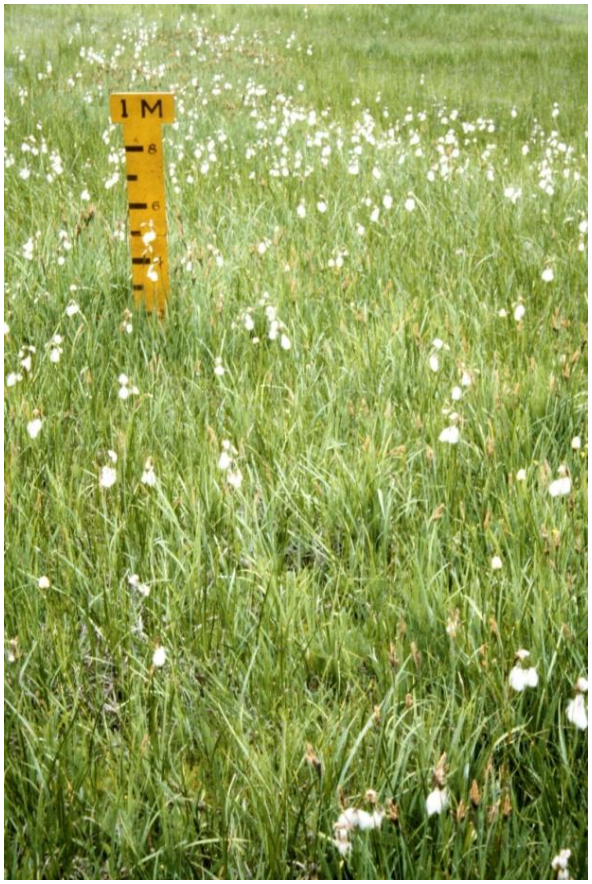
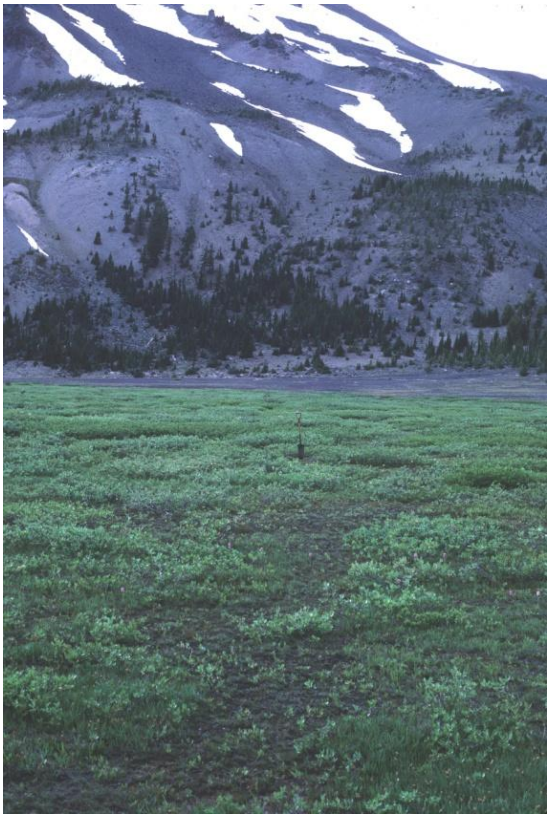
Willamette
Deschutes



Vegetation composition:

This wet graminoid meadow community is characterized by mountain sedge (CASC12). Few-flowered spikerush (ELQU2) is typically a co-dominant. Elephant's head (PEGR2) is found in over half the plots. Summed plant cover averages 130%.



Growth form	Mean cover (%)
Forb	29.0
Graminoid	79.7
Shrub	9.6
Tree	0.0

CASC12-ELQU2. Constancy table. Canopy cover for species in at least 25% of the plots.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
CASC12	*Carex scopulorum*	Mountain sedge	100.0	27.4	27.4
ELQU2	*Eleocharis quinqueflora*	Few-flowered spikerush	92.9	24.1	26.0
DECE	*Deschampsia caespitosa*	Tufted hairgrass	42.9	10.6	24.8
ORALA2	*Oreostemma alpigenum*	Alpine aster	42.9	9.9	23.0
CANI2	*Carex nigricans*	Black alpine sedge	42.9	9.0	21.0
PEGR2	*Pedicularis groenlandica*	Elephant's head	42.9	1.1	2.5
SPHAG2	*Sphagnum* spp.	Sphagnum	35.7	19.3	54.0
SACO2	*Salix commutata*	Variable willow	35.7	5.1	14.2
MUFI2	*Muhlenbergia filiformis*	Slender muhlenbergia	35.7	4.8	13.4

RAAL	*Ranunculus alismaefolius*	Water-plantain buttercup	28.6	2.4	8.5
AGHU	*Agrostis humilis*	Alpine bentgrass	28.6	1.9	6.5
TRLO	*Trifolium longipes*	Long-stalked clover	28.6	1.6	5.5
KAMI	*Kalmia microphylla*	Western bog-laurel	28.6	1.0	3.5
TRGL5	*Triantha glutinosa*	Sticky false asphodel	28.6	0.7	2.5
CALU7	*Carex luzulina*	Woodrush sedge	28.6	0.5	1.8

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 5 (5 Deschutes NF plots)

Profiles typically show multiple buried soils, in alluvium. Textures range from fine to coarse. Surface layers are typically high in organic matter. A horizons average 7", and are silt, loam, or sandy loam. Lower horizons can be gravelly or cobbly, loamy sands, sands, or silty clay loams. Restrictive layers that perch water are recorded in all five plots, and average 17" depth. In three of those pits, the restrictive layer is clay.

Previously described plant associations:

A similar type is described by Christy (2004) for northwestern Oregon: the *Eleocharis quinqueflora* phase of the *Carex scopulorum* plant association. It is described as occurring "at the wet end of the *Carex scopulorum* association and intergrades with the *Carex nigricans* association. Stands contain more *Eleocharis quinqueflora* than Carex. *Carex nigricans* and *Carex brunnescens* may form significant patches."

Alpine Dry Communities

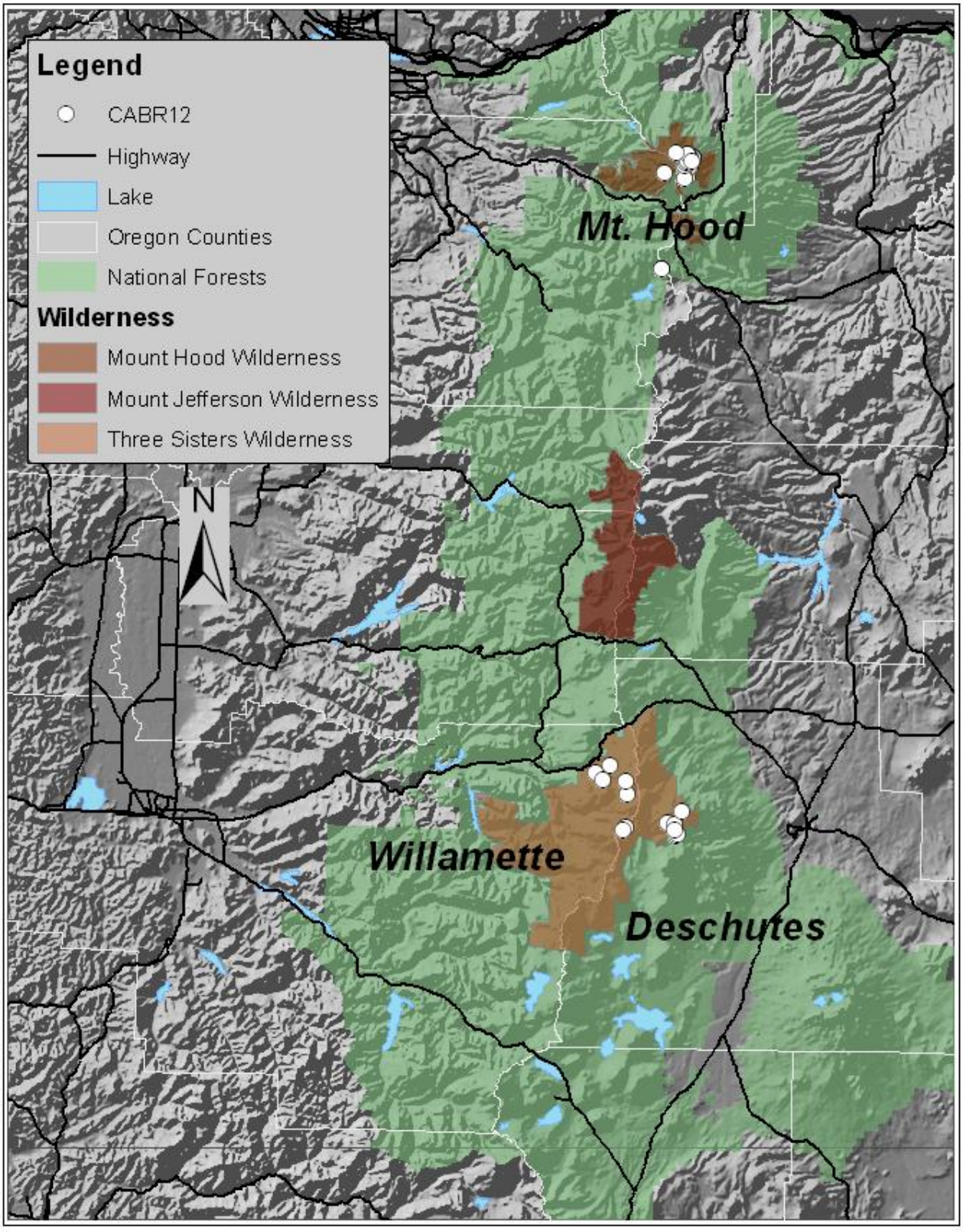
Carex breweri (Brewer's sedge)
CABR12
Eco-class code: MS1112

CABR12. Environmental conditions of plots.

Number of plots	42 (29 Mt. Hood NF, 4 Willamette NF, 9 Deschutes NF)
Elevation (ft)	Mean = 7030; Range = 6100-8800
Slope (%)	Mean = 29; Range = 1-72
Aspect (no. of plots)	FLAT = 3; NW = 6; NE = 14; SE = 13; SW = 6
Distribution	High Cascades (100 %)
Slope position	All slope positions
Slope shape	All slope shapes; mainly undulating

Environmental conditions:

CABR12 is an alpine community with low plant cover, exposing gravelly to rocky surfaces. Cover of bare ground, rock, and gravel averages 70%. An erosion pavement (surface gravels where fines are winnowed by erosion) of 0.5-2" depth is characteristic. Mt. Hood NF plots are mainly associated with snow melt drainages, glacial outwash drainages, moraines, and similar fell-field environments. Slopes are generally steep, with undulating topography. The soils developed in sands, pumice, and glacial till, and have low moisture-holding capacity. Sites are subject to freeze-thaw, snowmelt, and wind erosion.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National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This sparse, dry high-elevation community is characterized by Brewer's sedge (CABR12). Davis' knotweed (PODA) and partridge foot (LUPE) are present in at least half of the plots. Summed plant cover averages 32%.

Growth form	Mean cover (%)
Forb	13.6
Graminoid	17.0
Shrub	0.5
Tree	0.4

CABR12. Constancy table. Species with at least 25% constancy are listed.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
CABR12	*Carex breweri*	Brewer's sedge	100.0	13.5	13.5
PODA	*Polygonum davisiae*	Davis' knotweed	61.9	1.3	2.1
LUPE	*Luetkea pectinata*	Partridge foot	50.0	5.0	10.1
ORALA2	*Oreostemma alpigenum*	Alpine aster	42.9	0.8	1.9
CIUMU	*Cistanthe umbellata*	Pussypaws	42.9	0.5	1.2
PEDA2	*Penstemon davidsonii*	Davidson's penstemon	38.1	0.8	2.1
LULE2	*Lupinus lepidus*	Prairie lupine	33.3	0.4	1.1
JUDR	*Juncus drummondii*	Drummond's rush	26.2	1.1	4.4
LOMA5	*Lomatium martindalei*	Martindale's lomatium	26.2	0.3	1.2

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 25 (13 Mt. Hood NF, 4 Willamette NF, 8 Deschutes NF)

Soils are coarse textured, gravelly to cobbly loamy sands or sands. A horizons are loamy sands, sands, or sandy loams. Profiles include multiple A or AC horizons over stony to cobbly C horizon sands. Deschutes NF profiles developed in multiple layers of pumice. Roots are concentrated within the top 13" (3-23").

Observations from plot notes:

Vegetation: Scattered "shrub-like" whitebark pine; soil seemed too unstable for tree islands.

Soil: Plot narratives emphasized the gravelly, rocky, unstable exposed surface. Stabilized soil near protective rocks often had higher vegetation cover.

Fred Hall documented an erosion sequence in the Three Sisters Wilderness Area where a CABR12 community developed from a CANI2 type with loss of half of the A horizon (top 8"). See Appendix F.

Small mammal disturbance: Small mammal activity is not significant for this type.

Previously described plant associations:

Kovalchik (1987) describes a *Carex breweri* association for the Deschutes, Ochoco, Fremont and Winema National Forests. Along with *Carex breweri*, other plants with high constancy are *Juncus drummondii* (100%), *Carex nigricans* (100%), *Antennaria alpina* (75%), *Aster alpigenus* (75%), and *Spraguea umbellata* (75%). He notes that "the Brewer sedge association is locally abundant in subalpine and alpine settings, primarily in the Deschutes Cascades Physiographic Area. It has been observed only in the Three Sisters Wilderness Area and Crater Lake National Park but may occur on other high Cascade Mountains having thick mantles of ash and pumice."

Douglas and Bliss (1977) describe a *Carex breweri* association in the 'snowbed community type' of their alpine and high subalpine plant communities of the north Cascades Range of Washington and British Columbia. They note that "*Carex breweri* has a moderate average cover and a high frequency in this floristically rich community. *Erigeron aureus*, *Lupinus lepidus* var. *lobbii*, and *Danthonia intermedia* occur with moderate frequency and relatively low cover."

Alpine Dry Communities

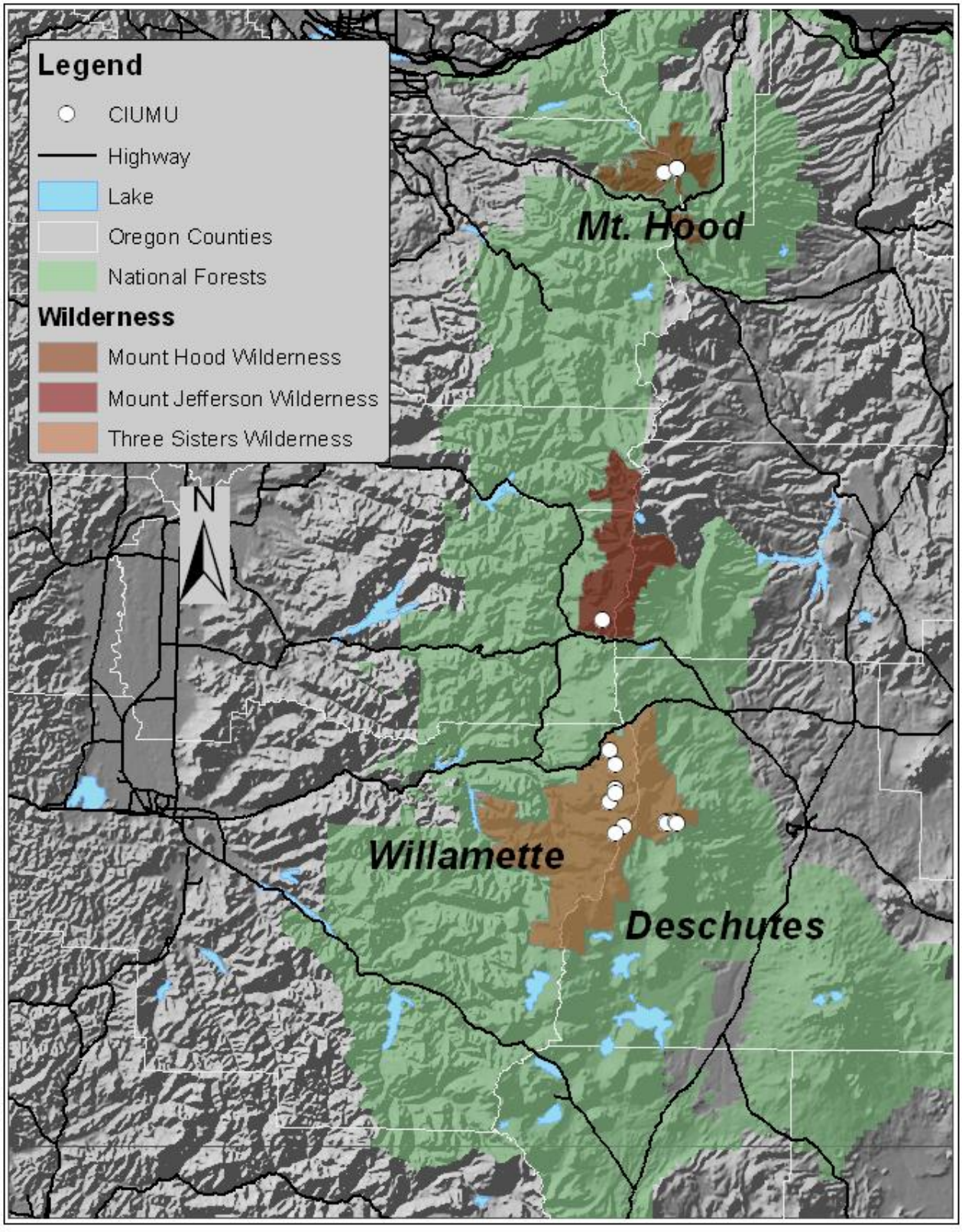
Cistanthe umbellata (Pussypaws)
CIUMU
Eco-class code: FS1111

CIUMU. Environmental conditions of plots.

Number of plots	18 (5 Mt. Hood NF, 7 Willamette NF, 6 Deschutes NF)
Elevation (ft)	Mean = 6950; Range = 5200-8725
Slope (%)	Mean = 28; Range = 0-79
Aspect (no. of plots)	FLAT = 4; NW = 1; NE = 1; SE = 7; SW = 5
Distribution	High Cascades (100 %)
Slope position	Mid to upper slopes
Slope shape	Undulating to straight topography

Environmental conditions:

CIUMU is a high-elevation community with very low plant cover, exposing gravelly to rocky surfaces. An erosion pavement (surface gravels where fines are winnowed by erosion) is characteristic. Cover of bare ground, rock, and gravel averages 76%. Slopes range from flat to steep, with all topographic shapes. Aspects are generally warm. The soils have low moisture holding capacity, with high coarse fragment content and very limited rooting depths. Some sites may have been subjected to substantial grazing disturbance in the late 1800s to early 1900s. Exposure and topography combine to severely constrain growing conditions.


Legend
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Highway
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Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This extremely dry, sparse high-elevation community is characterized by Pussypaws (CIUMU). Davis' knotweed (PODA) is typically present. Summed plant cover averages only 14%, lowest of the communities in this guide. Low plant cover and shallow rooting zones reflect the dry, eroded conditions.

Growth form	Mean cover (%)
Forb	11.5
Graminoid	2.2
Shrub	0.1
Tree	0.2

CIUMU. Constancy table. Species with at least 25% constancy are listed.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
CIUMU	*Cistanthe umbellata*	Pussypaws	100.0	4.3	4.3
PODA	*Polygonum davisiae*	Davis' knotweed	72.2	2.9	4.1
ELEL5	*Elymus elymoides*	Squirreltail	38.9	0.7	1.7
LOMA5	*Lomatium martindalei*	Martindale's lomatium	33.3	0.7	2.0
ERPY2	*Eriogonum pyrolaefolium*	Alpine buckwheat	33.3	0.4	1.3
LULE2	*Lupinus lepidus*	Prairie lupine	27.8	0.3	1.2
CAAR11	*Castilleja arachnoidea*	Cobwebby Indian paintbrush	27.8	0.3	1.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 14 (3 Mt. Hood NF, 6 Willamette NF, 5 Deschutes NF)

Soils are extremely coarse-textured gravelly loamy sands or sands from pumice or fresh volcanic sands. A surface gravel layer (erosion pavement) 0.5-1" in depth is characteristic of this community. A horizons are loamy sands or sands. Profiles typically include multiple AC horizons over a series of C horizons. Some horizons have massive structure. A compacted layer in one pit restricts rooting. Roots are concentrated within the top 7" (4-17").

Observations from plot notes:

Soil: Soil is easily displaced; increasing the surface AC depth by 1" or 2" increases plant density. Erosion, rock slides, and significant weathering are noted on several plots.

Fred Hall documented an erosion sequence in the Three Sisters Wilderness Area where loss of the entire A horizon (top 16-18") resulted in conversion of a CANI2 type to a CIUMU community. See Appendix F.

Small mammal disturbance: Small mammal activity is not significant for this type.

Alpine Dry Communities

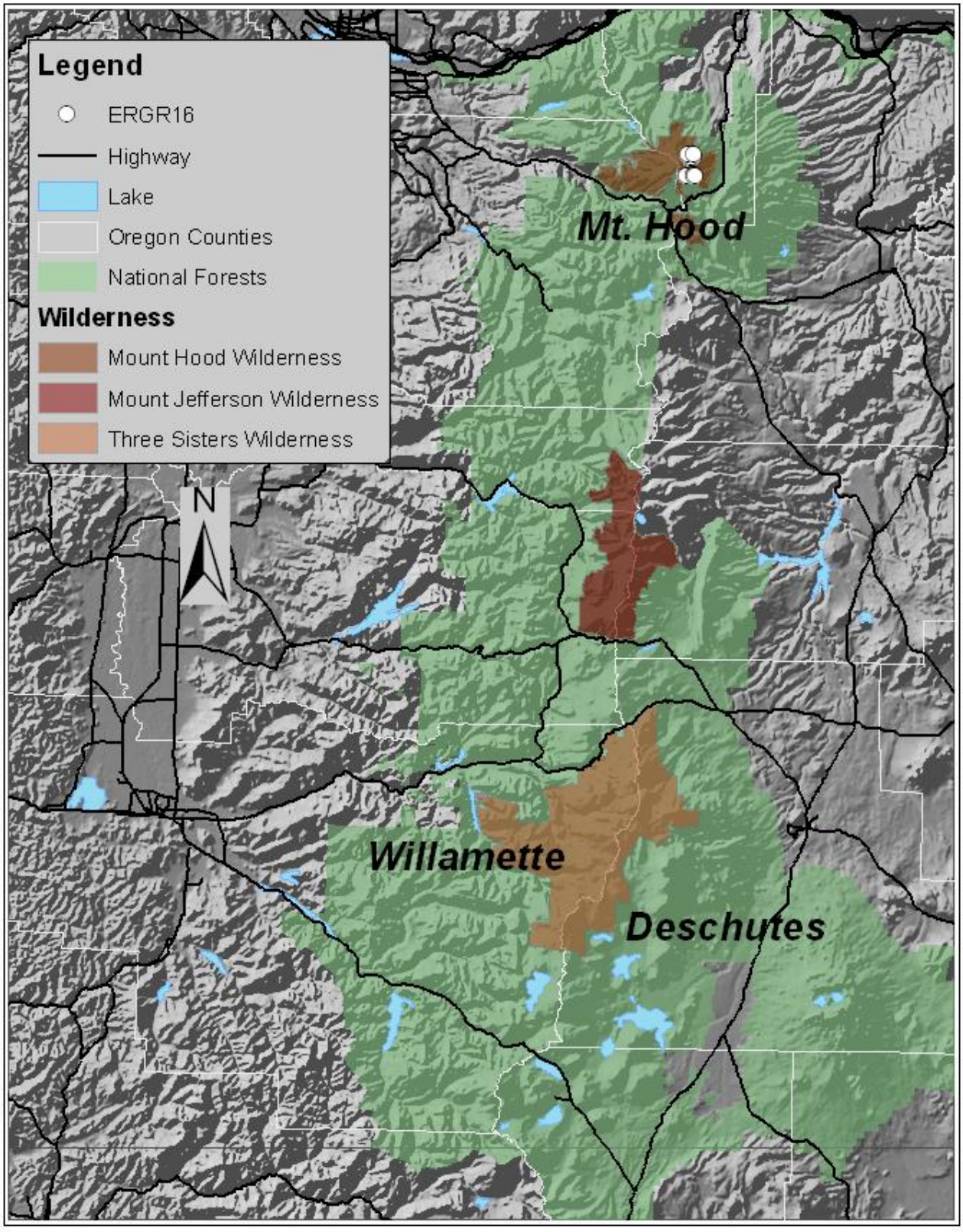
Ericameria greenei (Greene's goldenbush)
ERGR16
Eco-class code: SS7011

ERGR16. Environmental conditions of plots.

Number of plots	11 (11 Mt. Hood NF)
Elevation (ft)	Mean = 6400; Range = 5590-6825
Slope (%)	Mean = 43; Range = 17-67
Aspect (no. of plots)	FLAT = 0; NW = 0; NE = 8; SE = 3; SW = 0
Distribution	High Cascades (100 %)
Slope position	Mid to lower slopes
Slope shape	Undulating to straight topography

Environmental conditions:

ERGR16 is an alpine fell-field community with low plant cover, exposing gravelly to rocky surfaces. Cover of bare ground, rock, and gravel averages 60%. Slopes are generally steep, with undulating to straight topography. Soils have low moisture holding capacity, with high coarse fragment content. Soils, slope, and topographic position combine to create dry growing conditions.


Legend
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Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This sparse, dry alpine community is characterized by Greene's goldenbush (ERGR16). Davis' knotweed (PODA), silky lupine (LUSE4), and spreading phlox (PHDI3) are typically present. Summed plant cover averages 39%.

Growth form	Mean cover (%)
Forb	23.0
Graminoid	7.0
Shrub	8.7
Tree	0.5

ERGR16. Constancy table. Species with at least 25% constancy are listed.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
ERGR16	*Ericameria greenei*	Greene's goldenbush	100.0	8.7	8.7
PODA	*Polygonum davisiae*	Davis' knotweed	81.8	2.7	3.3
LUSE4	*Lupinus sericeus*	Silky lupine	72.7	5.2	7.1
PHDI3	*Phlox diffusa*	Spreading phlox	72.7	4.3	5.9
ERUM	*Eriogonum umbellatum*	Sulfur buckwheat	63.6	2.7	4.2
LOMA5	*Lomatium martindalei*	Martindale's lomatium	63.6	0.6	0.9
CIUMU	*Cistanthe umbellata*	Pussypaws	54.5	0.5	0.9
ARCA7	*Arenaria capillaris*	Thread-leaved sandwort	45.5	1.4	3.1
CABR12	*Carex breweri*	Brewer's sedge	36.4	3.9	10.8
ACMI2	*Achillea millefolium*	Yarrow	36.4	0.3	0.9
TRSP2	*Trisetum spicatum*	Spike trisetum	36.4	0.3	0.9
LULA4	*Lupinus latifolius*	Broadleaf lupine	27.3	2.1	7.7
PIAL	*Pinus albicaulis*	Whitebark pine	27.3	0.4	1.5
ELEL5	*Elymus elymoides*	Squirreltail	27.3	0.3	1.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 2 (Mt. Hood NF)

Soils are coarse textured gravelly to cobbly loamy sands or sands. A horizons are sandy loams or loamy sands. Profiles include multiple A or AC horizons over a series of C horizons. One pit shows bedrock at 23". Roots are concentrated within the top 18" (17-19").

Observations from plot notes:

Vegetation: Most plots are adjacent to whitebark pine or mountain hemlock tree islands; krummholz form is often noted.

Small mammal disturbance: Evidence of small mammal activity contributing to soil disturbance is recorded on two plots.

Alpine Dry Communities

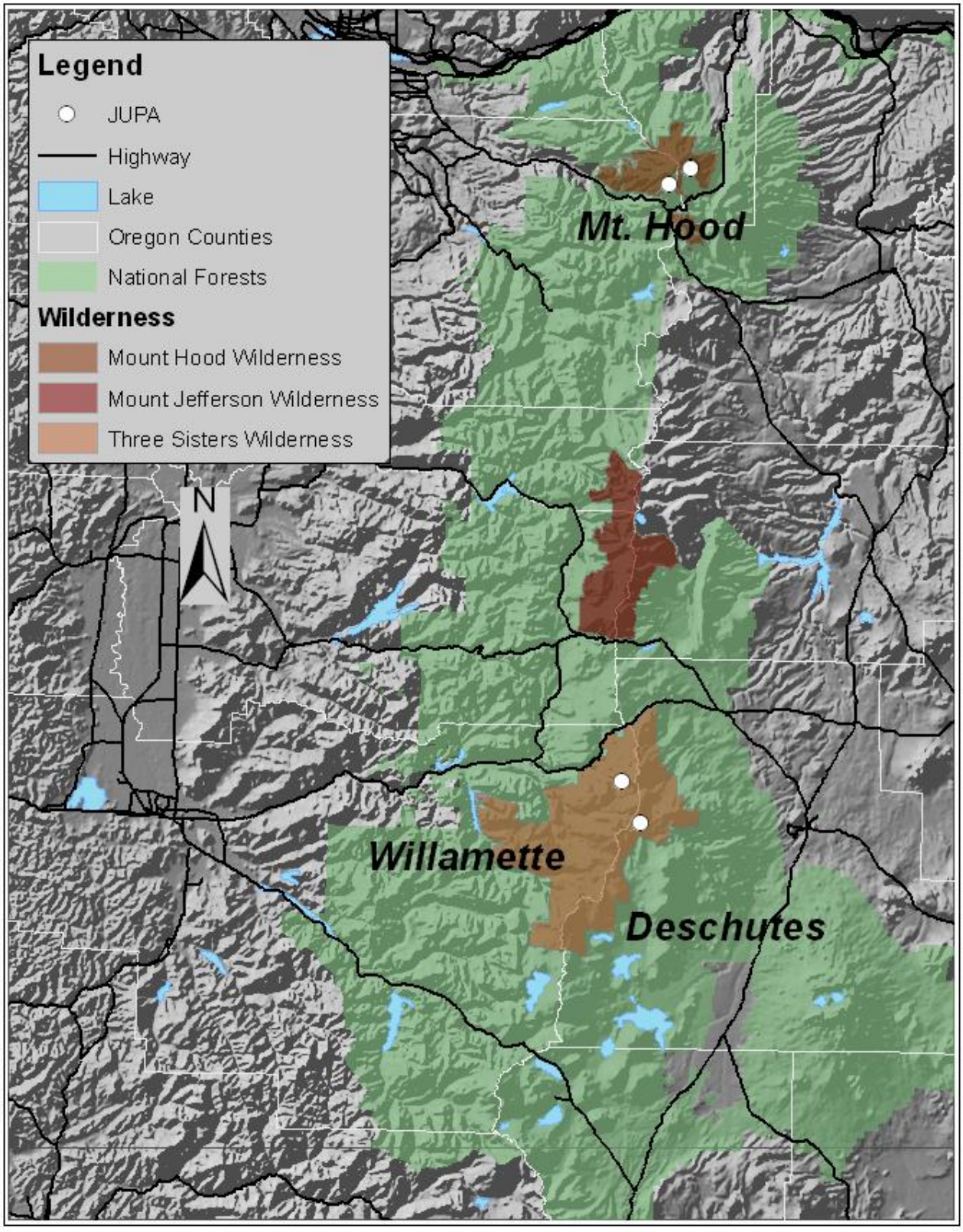
Juncus parryi (Parry's rush)
JUPA
Eco-class code: GS4014

JUPA. Environmental conditions of plots.

Number of plots	5 (3 Mt. Hood NF, 1 Deschutes NF, 1 Willamette NF)
Elevation (ft)	Mean = 6720; Range = 6000-7160
Slope (%)	Mean = 13; Range = 0-30
Aspect (no. of plots)	FLAT = 1; NW = 0; NE = 0; SE = 2; SW = 2
Distribution	High Cascades (100 %)
Slope position	Mid slopes, basins, or draws
Slope shape	Straight slopes or concave microtopography

Environmental conditions:

JUPA is a high-elevation community occurring on flat to gentle slopes. These dry, harsh sites are on warm aspects in basins, on basin rims, or at mid-slope positions. Cover of bare ground, gravel, and rock averages 47%. The well-drained, coarse soils have little moisture holding capacity. Snowmelt is likely to be late.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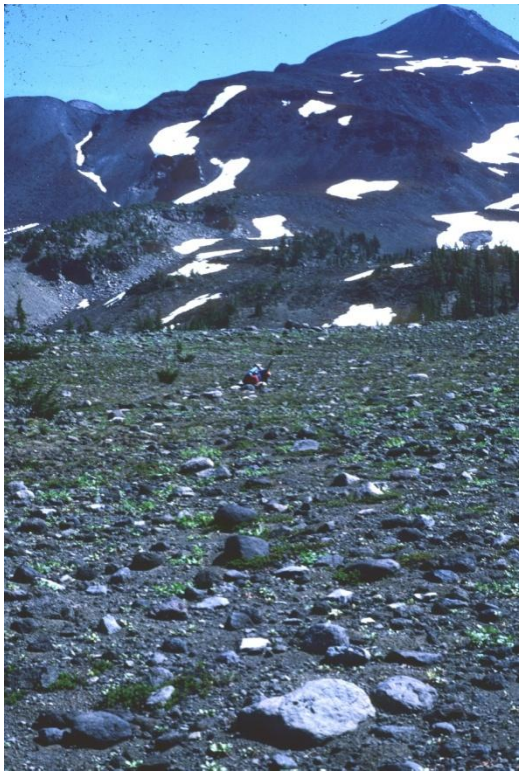
Willamette
Deschutes



Vegetation composition:

This dry, sparse, low alpine/subalpine community is dominated by Parry's rush (JUPA). Davis' knotweed (PODA) is typically present. Partridge foot (LUPE), alpine aster (ORALA2), prairie lupine (LULE2), and sulfur buckwheat (ERUM) occur in 60% of the plots. Summed plant cover averages 48%.

Growth form	Mean cover (%)
Forb	28.0
Graminoid	20.4
Shrub	0.0

Soil description:

No full soil profiles are described for JUPA plots. Soils are young, dry, shallow, coarse textured and well-drained, with a high coarse-fragment content.

JUPA. Constancy table. Species with at least 25% constancy are listed.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
JUPA	*Juncus parryi*	Parry's rush	100.0	19.4	19.4
PODA	*Polygonum davisiae*	Davis' knotweed	80.0	0.6	0.8
LUPE	*Luetkea pectinata*	Partridge foot	60.0	6.2	10.3
ORALA2	*Oreostemma alpigenum*	Alpine aster	60.0	2.4	4.0
LULE2	*Lupinus lepidus*	Prairie lupine	60.0	1.2	2.0
ERUM	*Eriogonum umbellatum*	Sulfur buckwheat	60.0	0.6	1.0
ERPE3	*Erigeron peregrinus*	Subalpine daisy	40.0	5.0	12.5
PHDI3	*Phlox diffusa*	Spreading phlox	40.0	4.2	10.5
PEPR2	*Penstemon procerus*	Small-flowered penstemon	40.0	2.4	6.0
ERPY2	*Eriogonum pyrolaefolium*	Alpine buckwheat	40.0	1.4	3.6
LOMA5	*Lomatium martindalei*	Martindale's lomatium	40.0	1.2	3.1
ARCA7	*Arenaria capillaris*	Thread-leaved sandwort	40.0	1.2	3.0
ANAL4	*Antennaria alpina*	Woolly pussytoes	40.0	0.6	1.5
CASP5	*Carex spectabilis*	Showy sedge	40.0	0.4	1.0
NOAL2	*Nothocalais alpestris*	Alpine lake false dandelion	40.0	0.0	0.1

*Characteristic cover: mean cover for plots in which a species occurs.

Alpine Dry Communities

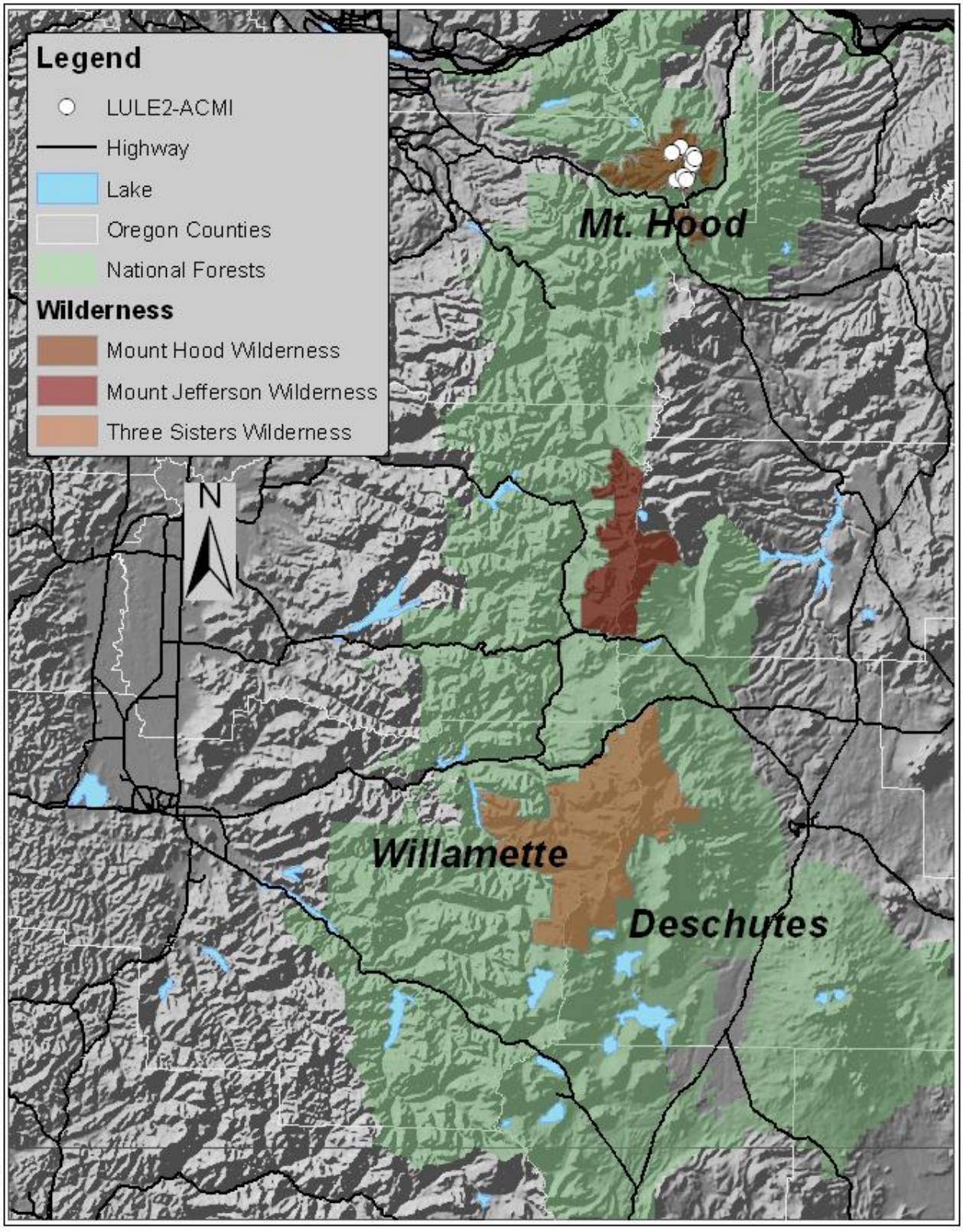
Lupinus lepidus-Achillea millefolium (Prairie lupine-Yarrow)
LULEL2-ACMI2
Eco-class code: FS6021

LULE2-ACMI2. Environmental conditions of plots.

Number of plots	18 (18 Mt. Hood NF)
Elevation (ft)	Mean = 7000; Range = 5900-8200
Slope (%)	Mean = 33; Range = 0-70
Aspect (no. of plots)	FLAT = 1; NW = 1; NE = 7; SE = 4; SW = 5
Distribution	High Cascades (100 %)
Slope position	Mainly ridges, also upper to lower slopes
Slope shape	Undulating, convex, or straight topography

Environmental conditions:

LULE2-ACMI2 is a dry, alpine fell-field pincushion community with low plant cover, on rocky ridges and mid-to upper slopes. Sites are generally steep, with undulating to convex topography. The soils have low moisture holding capacity, with high coarse fragment content. Cover of gravel, rock, and bare ground averages 51%. Soils, slope, and topographic position combine to create dry growing conditions.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Wilderness
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Mount Jefferson Wilderness
Three Sisters Wilderness
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Mt. Hood
Willamette
Deschutes

Vegetation composition:

This sparse, dry alpine community is characterized by prairie lupine (LULE2) and yarrow (ACMI2). Sulfur buckwheat (ERUM), squirreltail (ELEL5), and Davidson's penstemon (PEDA2) are typically present. Summed plant cover averages 42%.

Growth form	Mean cover (%)
Forb	25.5
Graminoid	9.3
Shrub	7.2
Tree	0.1

LULE2-ACMI2. Constancy table. Species with at least 25% constancy are listed.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
LULE2	*Lupinus lepidus*	Prairie lupine	100.0	8.2	8.2
ACMI2	*Achillea millefolium*	Yarrow	100.0	5.5	5.5
ERUM	*Eriogonum umbellatum*	Sulfur buckwheat	77.8	3.6	4.7
ELEL5	*Elymus elymoides*	Squirreltail	77.8	2.2	2.9
PEDA2	*Penstemon davidsonii*	Davidson's penstemon	55.6	1.8	3.3
TRSP2	*Trisetum spicatum*	Spike trisetum	55.6	0.8	1.4
SOSI3	*Solidago simplex*	Mt. Albert goldenrod	50.0	1.8	3.6
ARCA7	*Arenaria capillaris*	Thread-leaved sandwort	50.0	1.4	2.8
CABR12	*Carex breweri*	Brewer's sedge	33.3	1.8	5.3
CIUMU	*Cistanthe umbellata*	Pussypaws	27.8	0.3	1.0

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 5 (5 Mt. Hood NF)

Soils are coarse-textured loamy sands or sands. A horizons are loamy sands or gravelly loamy sands. Profiles often include multiple A to C or A-B-C horizons, suggesting erosion/deposition sequences. Roots are concentrated within the top 14" (4-25").

Observations from plot notes:

Vegetation: Tree islands, krummholz whitebark pine, and some juniper are near plots. Two plots are adjacent to Brewer's sedge communities.

Soil: Plot notes emphasize gravelly, rocky exposed sandy surfaces. One plot is characterized as aeolian sand over volcanic ash. Extreme weathering and potential rock movement are also noted.

Alpine Dry Communities

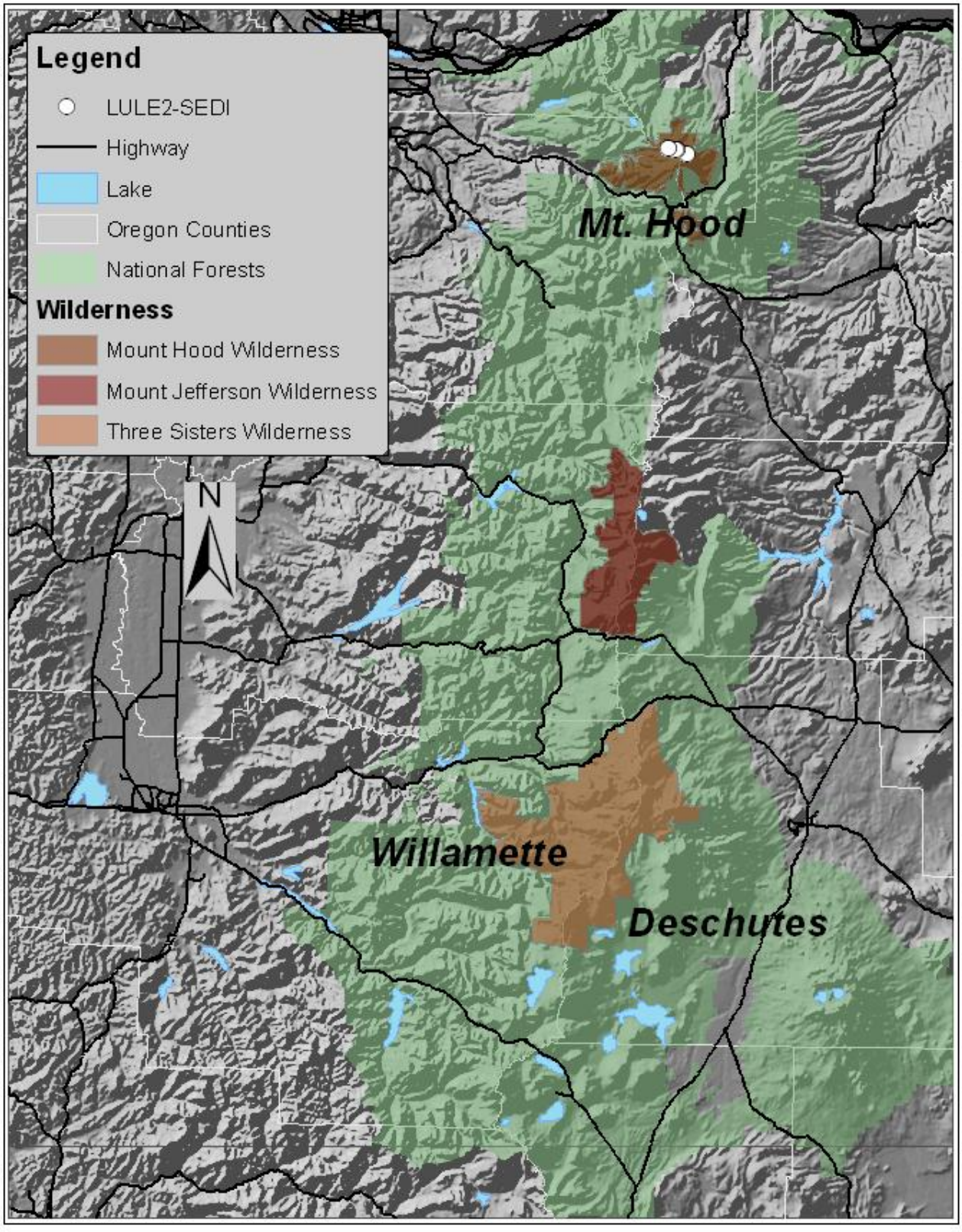
Lupinus lepidus-Sedum divergens (Prairie lupine-Spreading stonecrop)
LULEL2-SEDI
Eco-class code: FS6022

LULE2-SEDI. Environmental conditions of plots.

Number of plots	9 (9 Mt. Hood NF)
Elevation (ft)	Mean = 6850; Range = 5875-7300
Slope (%)	Mean = 35; Range = 18-57
Aspect (no. of plots)	FLAT = 0; NW = 4; NE = 3; SE = 0; SW = 2
Distribution	High Cascades (100 %)
Slope position	Mainly ridges, also upper to lower slopes
Slope shape	Undulating or straight topography

Environmental conditions:

LULE2-SEDI is a sparse alpine fell-field community on rocky ridges and mid- to upper slopes. Sites are steep, with undulating to straight topography. Shelf-like terracing from frost heave and soil creep are dominant forms of disturbance for this type; small mammal activity is also common. Aspects are mainly cool. The soils have low moisture-holding capacity, with high coarse-fragment content. Cover of gravel, rock, plus bare ground averages 47%. Soils, slope, and topographic position combine to create harsher growing conditions than for the similar LULE2-ACMI2 community.


Legend
LULE2-SEDI
Highway
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Oregon Counties
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Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
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Mt. Hood
Willamette
Deschutes

Vegetation composition:

This sparse, dry alpine fell-field community is characterized by prairie lupine (LULE2) and spreading stonecrop (SEDI). Yarrow (ACMI2), wooly pussytoes (ANAL4), and oval-leaved buckwheat (EROV) are typically present. Common juniper is an important component of this community, occurring in more than 40% of the plots with 23% cover where it occurs. Summed plant cover averages 45%.

Growth form	Mean cover (%)
Forb	24.9
Graminoid	6.1
Shrub	12.8
Tree	0.8

LULE2-SEDI. Constancy table. Species with at least 25% constancy are listed.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
LULE2	*Lupinus lepidus*	Prairie lupine	100.0	6.0	6.0
SEDI	*Sedum divergens*	Spreading stonecrop	100.0	1.1	1.1
ACMI2	*Achillea millefolium*	Yarrow	88.9	2.0	2.3
ANAL4	*Antennaria alpina*	Woolly pussytoes	66.7	1.6	2.3
EROV	*Eriogonum ovalifolium*	Oval-leaved buckwheat	66.7	1.2	1.8
SOSI3	*Solidago simplex*	Mt. Albert goldenrod	55.6	5.0	9.0
FEOV	*Festuca ovina*	Sheep fescue	55.6	0.7	1.2
JUCO6	*Juniperus communis*	Common juniper	44.4	10.0	22.5
PHDI3	*Phlox diffusa*	Spreading phlox	44.4	2.4	5.5
CAPH2	*Carex phaeocephala*	Dunhead sedge	44.4	1.0	2.3
LUPE	*Luetkea pectinata*	Partridge foot	44.4	0.8	1.8
CAPA26	*Castilleja parviflora*	Small-flowered paintbrush	44.4	0.4	1.0
MIOB2	*Minuartia obtusiloba*	Twinflower sandwort	33.3	1.7	5.0
ARCA7	*Arenaria capillaris*	Thread-leaved sandwort	33.3	0.8	2.3

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 1 (1 Mt. Hood NF)

The soil is a very stony, thin, coarse loamy sand. A1 and A2 horizons are loamy sands and gravelly loamy sands. The C horizon is cobbly loamy sand. The surface of the soil pit is 5% boulder, 15% stone, 25% cobble, and 30% gravel.

Observations from plot notes:

Vegetation: Krummholz mountain hemlock, subalpine fir, and whitebark pine are found nearby.

Soil: Plot notes emphasize ridge positions and fell-field environments, with gravelly, rocky exposed sandy surfaces. Frost heave/soil creep terracing is cited on more than half the plots. Notes from one plot indicate that some of the bare ground is stabilized by cryptogam cover.

Small mammal disturbance: Pocket gopher and marmot activity are noted, contributing to the bare soil in this community.

Previously described plant associations:

Johnson (2004) describes "scree communities" in the Wallowa and Strawberry mountains of Oregon. These have high constancy of *Poa* sp. (71%), *Sitanion hystrix* (57%), *Arenaria* sp. (57%), *Phlox* sp. (57%), *Sedum* (57%), *Draba* sp. (43%), *Oxytropis* sp. (43%), *Penstemon procerus* (43%), and *Potentilla* sp. (43%). He notes that the "shifting of rocks and grounds by gravity, freeze-thaw, and animal movement prevents abundant plant colonization or establishment."

Alpine Dry Communities

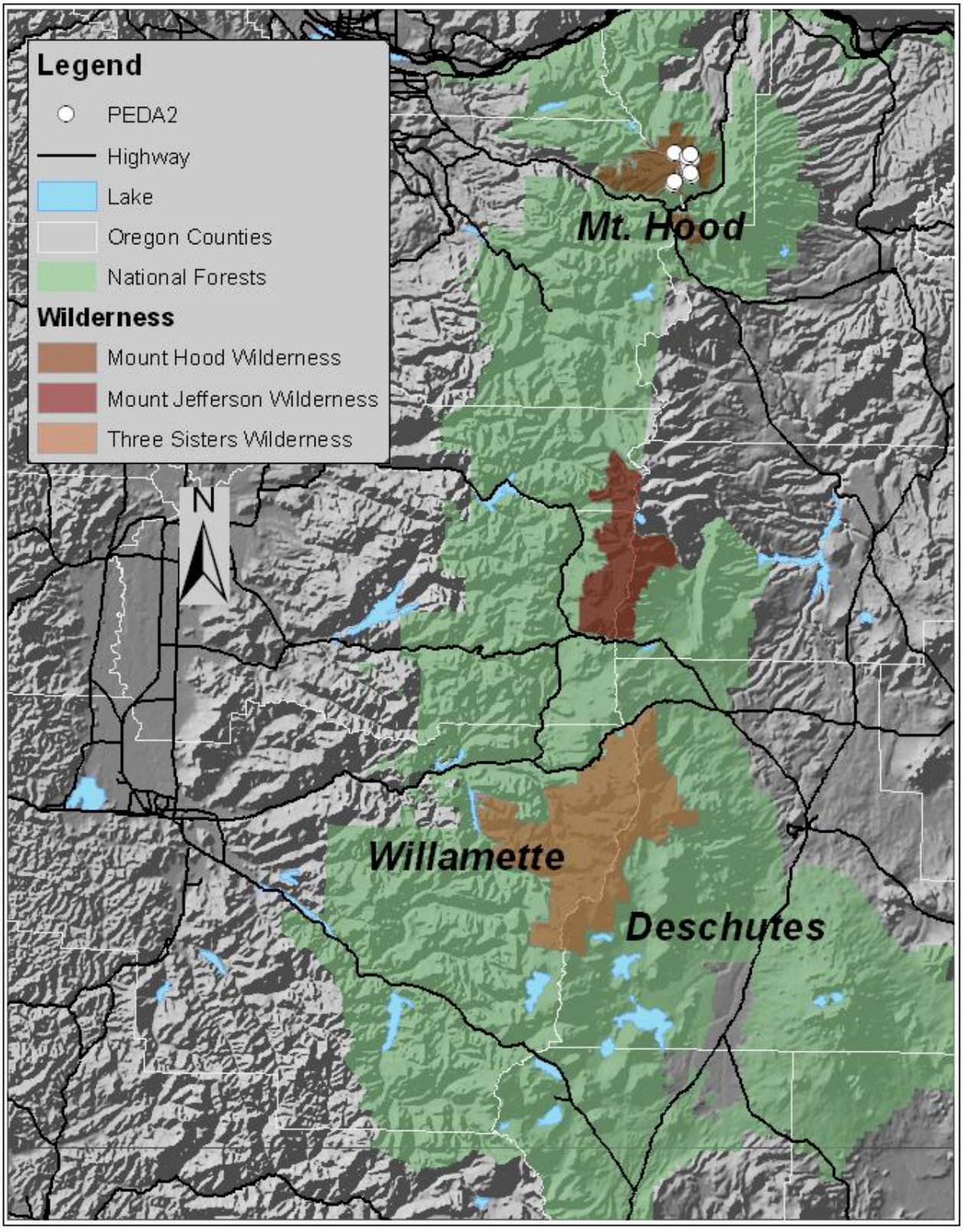
Penstemon davidsonii (Davidson's penstemon)
PEDA2
Eco-class code: FS7101

PEDA2. Environmental conditions of plots.

Number of plots	18 (18 Mt. Hood NF)
Elevation (ft)	Mean = 6900; Range = 6200-7575
Slope (%)	Mean = 37; Range = 0-68
Aspect (no. of plots)	FLAT = 1; NW = 2; NE = 3; SE = 5; SW = 6
Distribution	High Cascades (100 %)
Slope position	Ridges, rock faces
Slope shape	Undulating or convex topography

Environmental conditions:

The PEDA2 community occupies ridges and lateral moraines in the alpine zone. Aspects vary, but most plots are on warm exposures. Slopes are generally steep, with undulating or convex topography. The soils have very low moisture holding capacity, with high coarse fragment content and very limited rooting depths. Wind, snow, and rock slides promote continual disturbance of the sparse vegetation. Cover of gravel, rock, plus bare ground averages 84%. Elevation, soils, exposure, slope, and topographic position combine to severely constrain growing conditions.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Willamette
Deschutes

Vegetation composition:

This extremely dry, sparse alpine community is characterized by Davidson's penstemon (PEDA2). Prairie lupine (LULE2), oval-leaved buckwheat (EROV), and squirreltail (ELEL2) are present in over half the plots. The most important shrub is common juniper (JUCO4), found in 11% of the plots, but with 36% cover where it occurs. Summed plant cover averages 19%. Low plant cover and shallow rooting zones are indicative of the harsh conditions.

Growth form	Mean cover (%)
Forb	11.6
Graminoid	2.9
Shrub	4.1
Tree	0.4

PEDA2. Constancy table. Species with at least 25% constancy are listed.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
PEDA2	*Penstemon davidsonii*	Davidson's penstemon	100.0	3.3	3.3
LULE2	*Lupinus lepidus*	Prairie lupine	50.0	1.2	2.3
ELEL5	*Elymus elymoides*	Squirreltail	50.0	0.7	1.4
EROV	*Eriogonum ovalifolium*	Oval-leaved buckwheat	50.0	0.7	1.4
ACMI2	*Achillea millefolium*	Yarrow	44.4	0.7	1.5
SOSI3	*Solidago simplex*	Mt. Albert goldenrod	38.9	0.6	1.6
ERUM	*Eriogonum umbellatum*	Sulfur buckwheat	33.3	1.2	3.5
LUPE	*Luetkea pectinata*	Partridge foot	33.3	1.1	3.3
CAPH2	*Carex phaeocephala*	Dunhead sedge	33.3	0.9	2.7
PHHE2	*Phacelia heterophylla*	Varileaf phacelia	33.3	0.6	1.7

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 5 (5 Mt. Hood NF)

Soils are coarse-textured gravelly loamy sands, sands, or sandy loams. Surfaces average 51% gravel cover, 20% cobble cover, and 18% stone cover. A horizons are gravelly loamy sands or sands. Profiles show one to two A horizons over one or more C horizons. The lowest C horizon is generally cobbly sand. Roots are concentrated within the top 10" (6-14").

Observations from plot notes:

Vegetation: Observations from two plots note that this community approximates an upper limit for krummholz whitebark pine and mountain hemlock.

Soil: Some plots are in rock with plants growing in cracks. Erosion, rock slides, and significant weathering are noted on several plots.

Small mammal disturbance: Small mammal activity is not significant for this type, although marmots were evident on two plots.

Alpine Dry Communities

Phlox diffusa (Spreading phlox)
PHDI3
Eco-class code: FS8119

PHDI3. Environmental conditions of plots.

Number of plots	11 (11 Mt. Hood NF)
Elevation (ft)	Mean = 6500; Range = 5850-6975
Slope (%)	Mean = 47; Range = 15-70
Aspect (no. of plots)	FLAT = 0; NW = 1; NE = 3; SE = 5; SW = 2
Distribution	High Cascades (100 %)
Slope position	Ridges to mid-slopes
Slope shape	Undulating microtopography

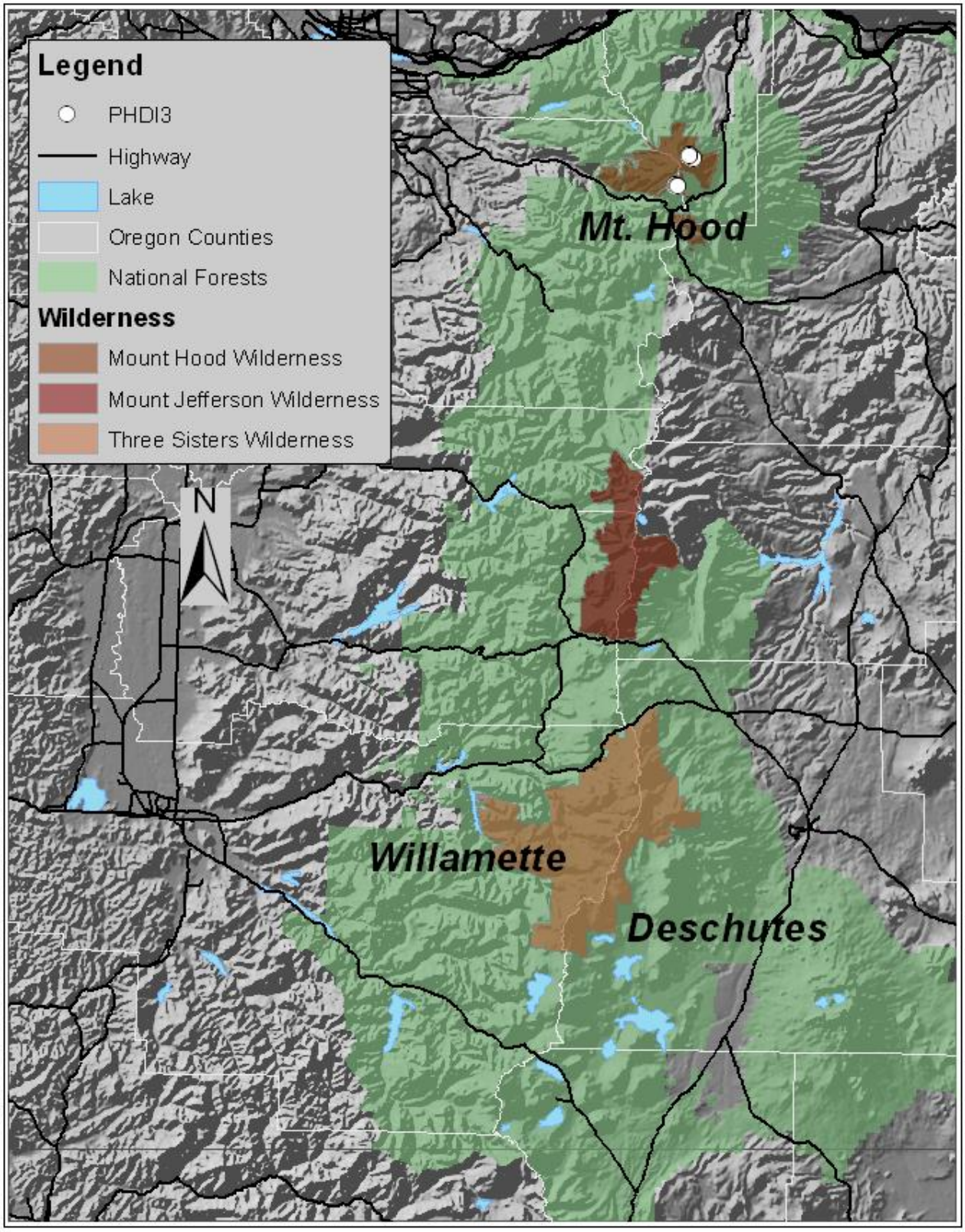
Environmental conditions:

PHDI3 is an alpine community primarily occupying steep, dry mid-slopes to ridge tops with mainly warm aspects and early snowmelt. Cover of bare ground, gravel, plus rock averages 48%. The steep slopes and topography reduce available moisture and the well-drained, coarse soils have little moisture holding capacity. Small mammal activity results in significant bare ground, averaging 20% (5% to 45%). Active erosion and rock sliding result in continuous disturbance.

Vegetation composition:

This dry, sparse, low alpine community is characterized by spreading phlox (PHDI3). Yarrow (ACMI2), silky lupine (LUSE4), squirreltail (ELEL5), and sulfur buckwheat (ERUM) are typically present. Davis' knotweed (PODA) occurs in more than half of the plots. Summed plant cover averages 54%.

Growth form	Mean cover (%)
Forb	34.4
Graminoid	11.0
Shrub	8.6
Tree	0.4


Legend
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National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

PHDI3. Constancy table. Species with at least 25% constancy are listed.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
PHDI3	*Phlox diffusa*	Spreading phlox	100.0	9.4	9.4
ACMI2	*Achillea millefolium*	Yarrow	90.9	1.5	1.7
LUSE4	*Lupinus sericeus*	Silky lupine	63.6	7.2	11.3
ERUM	*Eriogonum umbellatum*	Sulfur buckwheat	63.6	6.1	9.6
ELEL5	*Elymus elymoides*	Squirreltail	63.6	2.2	3.4
PODA	*Polygonum davisiae*	Davis' knotweed	54.5	1.5	2.7
AGPA8	*Agrostis pallens*	Thin bentgrass	45.5	1.6	3.6
POPU3	*Polemonium pulcherrimum*	Showy Jacob's-ladder	36.4	1.8	5.0
EULEL2	*Eucephalus ledophyllus*	Cascade aster	36.4	1.0	2.8
LOMA5	*Lomatium martindalei*	Martindale's lomatium	36.4	0.4	1.0
JUCO6	*Juniperus communis*	Common juniper	27.3	7.3	26.7
CASP5	*Carex spectabilis*	Showy sedge	27.3	4.2	15.3
CIUMU	*Cistanthe umbellata*	Pussypaws	27.3	1.7	6.3
ARCA7	*Arenaria capillaris*	Thread-leaved sandwort	27.3	0.7	2.7
CABR12	*Carex breweri*	Brewer's sedge	27.3	0.7	2.7
TRSP2	*Trisetum spicatum*	Spike trisetum	27.3	0.5	2.0
PIAL	*Pinus albicaulis*	Whitebark pine	27.3	0.4	1.3

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:

n = 6 (6 Mt. Hood NF)

Soils are loamy fine sands or sands, becoming gravelly to cobbly sands with depth. Most soil pits have one to three paired A over AC horizons; four of the pits have B horizons. Roots are concentrated in the top 21" (12-31"). Soils are characterized as aeolian sands in two pits.

Observations from plot notes:

Vegetation: Tree islands of krummholz whitebark pine or mountain hemlock are frequently adjacent to plots.

Soil: Erosion, rock sliding, and weathering are noted. Plot notes from one soil pit include an observation that extensive root materials are almost more complex than surface plants. Another notes roots from adjacent krummholz pine.

Alpine Mesic Communities

Juncus drummondii-Saxifraga tolmiei (Drummond's rush-Tolmie's saxifrage)
JUDR-SATO2
Eco-class code: GS4022

JUDR-SATO2. Environmental conditions of plots.

Number of plots	3 (3 Mt. Hood NF)
Elevation (ft)	Mean = 6340; Range = 5640-7030
Slope (%)	Mean = 13; Range = 4-24
Aspect (no. of plots)	FLAT = 0; NW = 3; NE = 0; SE = 0; SW = 0
Distribution	High Cascades (100 %)
Slope position	Basins and drainages
Slope shape	Concave topography

Environmental conditions:

JUDR-SATO2 is a moist community occurring on flat, gravelly areas along snowmelt channels, generally adjacent to snowfields or persistent snowbanks. It has very low plant cover, exposing gravelly to rocky surfaces but little bare ground (average of 0.3%, range of 0 to 1%). Cover of surface gravel plus rock averages 62%. Slopes are gentle, and standing water is noted on one plot. Riparian locations and gentle slopes with cool aspects amid late snowmelt channels supply moisture, although soils have low moisture-holding capacity.

Vegetation composition:

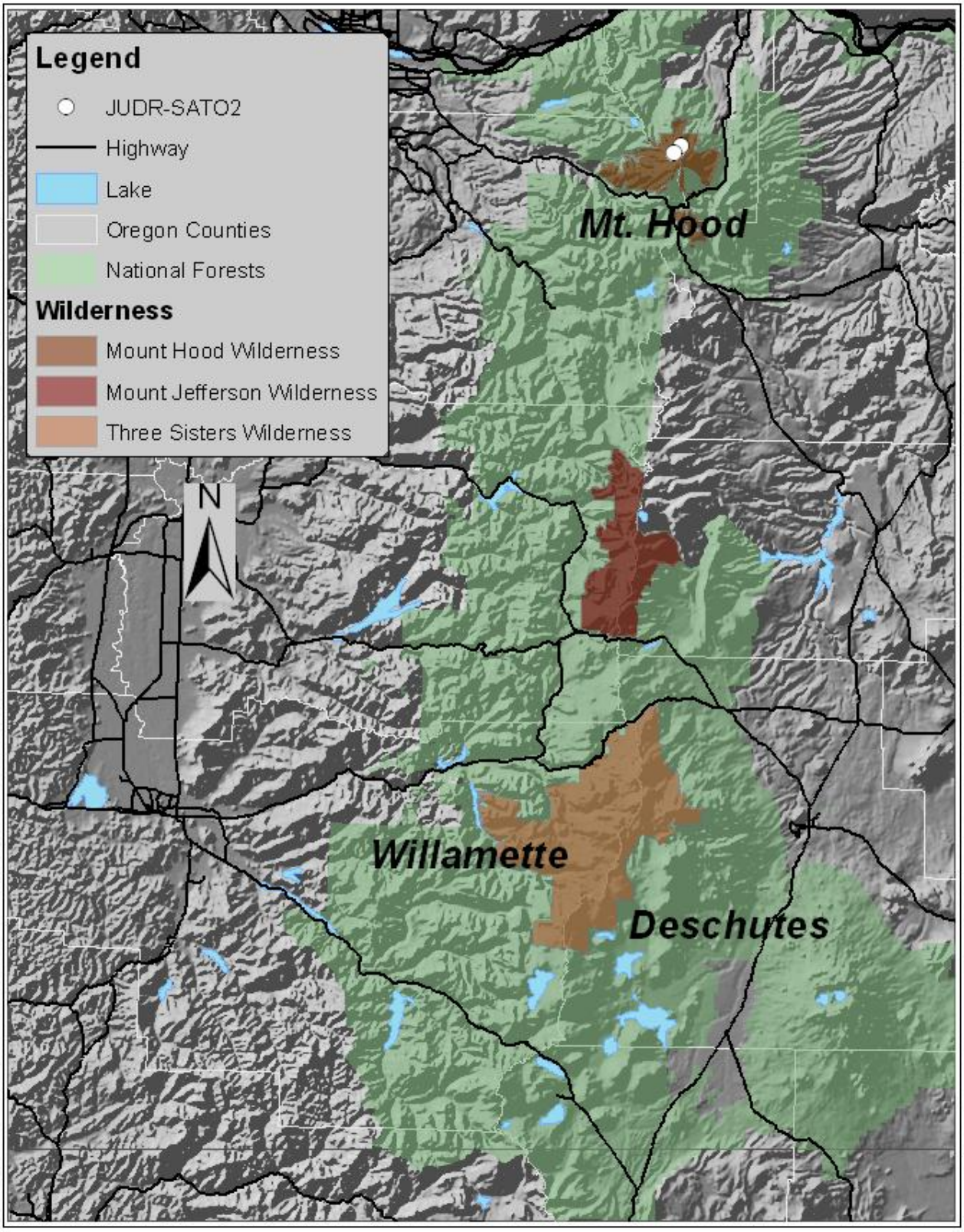
This moist, sparse community is dominated by Drummond's rush (JUDR), and Tolmie's saxifrage (SATO2) is always present. Partridge foot is present in two thirds of the plots. Summed plant cover averages only 17%. The low plant cover reflects the cold, wet, and frequently disturbed conditions.

Growth form	Mean cover (%)
Forb	5.0
Graminoid	11.7
Shrub	0.3

JUDR-SATO2. Constancy table. Species with at least 25% constancy are listed.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
JUDR	*Juncus drummondii*	Drummond's rush	100.0	11.3	11.3
SATO2	*Saxifraga tolmiei*	Tolmie's saxifrage	100.0	4.3	4.3
LUPE	*Luetkea pectinata*	Partridge foot	66.7	0.7	1.0
CASP5	*Carex spectabilis*	Showy sedge	33.3	0.3	1.0
PHEM	*Phyllodoce empetriformis*	Red mountain heather	33.3	0.3	1.0

*Characteristic cover: mean cover for plots in which a species occurs.


Legend
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Highway
Lake
Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Soil description :

n = 1 (Mt. Hood NF)

The soil is coarse textured loamy sand over stony sand. The A horizon is a shallow (2”) layer of loamy sand over a C horizon of stony sand.

Observations from plot notes:

Soil: Locations include an alluvial fan in a basin below a snowfield, a site adjacent to a creek at the base of a snowfield, and a gravelly flat between two stream channels by a snow bank. Frequent flooding seems the most likely disturbance.

Small mammal disturbance: Small mammal activity is not recorded in the plot notes.

Previously described plant associations:

Douglas and Bliss (1977) describe a *Saxifraga tolmiei/Luzula piperi* association in the ‘snowbed community type’ in their alpine and high subalpine plant communities of the north Cascades Range, Washington and British Columbia, which has a high “prominence value” for *Juncus drummondii*, as well as *Carex pyrenaica*. They note that “this community occurs on gentle to moderately steep, mainly southerly slopes in the western North Cascades. Snow remains until late July or early August. Soils are poorly developed, poor to fairly well drained, and show indications of surficial movement.”

Douglas (1972) describes a *Saxifraga tolmiei* community in his rawmark meadow habitat (a rawmark meadow is characterized by short snow-free periods, moist soils, and the lack of a closed vegetative cover). He notes that the *S. tolmiei* community “is found on gentle to steep northerly slopes which are poorly to fairly well drained. These sites have an extremely short snow-free season, with snow usually remaining until sometime in late July or August.” Species with high Constancy are *Saxifraga tolmiei* (98%) and *Luzula wahlenbergii* (82%). *Polytrichadelphus lyallii* is the only important cryptogam.

Alpine Wet Communities

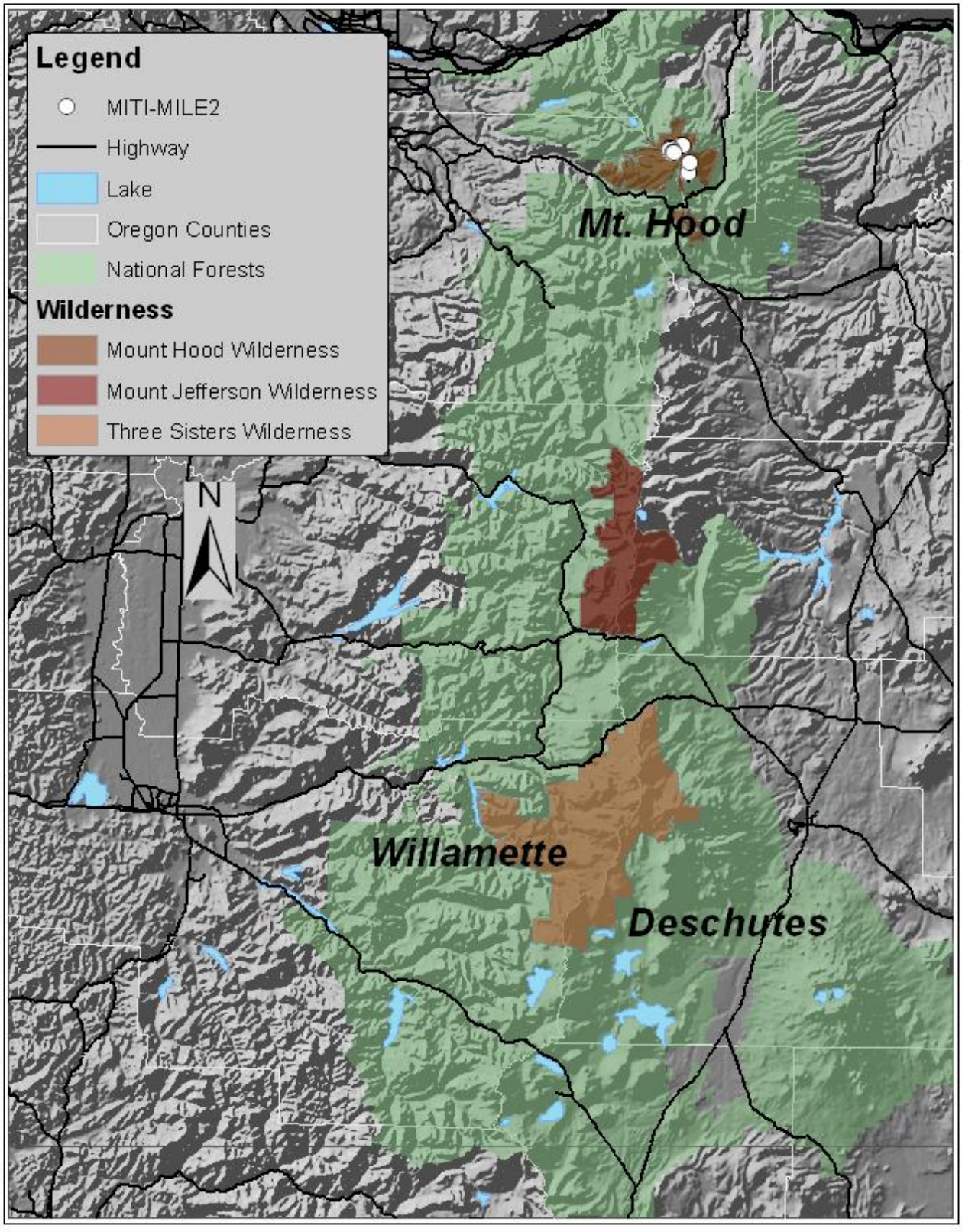
Mimulus tilingii-Mimulus lewisii (Mountain monkeyflower-Pink monkeyflower)
MITI-MILE2
Eco-class code: FS3012

MITI-MILE2. Environmental conditions of plots.

Number of plots	14 (14 Mt. Hood NF)
Elevation (ft)	Mean = 6700; Range = 5600-7820
Slope (%)	Mean = 40; Range = 0-70
Aspect (no. of plots)	FLAT = 1; NW = 4; NE = 5; SE = 4; SW = 0
Distribution	High Cascades (100 %)
Slope position	Drainages, basins, upper to mid-slopes
Slope shape	Undulating or concave topography

Environmental conditions:

MITI-MILE2 is a mossy, forb community found along snowmelt channels on steep hillsides in the alpine zone, in seepy areas or straddling small streams. Exposed soil averages only 2% (0% to 10%), although rock averages 13% (0% to 85%). Gravels are insignificant. Water is readily available through the growing season; water tables are shallow and fluctuating.


Legend
MITI-MILE2
Highway
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Oregon Counties
National Forests
Wilderness
Mount Hood Wilderness
Mount Jefferson Wilderness
Three Sisters Wilderness
N
Mt. Hood
Willamette
Deschutes

Vegetation composition:

This alpine, streamside forb community is dominated by mountain monkeyflower (MITI) and/or pink monkeyflower (MILE2). Alpine willowherb (EPAL) is typically present. Drummond's rush (JUDR), showy sedge (CASP5), Merten's rush (JUME3), and arrowleaf groundsel (SETR) are present in more than half of the plots. Variable willow (SACO2) is the most important shrub (22% cover in 50% of the plots). Summed plant cover averages 60%.

Growth form	Mean cover (%)
Forb	33.2
Graminoid	12.1
Shrub	14.6
Tree	0.2

MITE-MILE2. Constancy table. Species with at least 25% constancy are listed.

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
EPAL	*Epilobium alpinum*	Alpine willowherb	92.9	3.4	3.7
MITI	*Mimulus tilingii*	Mountain monkeyflower	85.7	8.8	10.3
MILE2	*Mimulus lewisii*	Pink monkeyflower	85.7	6.5	7.6
JUDR	*Juncus drummondii*	Drummond's rush	64.3	2.0	3.1
CASP5	*Carex spectabilis*	Showy sedge	57.1	4.9	8.5
JUME3	*Juncus mertensianus*	Mertens' rush	57.1	1.3	2.3
SETR	*Senecio triangularis*	Arrowleaf groundsel	57.1	0.9	1.5
SACO2	*Salix commutata*	Variable willow	50.0	10.9	21.9
LULA4	*Lupinus latifolius*	Broadleaf lupine	35.7	4.0	11.2
VEWO2	*Veronica wormskjoldii*	Alpine speedwell	35.7	1.1	3.0
CANI2	*Carex nigricans*	Black alpine sedge	28.6	1.9	6.8
PHEM	*Phyllodoce empetriformis*	Red mountain heather	28.6	1.7	6.0
VASI	*Valeriana sitchensis*	Sitka valerian	28.6	1.1	3.8

Plants symbol	Scientific name	Common name	Const (%)	Mean cover (%)	Charact cover* (%)
SAFE	*Saxifraga ferruginea*	Alaska saxifrage	28.6	1.0	3.5
ERPE3	*Erigeron peregrinus*	Subalpine daisy	28.6	0.7	2.5
LUPE	*Luetkea pectinata*	Partridge foot	28.6	0.5	1.8
LIGR	*Ligusticum grayi*	Gray's lovage	28.6	0.4	1.5

*Characteristic cover: mean cover for plots in which a species occurs.

Soil description:
n = 11 (11 Mt. Hood NF)

Profiles generally show multiple A or AC horizons over sequences of A to AC, Bg, or C horizons below. Textures are loamy sands, sands, or sandy loams. Lowest horizons are gravelly to cobbly sands or loamy sands, in coarse alluvium. Three pits record summer water table depths of 4-25". Mottles are found in 77% of the pits with an average depth of 9" (4-18"), indicating a shallow, fluctuating water table. Roots are concentrated in the top 18-25."

Observations from plot notes:

Vegetation: Notes from one plot include: "Seeps running over rocky morainal debris covered with moss. Monkeyflower hugs the open water channels, while willow grows on rockier areas within seep and around it." Another plot on a steep scree slope notes "plants growing where moss is colonizing." Several plots note plants growing in deposits of ash between rocks. One location is described as a seepy area "draining into avalanche/snowmelt gully;" another is on a scree slope "embracing waterfall with shallow soil under dense matting of moss."

Small mammal disturbance: Small mammal activity is noted on only one plot.

Previously described plant associations:

Smith (1998) describes a *Mimulus lewisii* type for northeastern California based on one plot. She explains that the "*Mimulus lewisii* community type is an early seral type that occurs along steeper gradient streambanks." Smith observes that "sites are streambanks and coarse-textured point bars. Valley bottoms are steep and narrow. Sites receive moisture from upland flows, and do not dry out during the summer." Some of the species found in her characteristic plot were similar to those noted in this guide, including *Mimulus tilingii* and *Juncus mertensiana*.

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Appendix A. Crosswalk between current and former Latin names

This crosswalk table links current names from USDA Plants Database to former names from Hitchcock et al. (1984).

Current names	Former names
Achnatherum occidentale	*Stipa occidentalis*
Aconitum columbianum ssp. *columbianum*	*Aconitum columbianum* var. *ochroleucum*
Aconitum columbianum ssp. *viviparum*	*Aconitum columbianum* var. *howellii*
Agrostis capillaris	*Agrostis tenuis*
Agrostis humilis	*Agrostis thurberiana*
Agrostis stolonifera	*Agrostis alba*
Agrostis stolonifera	*Agrostis alba* var. *stolonifera*
Alnus viridis ssp. *sinuata*	*Alnus sinuata*
Angelica arguta	*Angelica lyallii*
Antennaria luzuloides ssp. *aberrans*	*Antennaria microcephala*
Argentina anserina	*Potentilla anserina*
Arnica x*diversifolia*	*Arnica diversifolia*
Artemisia ludoviciana ssp. *candicans*	*Artemisia ludoviciana* var. *latiloba*
Aspidotis densa	*Cryptogramma densa*
Aulacomnium palustre	*Aulocomnium paulustre*
Boykinia occidentalis	*Boykinia elata*
Brassica rapa var. *rapa*	*Brassica campestris*
Bromus racemosus	*Bromus commutatus*
Calamagrostis stricta ssp. *inexpansa*	*Calamagrostis inexpansa*
Calochortus bruneaunis	*Calochortus nuttallii*
Caltha leptosepala ssp. *howellii*	*Caltha biflora*
Calystegia atriplicifolia ssp. *atriplicifolia*	*Convolvulus nyctagineus*
Canadanthus modestus	*Aster modestus*
Carex angustata	*Carex eurycarpa*
Carex aquatilis var. *dives*	*Carex sitchensis*
Carex echinata ssp. *echinata*	*Carex muricata*
Carex echinata ssp. *echinata*	*Carex ormantha*
Carex exsiccata	*Carex vesicaria*
Carex hallii	*Carex parryana*
Carex hystericina	*Carex hystricina*
Carex inops	*Carex pensylvanica*
Carex lenticularis var. *lipocarpa*	*Carex kelloggii*

Current names	Former names
Carex microptera	*Carex limnophila*
Carex utriculata	*Carex rostrata*
Cerastium glomeratum	*Cerastium viscosum*
Chamerion angustifolium ssp. *angustifolium*	*Epilobium angustifolium*
Chrysolepis chrysophylla var. *chrysophylla*	*Castanopsis chrysophylla*
Cirsium remotifolium	*Cirsium callilepis*
Cirsium remotifolium	*Cirsium callilepis* var. *oregonense*
Cistanthe umbellata var. *umbellata*	*Spraguea umbellata*
Claytonia exigua ssp. *exigua*	*Montia spathulata*
Claytonia perfoliata	*Montia perfoliata*
Claytonia sibirica var. *sibirica*	*Montia sibirica*
Columbiadoria hallii	*Haplopappus hallii*
Comarum palustre	*Potentilla palustris*
Cornus sericea ssp. *sericea*	*Cornus stolonifera*
Corydalis caseana ssp. *aquae-gelidae*	*Corydalis aquae-gelidae*
Cryptantha intermedia	*Cryptantha intermedia* var. *grandiflora*
Cryptogramma acrostichoides	*Cryptogramma crispa*
Cupressus nootkatensis	*Chamaecyparis nootkatensis*
Delphinium menziesii ssp. *menziesii*	*Delphinium menziesii* ssp. *pyramidale*
Delphinium X *occidentale*	*Delphinium occidentale*
Dichelostemma congestum	*Brodiaea congesta*
Dodecatheon hendersonii	*Dodecatheon hendersoni*
Dodecatheon pulchellum ssp. *monanthum*	*Dodecatheon pauciflorum* var. *monanthum*
Dryopteris carthusiana	*Dryopteris austriaca*
Eleocharis quinqueflora	*Eleocharis pauciflora*
Elymus elymoides	*Sitanion hystrix*
Elymus trachycaulus ssp. *trachycaulus*	*Agropyron caninum* ssp. *majus*
Epilobium anagallidifolium	*Epilobium alpinum*
Epilobium brachycarpum	*Epilobium paniculatum*
Epilobium ciliatum ssp. *ciliatum*	*Epilobium adenocaulon*
Epilobium ciliatum ssp. *glandulosum*	*Epilobium glandulosum*
Epilobium ciliatum ssp. *watsonii*	*Epilobium watsonii*
Ericameria bloomeri	*Haplopappus bloomeri*
Ericameria greenei	*Haplopappus greenei*
Eriogonum pyrolifolium	*Eriogonum pyrolaefolium*

Current names	Former names
Eriophorum angustifolium ssp. *angustifolium*	*Eriophorum polystachion*
Erysimum capitatum var. *capitatum*	*Erysimum asperum*
Eucephalus gormanii	*Aster gormanii*
Eucephalus ledophyllus var. *ledophyllus*	*Aster ledophyllus*
Eurybia radulina	*Aster radulinus*
Euthamia occidentalis	*Solidago occidentalis*
Festuca campestris	*Festuca scabrella*
Frangula purshiana	*Rhamnus purshiana*
Frasera fastigiata	*Frasera umpquaensis*
Fritillaria affinis var. *affinis*	*Fritillaria lanceolata*
Galium mexicanum ssp. *asperulum*	*Galium asperrimum*
Gentianopsis simplex	*Gentiana simplex*
Hierochloe hirta	*Hierochloe odorata*
Hypericum scouleri	*Hypericum formosum*
Ipomopsis aggregata ssp. *formosissima*	*Gilia aggregata*
Juncus arcticus ssp. *littoralis*	*Juncus balticus*
Juncus nevadensis var. *nevadensis*	*Juncus mertensianus* ssp. *gracilis*
Kalmia microphylla	*Kalmia occidentalis*
Koeleria macrantha	*Koeleria cristata*
Leucanthemum vulgare	*Chrysanthemum leucanthemum*
Lithophragma parviflorum	*Lithophragma parviflora*
Lotus unifoliolatus var. *unifoliolatus*	*Lotus purshianus*
Lupinus argenteus ssp. *argenteus* var. *laxiflorus*	*Lupinus laxiflorus*
Luzula comosa	*Luzula campestris*
Luzula glabrata var. *hitchcockii*	*Luzula hitchcockii*
Lycopodiella inundata	*Lycopodium inundatum*
Lysichiton americanus	*Lysichitum americanum*
Mahonia aquifolium	*Berberis aquifolium*
Mahonia nervosa	*Berberis nervosa*
Maianthemum racemosum	*Smilacina racemosa*
Maianthemum stellatum	*Smilacina stellata*
Minuartia nuttallii ssp. *nuttallii*	*Arenaria nuttallii*
Minuartia obtusiloba	*Arenaria obtusiloba*
Moehringia macrophylla	*Arenaria macrophylla*
Nothocalais alpestris	*Microseris alpestris*

Current names	Former names
Oplopanax horridus	*Oplopanax horridum*
Oreostemma alpigenum var. *alpigenum*	*Aster alpigenus*
Orthilia secunda	*Pyrola secunda*
Osmorhiza berteroi	*Osmorhiza chilensis*
Packera streptanthifolia	*Senecio cymbalarioides*
Packera subnuda	*Senecio subnudus*
Pascopyrum smithii	*Agropyron smithii*
Paxistima myrsinites	*Pachistima myrsinites*
Piperia elegans ssp. *elegans*	*Habenaria elegans*
Platanthera dilatata var. *dilatata*	*Habenaria dilatata*
Platanthera stricta	*Habenaria saccata*
Poa leptocoma	*Poa leptocoma* var. *leptocoma*
Poa lettermanii	*Poa lettermani*
Poa secunda	*Poa canbyi*
Polygonum davisiae	*Polygonum newberryi*
Polygonum phytolaccifolium	*Polygonum phytolaccaefolium*
Prosartes hookeri var. *hookeri*	*Disporum hookeri*
Prosartes smithii	*Disporum smithii*
Pseudognaphalium canescens ssp. *thermale*	*Gnaphalium microcephalum*
Pseudostellaria jamesiana	*Stellaria jamesiana*
Pulsatilla occidentalis	*Anemone occidentalis*
Rainiera stricta	*Luina stricta*
Ranunculus alismifolius	*Ranunculus alismaefolius*
Rhodiola integrifolia ssp. *integrifolia*	*Sedum roseum*
Ribes acerifolium	*Ribes howellii*
Rumex aquaticus var. *fenestratus*	*Rumex occidentalis*
Salix boothii	*Salix myrtillifolia*
Salix commutata	*Salix barclayi*
Salix lemmonii	*Salix lemmoni*
Salix lucida ssp. *lasiandra*	*Salix lasiandra*
Salix planifolia	*Salix phylicifolia*
Sambucus nigra ssp. *cerulea*	*Sambucus cerulea*
Sanguisorba annua	*Sanguisorba occidentalis*
Saxifraga nelsoniana	*Saxifraga punctata*
Silene parryi	*Silene parryii*

Current names	Former names
Sparganium angustifolium	*Sparganium emersum* var. *multipedunculatum*
Spergula arvense	*Spergula arvensis*
Sphagnum palustre	*Sphagnum paulustre*
Spiraea splendens var. *splendens*	*Spiraea densiflora*
Stachys chamissonis var. *cooleyae*	*Stachys cooleyae*
Streptopus lanceolatus	*Streptopus roseus*
Symphoricarpos hesperius	*Symphoricarpos mollis*
Symphyotrichum foliaceum var. *foliaceum*	*Aster foliaceus*
Symphyotrichum spathulatum var. *spathulatum*	*Aster occidentalis*
Taraxacum officinale ssp. *ceratophorum*	*Taraxacum ceratophorum*
Thelypteris quelpaertensis	*Thelypteris limbosperma*
Torreyochloa pallida var. *pauciflora*	*Puccinellia pauciflora*
Triantha glutinosa	*Tofieldia glutinosa*
Trichophorum cespitosum	*Scirpus cespitosus*
Trientalis borealis ssp. *latifolia*	*Trientalis latifolia*
Trientalis europaea ssp. *arctica*	*Trientalis arctica*
Triphysaria pusilla	*Orthocarpus pusillus*
Trisetum canescens	*Trisetum cernuum*
Triteleia hyacinthina	*Brodiaea hyacinthina*
Utricularia macrorhiza	*Utricularia vulgaris*
Vaccinium cespitosum	*Vaccinium caespitosum*
Vaccinium membranaceum	*Vaccinium globulare*
Vaccinium uliginosum	*Vaccinium occidentale*
Vahlodea atropurpurea	*Deschampsia atropurpurea*
Valeriana scouleri	*Valeriana sitchensis* var. *scouleri*
Veronica hederifolia	*Veronica hederaefolia*
Viburnum edule	*Viburnum pauciflorum*
Vicia americana ssp. *americana*	*Vicia americana* var. *truncata*
Viola bakeri	*Viola nuttallii*
Vulpia myuros	*Festuca myuros*

Appendix B. Artificial key to the non-forested communities

This key was developed from the plot data used to define the communities in this guide. However, it has not been field tested, and it may not work in some locations. Communities are grouped by elevational zone: brown band = subalpine, green band = montane, and blue band = alpine. If you know which zone you are in, begin keying at the top of the corresponding band and work through the key, step by step to a preliminary identification (community type or phase). The key uses the term "trace" for species that are a minor component, or about 1% or less cover.

Next, read the relevant community (or phase) description and the descriptions of similar communities (or phases) to determine which best fits the composition and environmental conditions present. It may also be helpful to compare the extended constancy tables in Appendix E.

Subalpine communities

1. Mountain sedge (CASC12) >2% cover
    a. Marsh-marigold (CALEH2) and Jeffrey's shootingstar (DOJE) absent and few-flowered spikerush (ELQU2) >1% cover **CASC12-ELQU2**
    b. Not as above ..... go to 2

2. Mountain sedge (CASC12) >2% cover
    a. If black alpine sedge (CANI2) ≥5% cover, then tufted hairgrass (DECE) also present **CASC12**
    b. Not as above ..... go to 3

3. Arrowleaf groundsel (SETR) present and cow-parsnip (HEMA80) absent
    a. False hellebore (VERAT) and/or arrowleaf groundsel (SETR) ≥4% cover, and Sitka valerian (VASI) present or shrub cover >20% cover ..... **SETR-VERAT-VASI**
    b. Not as above ..... go to 4

4. Showy sedge (CASP5) and broadleaf lupine (LULA4) both present
    a. Black alpine sedge (CANI2) ≤10% cover and black alpine sedge (CANI2) <showy sedge (CASP5) *and:*
        - Greenleaf fescue (FEVI) <5% cover and greenleaf fescue(FEVI) < showy sedge (CASP5) *and*
        - Red mountain heather (PHEM) <5% cover and red mountain heather (PHEM) < showy sedge (CASP5) *and*
        - Partridge foot (LUPE) < broadleaf lupine (LULA4) **CASP5-LULA4**
    b. Not as above ..... go to 5

5. Black alpine sedge (CANI2) present or not
    a. Black alpine sedge (CANI2) <5% cover or not present..... go to 14
    b. Black alpine sedge (CANI2) ≥5% cover..... go to 6

6. Black alpine sedge (CANI2) >5% cover and
    a. Black alpine sedge (CANI2) > partridge foot (LUPE) or partridge foot absent, *and:*
        - black alpine sedge (CANI2) ≥ red mountain heather (PHEM), or western bog-laurel (KAMI) present, *or*
        - Western bog-laurel (KAMI) >1% cover and red mountain heather (PHEM) ≥1% cover ..... **CANI2 [PHEM phase]**
    b. Not as above ..... go to 7

7. Black alpine sedge (CANI2) >5% cover
    a. Red mountain heather (PHEM) >7% cover, *and*:
        - red mountain heather (PHEM) > alpine aster (ORALA2), *and*
        - red mountain heather (PHEM) < showy sedge (CASP5) ..... **CANI2 [PHEM phase]**
    b. Not as above ..... go to 8

8. Black alpine sedge (CANI2) >5% cover
    a. Showy sedge (CASP5) >10% cover ..... **CANI2 [CASP5 phase]**
    b. Not as above ..... go to 9

9. Black alpine sedge (CANI2) >5% cover
    a. Showy sedge (CASP5) >5% cover and showy sedge (CASP5) > fan-leaved cinquefoil (POFL3), partridge foot (LUPE), and alpine aster (ORALA2) ..... **CANI2 [CASP5 phase]**
    b. Not as above ..... go to 10

10. Black alpine sedge (CANI2) >5% cover
    a. Fan-leaved cinquefoil (POFL3) >5% cover and fan-leaved cinquefoil (POFL3) > alpine aster (ORALA2) ..... **CANI2 [POFL3 phase]**
    b. Not as above ..... go to 11

11. Black alpine sedge (CANI2) >5% cover
    a. Alpine aster (ORALA2) >1% cover and alpine aster (ORALA2) > partridge foot (LUPE) ..... **CANI2 [ORALA2 phase]**
    b. Not as above ..... go to 12

12. Black alpine sedge (CANI2) >5% cover
    a. Partridge foot (LUPE) >5% cover ..... **CANI2 [LUPE phase]**
    b. Not as above ..... go to 13

13. Black alpine sedge (CANI2) >5% cover
    a. Black alpine sedge (CANI2) >5% cover and does not fit steps 7-13 in this key ..... **CANI2 [monotypic phase]**
    b. Not as above ..... go to 14

14. Red mountain heather (PHEM) present or not
    a. Red mountain heather (PHEM) trace or not present ..... go to 19
    b. Red mountain heather (PHEM) >2% cover ..... go to 15

15. Red mountain heather (PHEM) ≥5% cover, *or*:
    - red mountain heather (PHEM) >2% cover *and*
    - blueleaf huckleberry (VADE) present
    a. White mountain heather (CAME7) ≥5% cover **PHEM-CAME7**
    b. Not as above ..... go to 16

16. Red mountain heather (PHEM) ≥5% cover, *or*:
    - red mountain heather (PHEM) >2% cover *and*
    - blueleaf huckleberry (VADE) present
    a. White mountain heather (CAME7) present and fan-leaved cinquefoil (POFL3) <10% cover **PHEM-CAME7**
    b. Not as above ..... go to 17

17. Red mountain heather (PHEM) ≥5% cover, *or*:
    - red mountain heather (PHEM) >2% cover *and*
    - blueleaf huckleberry (VADE) present
    a. Fan-leaved cinquefoil (POFL3) > partridge foot (LUPE) **PHEM/POFL3**
    b. Not as above ..... go to 18

18. Red mountain heather (PHEM) ≥5% cover, *or*:
    - red mountain heather (PHEM) >2% cover *and*
    - blueleaf huckleberry (VADE) present
    a. Red mountain heather (PHEM) ≥5% cover and not described in steps 16-18 ..... **PHEM**
    b. Not as above ..... go to 19

19. Silky lupine (LUSE4) >1% cover
    a. Silky lupine (LUSE4) > greenleaf fescue (FEVI) **LUSE4**
    b. Not as above ..... go to 20

20. Partridge foot (LUPE) ≥5% cover
    a. Partridge foot (LUPE) > greenleaf fescue (FEVI) and Cascade aster (EULEL2) ..... **LUPE**
    b. Not as above ..... go to 21

21. Davis' knotweed (PODA) >2% cover and long stolon sedge (CAIN9) absent
    a. Cascade aster (EULEL2) ≥ alpine buckwheat (ERPY2) **PODA-EULEL2**
    b. Not as above ..... go to 22

22. Greenleaf fescue (FEVI) present or not
    a. Greenleaf fescue (FEVI) trace or not present ..... go to 28
    b. Greenleaf fescue (FEVI) >2% cover ..... go to 23

23. Greenleaf fescue (FEVI) >5% cover, *or*:
    - greenleaf fescue (FEVI) ≥2% cover *and*
    - pinemat manzanita (ARNE) absent *and*
    - California brome (BRCA5) <4% cover *and*
    - alpine buckwheat (ERPY) <5% cover *and*
    - beargrass (XETE) <50% cover *and*
    - blue wildrye (ELGL) <5% cover

    a. Thin bentgrass (AGPA8)>5% cover ..... **FEVI [AGPA8 phase]**
    b. Not as above ..... go to 24

24. Greenleaf fescue (FEVI) >5% cover, *or*:
    - greenleaf fescue (FEVI) ≥2% cover *and*
    - pinemat manzanita (ARNE) absent *and*
    - California brome (BRCA5) <4% cover *and*
    - alpine buckwheat (ERPY) <5% cover *and*
    - beargrass (XETE) <50% cover *and*
    - blue wildrye (ELGL) <5% cover

    a. Showy sedge (CASP5) present and broadleaf lupine (LULA4) > Cascade aster (EULEL2) ..... **FEVI [CASP5-LULA4 phase]**
    b. Not as above ..... go to 25

25. Greenleaf fescue (FEVI) >5% cover, *or*:
    - greenleaf fescue (FEVI) ≥2% cover *and*
    - pinemat manzanita (ARNE) absent *and*
    - California brome (BRCA5) <4% cover *and*
    - alpine buckwheat (ERPY) <5% cover *and*
    - beargrass (XETE) <50% cover *and*
    - blue wildrye (ELGL) <5% cover

    a. Long stolon sedge (CAIN9) >1% cover or long stolon sedge (CAIN9) ≥ Cascade aster (EULEL2) ..... **FEVI [CAIN9 phase]**
    b. Not as above ..... go to 26

26. Greenleaf fescue (FEVI) >5% cover, *or*:
    - greenleaf fescue (FEVI) ≥2% cover *and*
    - pinemat manzanita (ARNE) absent *and*
    - California brome (BRCA5) <4% cover *and*
    - alpine buckwheat (ERPY) <5% cover *and*
    - beargrass (XETE) <50% cover *and*
    - blue wildrye (ELGL) <5% cover

    a. Cascade aster (EULEL2) present..... **FEVI [EULEL2 phase]**
    b. Not as above ..... go to 26

27. Greenleaf fescue (FEVI) >5% cover, *or*:
    - greenleaf fescue (FEVI) ≥2% cover *and*
    - pinemat manzanita (ARNE) absent *and*
    - California brome (BRCA5) <4% cover *and*
    - alpine buckwheat (ERPY) <5% cover *and*
    - beargrass (XETE) <50% cover *and*
    - blue wildrye (ELGL) <5% cover

    a. Davis' knotweed (PODA) present ..... **FEVI [PODA phase]**
    b. Not as above ..... go to 27

28. Davis' knotweed (PODA) >2% cover and long stolon sedge (CAIN9) absent
    a. Alpine buckwheat (ERPY2) present..... **PODA-ERPY2**
    b. Not as above ..... go to 29

29. Long stolon sedge (CAIN9) present or not
    a. Long stolon sedge (CAIN9) not present ..... go to 33
    b. Long stolon sedge (CAIN9) present..... go to 30

30. Long stolon sedge (CAIN9) present
    a. Pinemat manzanita (ARNE) present and Sierra sanicle (SAGR5) absent **CAIN9-ARNE**
    b. Not as above ..... go to 31

Montane communities

31. Long stolon sedge (CAIN9) present
    a. California brome (BRCA5) > Sierra sanicle (SAGR5), and thimbleberry (RUPA) absent **BRCA5-CAIN9**
    b. Not as above ..... go to 32

32. Long stolon sedge (CAIN9) present
    a. Sierra sanicle (SAGR5) present..... **CAIN9-SAGR5-PEPR2**
    b. Not as above ..... go to 33

33. Beargrass (XETE) >50% cover
    a. Greenleaf fescue (FEVI) present ..... **XETE-FEVI**
    b. Not as above ..... go to 34

34. Thimbleberry (RUPA) ≥4%
    a. Sitka alder (ALVIS) not dominant..... **RUPA–NWO Cascades**
    b. Not as above ..... go to 35

35. Western coneflower (RUOC2) ≥5% cover
    a. False hellebore (VERAT), cow-parsnip (HEMA80), and California brome (BRCA5) each <5% cover..... **RUOC2**
    b. Not as above ..... go to 36

36. Blue wildrye (ELGL) present
    a. Arrowleaf groundsel (SETR) <3% cover or absent, *and*:
        - Oregon sunshine (ERLA6) trace or absent, *and*
        - either California brome (BRCA5) present and/or false hellebore species (VERAT) present. **ELGL-BRCA5**
    b. Not as above ..... go to 37

37. Oregon sunshine (ERLA6) present
    a. Wallace's selaginella (SEWA) trace or absent **ERLA6**
    b. Not as above ..... go to 38

38. Sitka alder (ALVIS) ≥5% cover
    a. Wetland sedges (CAREX) absent ..... **ALVIS**
    b. Not as above ..... go to 39

39. Vine maple (ACCI) ≥30% cover
    a. Vine maple (ACCI) ≥30% cover, in boulders and rock ..... **ACCI**
    b. Not as above ..... go to 40

40. Rocky or talus soils, and dry in the summer
    a. At least two of the following present: vine maple (ACCI), Cascara buckthorn (FRPU7), American rockbrake (CRAC3) ..... **TALUS [ACCI-FRPU7]**
    b. Not as above ..... go to 41

41. Rocky or talus soils, and dry in the summer
    a. Stonecrop (SEDUM) species and/or Wallace's selaginella (SEWA) present and at least two of the following absent: vine maple (ACCI), Cascara buckthorn (FRPU7), American rockbrake (CRAC3). . ..... **ROCK GARDEN (STEEP, XERIC)**
    b. Not as above ..... go to 42

42. False hellebore (VERAT) ≥5% cover
    a. Cow-parsnip (HEMA80) present **VERAT-HEMA80**
    b. Not as above ..... go to 43

43. Marsh-marigold (CALEH2) present
    a. Sitka sedge (CAAQD), western inflated sedge (CAEX5), tufted sedge (CALE8), few-flowered spikerush (ELQU2), Northwest Territory sedge (CAUT), and Douglas spiraea (SPDO) each < marsh-marigold (CALEH2), *and:*
        - tufted hairgrass (DECE) <5% cover *and*
        - bog blueberry (VAUL) <3% cover **CALEH2-DOJE**
    b. Not as above ..... go to 44

44. Bog blueberry (VAUL) present
    a. Few-flowered spikerush (ELQU2), tufted hairgrass (DECE), Douglas spiraea (SPDO), Northwest Territory sedge (CAUT), and western inflated sedge (CAEX5) each < bog blueberry (VAUL), and CAAQD <30% cover **VAUL/TRGL5**
    b. Not as above ..... go to 45

45. Western inflated sedge (CAEX5) >10% cover
    a. Tufted hairgrass (DECE) <5% cover **CAEX5**
    b. Not as above ..... go to 46

46. Tufted hairgrass (DECE) >10% cover
    a. Long-stalked clover (TRLO) ≥2% cover *and:*
        - sphagnum moss (SPHAG) trace, *and*:
        - black alpine sedge(CANI2) absent, *and*:
        - mountain sedge (CASC12) ≤5% cover ..... **DECE-TRLO**
    b. Not as above ..... go to 47

47. Tufted hairgrass (DECE) >5% cover
    a. Sitka sedge (CAAQD) <25% cover and Sphagnum moss (SPHAG) present ..... **DECE [SPHAG phase]**
    b. Not as above ..... go to 48

48. Tufted hairgrass (DECE) >5% cover
    a. Sphagnum moss (SPHAG) absent ..... **DECE**
    b. Not as above ..... go to 49

49. Sitka sedge (CAAQD) ≥30% cover
    a. Skunk cabbage (LYAM) ≥2% cover ..... **CAAQD [LYAM phase]**
    b. Not as above ..... go to 50

50. Sitka sedge (CAAQD) ≥30% cover
    a. Skunk cabbage (LYAM) <2% cover ..... **CAAQD**
    b. Not as above ..... go to 51

51. Tufted sedge (CALE8) ≥20% cover
    a. Few-flowered spikerush (ELQU2) <5% cover and Northwest Territory sedge (CAUT) < tufted sedge (CALE8) **CALE8**
    b. Not as above ..... go to 52

52. Northwest Territory sedge (CAUT) present
    a. Northwest Territory sedge (CAUT) >10% cover ..... **CAUT**
    b. Not as above ..... go to 53

53. Douglas spiraea (SPDO) present
    a. Douglas spiraea (SPDO) ≥5% cover ..... **SPDO**
    b. Not as above ..... go to 54

54. Few-flowered spikerush (ELQU2) present
    a. Few-flowered spikerush (ELQU2) ≥5% cover and Jeffrey's shootingstar (DOJE) present **ELQU2**
    b. Not as above ..... go to 55

55. Mountain alder (ALIN2) present
    a. Mountain alder (ALIN2) ≥25% cover and fowl mannagrass (GLST) present..... **ALIN2/GLST**
    b. Not as above ..... go to 56

56. Arrowleaf groundsel (SETR) present
    a. Arrowleaf groundsel (SETR) >1% cover ..... **SETR**
    b. Not as above ..... go to 57

Alpine communities

57. Greene's goldenbush (ERGR16) present
    a. Any combination of Silky lupine (LUSE4), broadleaved lupine (LULA4), or spreading phlox (PHDI3) >1% cover **ERGR13**
    b. Not as above ..... go to 58

58. Prairie lupine (LULE2) present
    a. Spreading stonecrop (SEDI) present **LULEL2-SEDI**
    b. Not as above ..... go to 59

59. Prairie lupine (LULE2) present
    a. Prairie lupine (LULEL2) and yarrow (ACMI2) > Davidson's penstemon (PEDA2) **LULEL2-ACMI2**
    b. Not as above ..... go to 60

60. Brewer's sedge (CABR12) >1% cover
    a. Black alpine sedge (CANI2), red mountain heather (PHEM), and spreading phlox (PHDI3) each < Brewer's sedge (CABR12) **CABR12**
    b. Not as above ..... go to 61

61. Spreading phlox (PHDI3) present
    a. Long stolon sedge (CAIN9) absent **PHDI3**
    b. Not as above 62

62. Davidson's penstemon (PEDA2) present
    a. Davidson's penstemon (PEDA2) >2% cover or Partridge foot (LUPE) ≤ Davidson's penstemon (PEDA2) **PEDA2**
    b. Not as above ..... go to 63

63. Pussypaws (CIUMU) >1% cover
    a. Black alpine sedge (CANI2) and alpine buckwheat (ERPY2) each <2% cover, and Cascade aster (EULEL2) trace or absent..... **CIUMU**
    b. Not as above ..... go to 64

64. Parry's rush (JUPA) >5% cover
    a. Black alpine sedge (CANI2) and red mountain heather (PHEM) each <2% cover or absent and greenleaf fescue (FEVI), broadleaf lupine (LULA4) and pussypaws (CIUMU) each <1% cover or absent ..... **JUPA**
    b. Not as above ..... go to 65

65. Drummond's rush (JUDR) and Tolmies' saxifrage (SATO2) both present
    a. Black alpine sedge (CANI2) absent and Drummond's rush (JUDR) > partridge foot (LUPE)..... **JUDR-SATO2**
    b. Not as above ..... go to 66

66. Mountain monkeyflower (MITI) and/or pink monkeyflower (MILE) present
    a. Alpine willowherb (EPAL) present **MITI-MILE2**
    b. Not as above ..... go to 67

67. Mountain monkeyflower (MITI) and/or pink monkeyflower (MILE) present
    a. Alpine willowherb (EPAL) absent, and monkeyflowers > showy sedge (CASP5), or Brewer's sedge (CABR12)..... **MITI-MILE2**
    b. Not as above ..... See note.

Note: If you did not find a plant association that fits the site under consideration you may have to work through the key again, using lower cover thresholds than indicated.

Appendix C. Indicator species descriptions

The species included in this section are common, or indicator, species for the non-forested plant communities described in this guide. Brief descriptions of the species emphasize growth form and environmental distributions or affinities. The illustrations are from Vascular Plants of the Pacific Northwest (Hitchcock et al. 1984), with permission. The name at the top of a page reflects the current nomenclature (USDA PLANTS Database); older names (from Hitchcock et al. 1984) are included below the illustration. For full descriptions see Hitchcock et al. (1984).

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Trees PLANTS Code: ALIN2

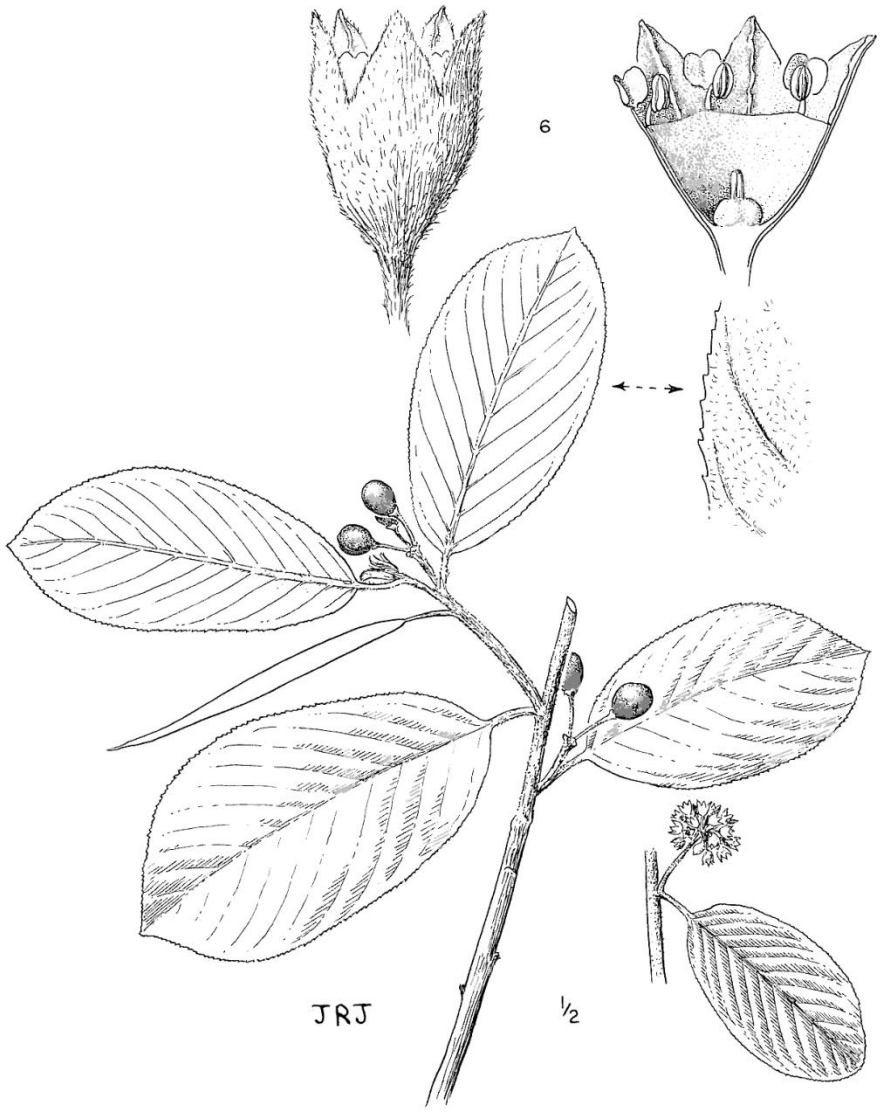
Alnus incana

Alnus incana from Hitchcock et al. (1984)

Alnus incana is a small tree that grows in seasonally moist to perennially saturated soils in swamps and along stream banks and springs at low to moderate elevations (montane zone).

Trees PLANTS Code: FRPU7

Frangula purshiana



Hitchcock et al. (1984): *Rhamnus purshiana*
PLANTS Database: *Frangula purshiana* (DC.) A. Gray

Frangula purshiana is a small tree or shrub whose fruits are animal dispersed. It occurs on moderate to steep slopes or on ridge tops in the montane zone, often in rocky soils or talus.

Shrubs PLANTS Code: ACCI

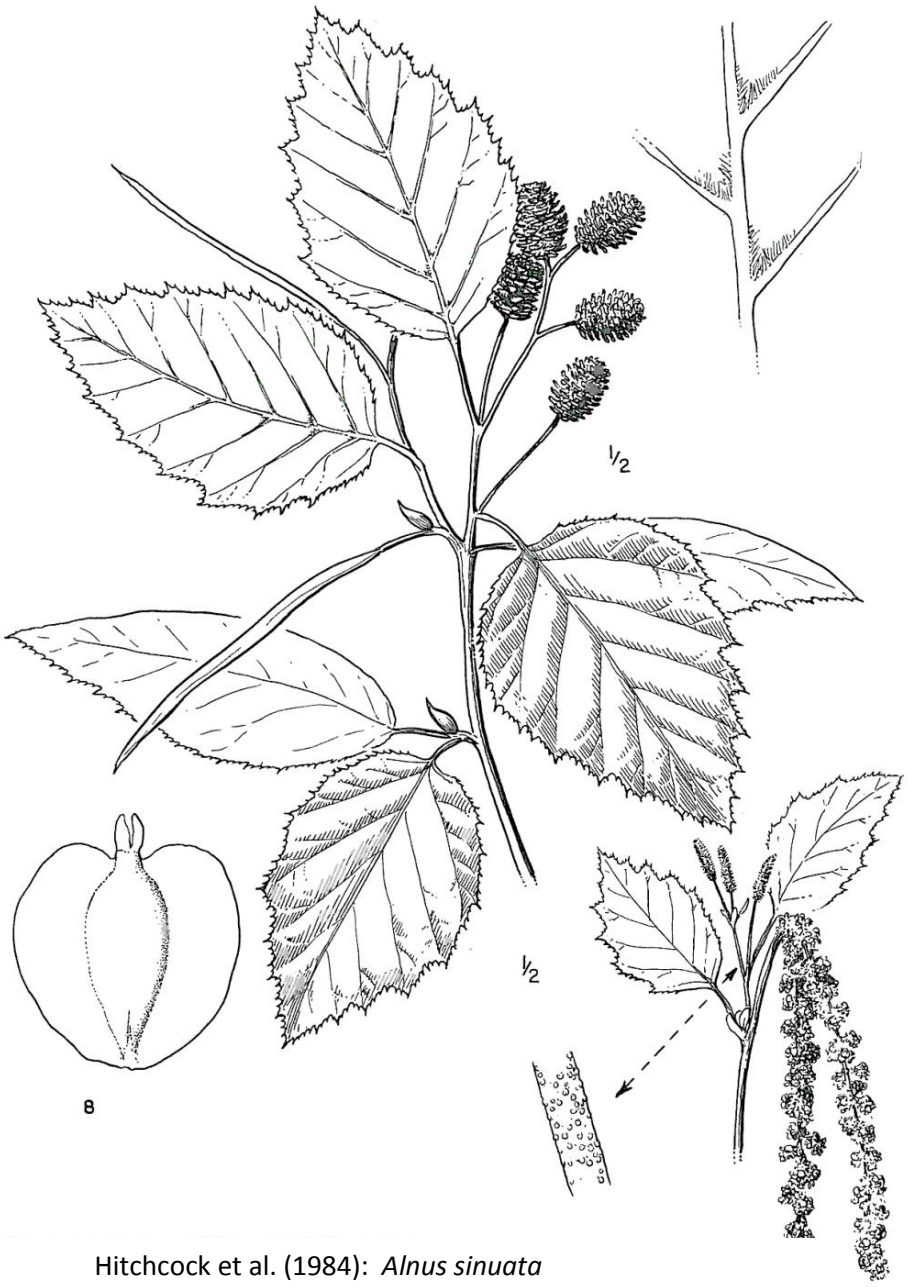
Acer circinatum

Acer circinatum from Hitchcock et al. (1984)

Acer circinatum is widely distributed in mesic forests of the montane zone, but can form extensive shrub fields in rocky soils or lava flows, typically on warmer south-facing aspects.

Shrubs PLANTS code: ALVIS

Alnus viridis ssp. *sinuata*



Hitchcock et al. (1984): *Alnus sinuata*
PLANTS Database: *Alnus viridis* (Chaix) DC. ssp. *sinuata* (Regel) Á. Löve & D. Löve

Alnus viridis ssp. *sinuata* is a tall shrub that forms dense thickets on relatively steep rocky slopes with north-facing exposures—montane environments that experience snow creep or periodic avalanches. It can also occur in cool, moist sites within wet meadow basins.

Shrubs PLANTS code: ARNE

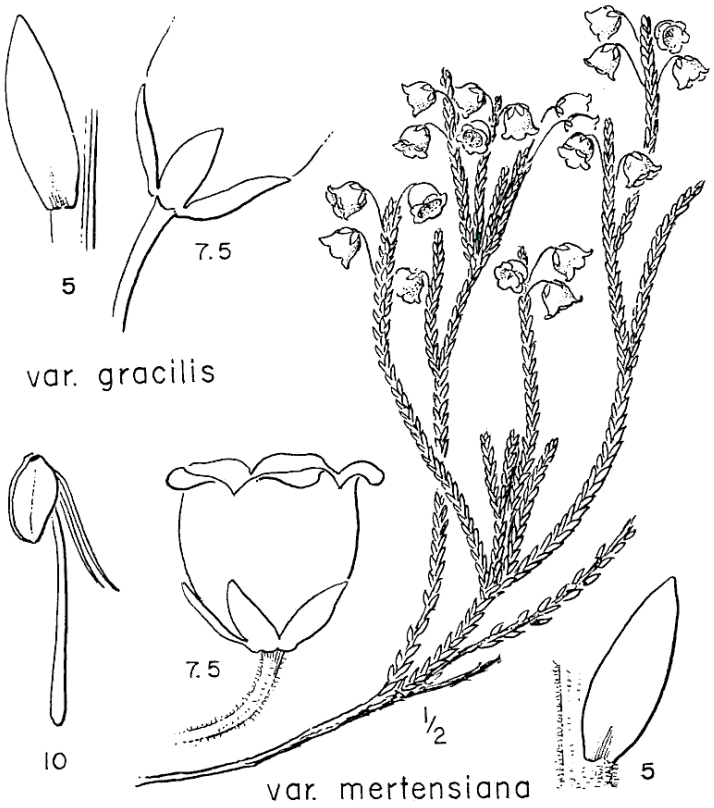
Arctostaphylos nevadensis

Arctostaphylos nevadensis from Hitchcock et al. (1984)

Arctostaphylos nevadensis is a dense, mat-forming shrub that characterizes warm, dry sites and thin, rocky soils in both the montane and subalpine zones.

Shrubs PLANTS code: CAME7

Cassiope mertensiana



Cassiope mertensiana from Hitchcock et al. (1984)

Cassiope mertensiana is one of several subalpine heather species. It is a low-growing shrub associated with cool, moist slopes or flats, often among boulders, and is indicative of fairly late-lying snow.

Shrubs PLANTS code: ERGR16

Ericameria greenei

Hitchcock et al. (1984): *Haplopappus greenii*
PLANTS Database: *Ericameria greenei* (A. Gray) G.L. Nesom.

Ericameria greenei is a low, broad shrub with a wide elevational distribution. In northern Oregon, it characterizes steep, exposed subalpine to alpine slopes with dry, gravelly (often disturbed) soils.

Shrubs PLANTS code: KAMI

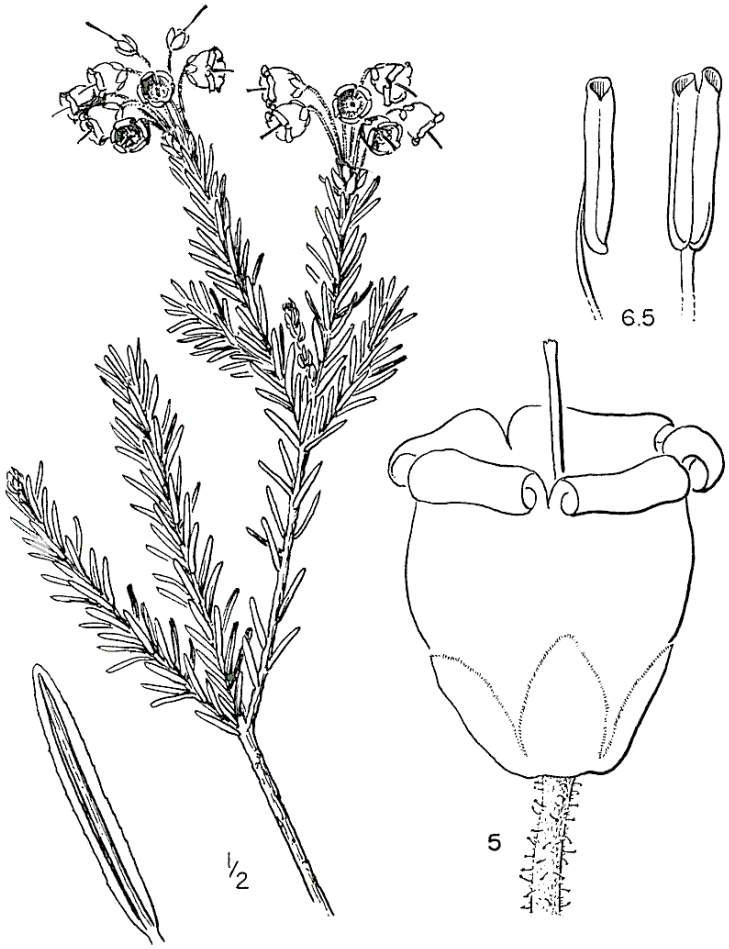
Kalmia microphylla

Hitchcock et al. (1984): *Kalmia polifolia* var. *microphylla*
PLANTS Database: *Kalmia microphylla* (Hook.) A. Heller

Kalmia microphylla is a short, spreading shrub that occurs in subalpine and alpine meadows and bogs. It is indicative of a high water table, late-lying snow, and a short growing season.

Shrubs PLANTS code: PHEM

Phyllodoce empetriformis

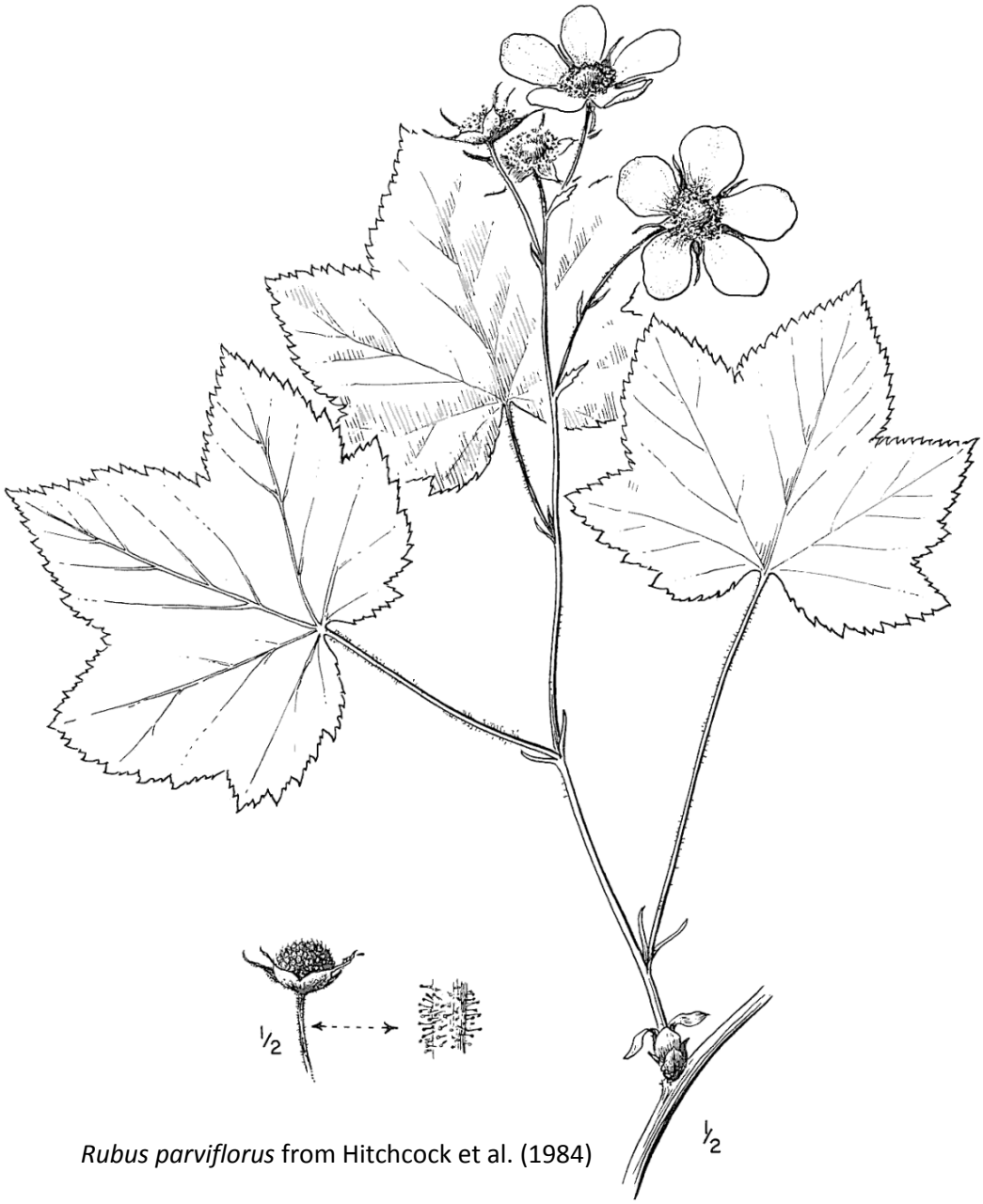


Phyllodoce empetriformis from Hitchcock et al. (1984)

Phyllodoce empetriformis is one of several subalpine heather species. It is a low-growing shrub associated with cool, well-drained sites, often in association with talus or boulders. It is indicative of fairly late-lying snow.

Shrubs PLANTS code: RUPA

Rubus parviflorus

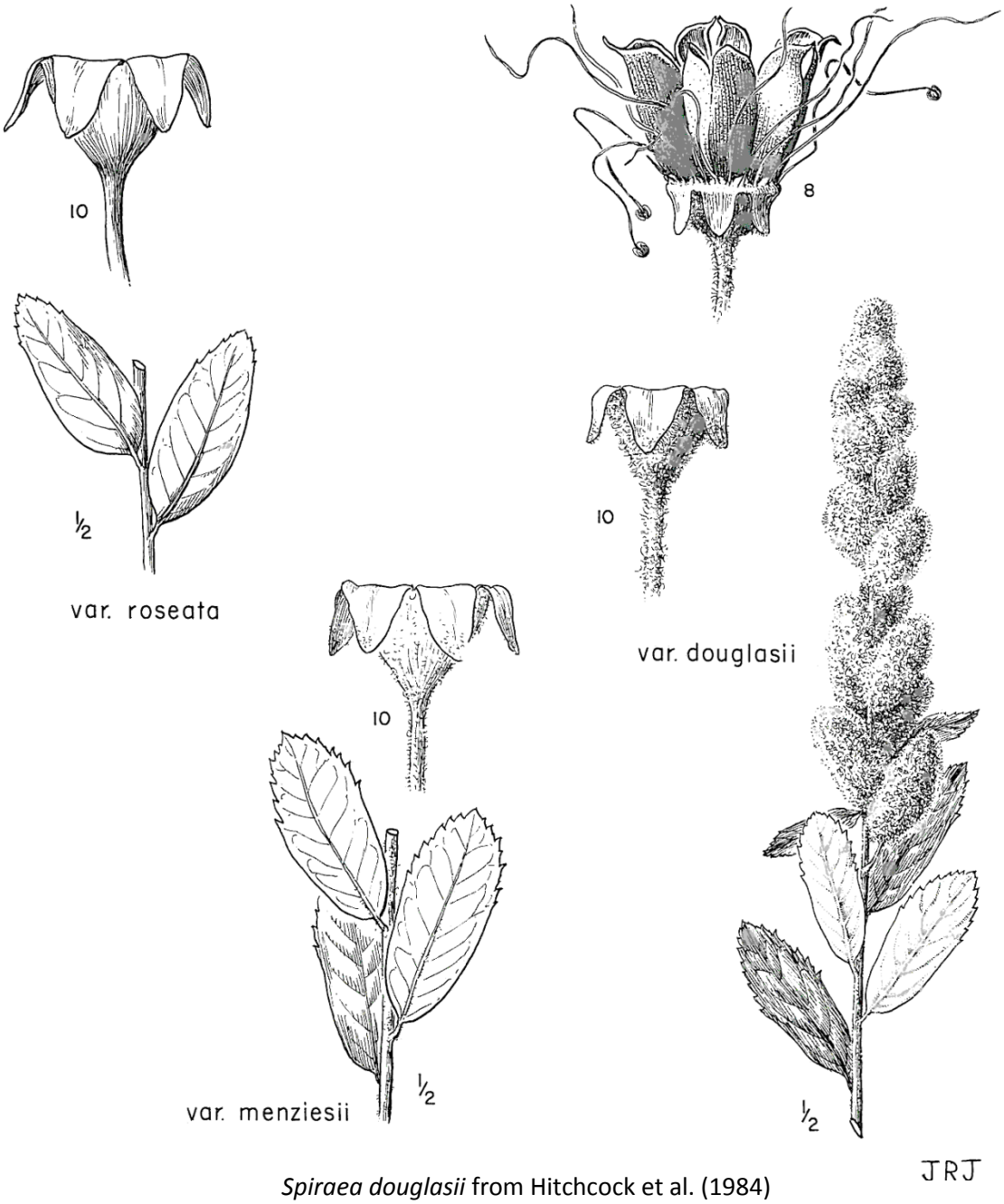


Rubus parviflorus from Hitchcock et al. (1984)

Rubus parviflorus is a widely distributed species of moderate shade tolerance. It highly rhizomatous and can form extensive shrub fields on moderate to steep, warm mesic slopes in the montane zone.

Shrubs PLANTS code: SPDO

Spiraea douglasii



Spiraea douglasii from Hitchcock et al. (1984)

Spiraea douglasii is a tall, strongly rhizomatous shrub that can form dense thickets in seasonally flooded bottom lands and poorly drained flats in the montane zone.

Shrubs PLANTS code: VAUL

Vaccinium uliginosum

Hitchcock et al. (1984): *Vaccinium occidentale*
PLANTS Database: *Vaccinium uliginosum* L.

Vaccinium uliginosum is a moderately tall shrub characteristic of wet montane basins or flats. It is usually found on elevated microsites among forb- and graminoid-dominated communities.

Grasses, sedges, and rushes PLANTS code: AGPA8

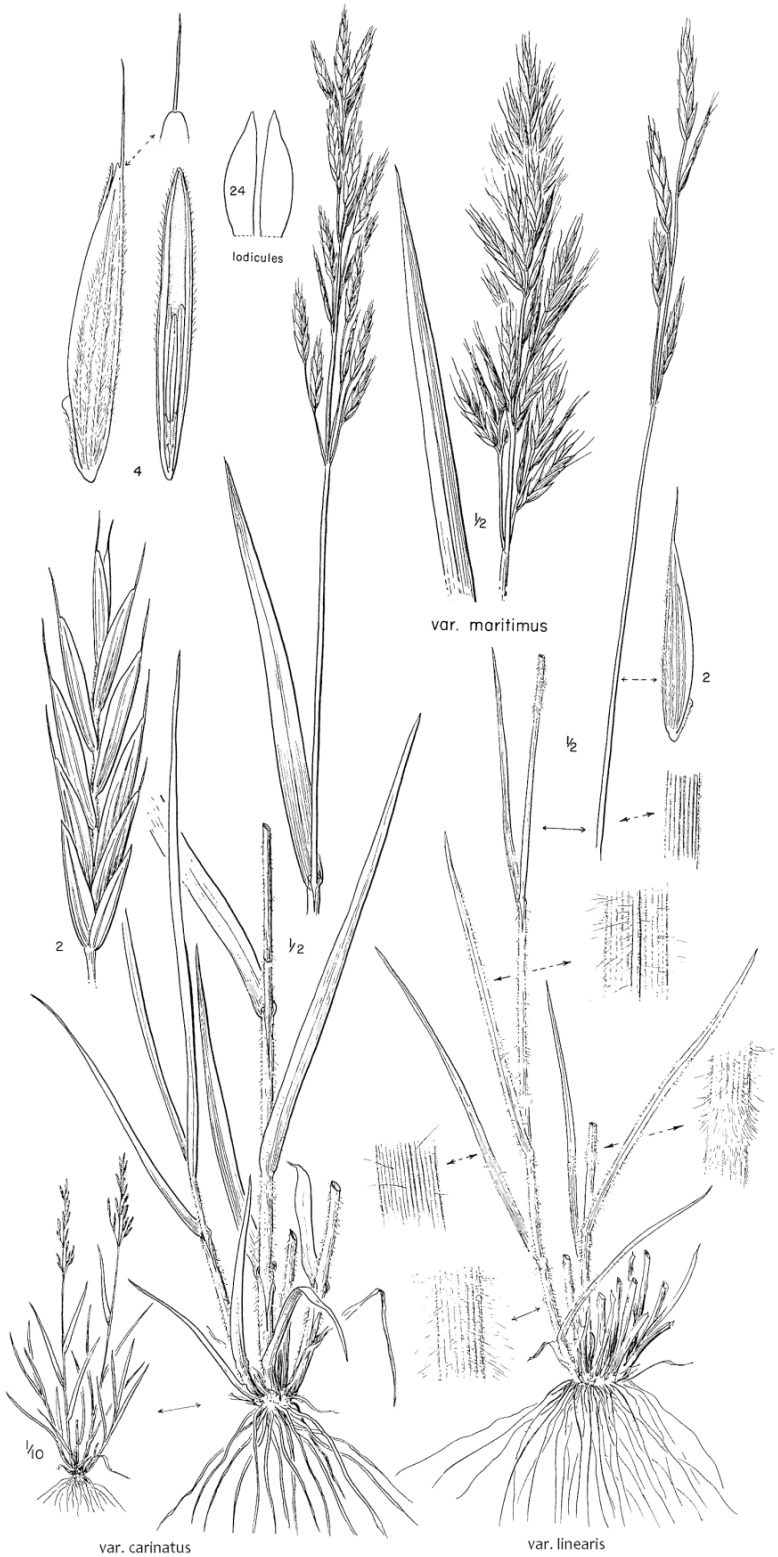
Agrostis pallens

Hitchcock et al. (1984): *Agrostis diegoensis*
PLANTS Database: *Agrostis pallens* Trin.

Agrostis pallens is a tufted perennial grass with a well-developed rhizome. It occurs on dry to moist meadow slopes in the montane and subalpine zones.

Grasses, sedges, and rushes PLANTS code: BRCA5

Bromus carinatus



Bromus carinatus from Hitchcock et al. (1984)

Bromus carinatus is a short-lived perennial grass (sometimes annual or biennial) with a broad elevational range. It is common in mesic to dry montane meadows with relatively deep soils.

Grasses, sedges, and rushes

PLANTS code: CAAQD

Carex aquatilis var. *dives*

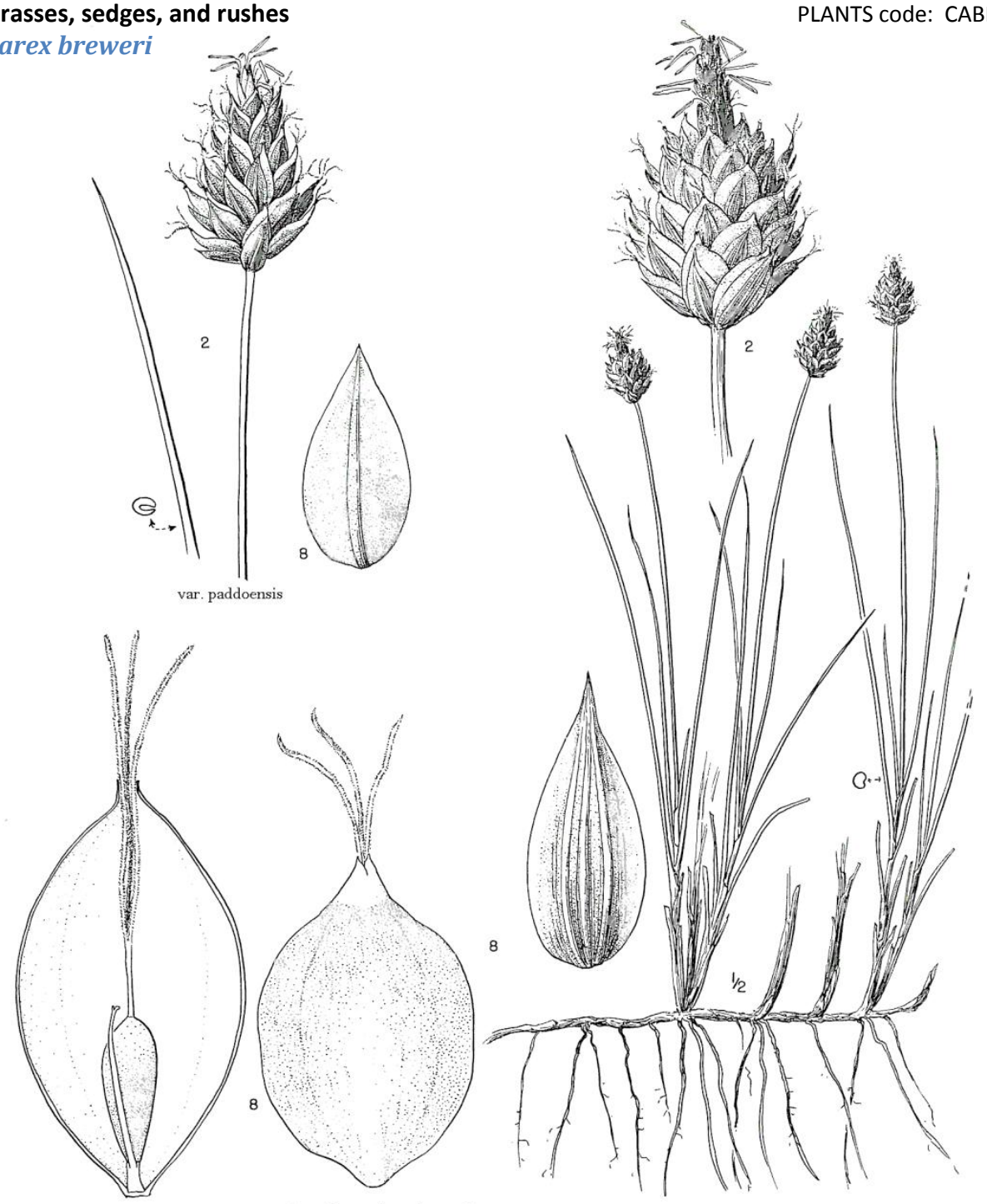
Carex aquatilis var. *dives* is a tall highly rhizomatous sedge that grows in swamps and wet meadows and along lake shores, at low to moderate elevations (montane zone). It is indicative of a seasonally or perennially high water table.

Hitchcock et al. (1984): *Carex sitchensis*

PLANTS Database: *Carex aquatilis* Wahlenb. var. *dives* (T. Holm) Kük.

Grasses, sedges, and rushes PLANTS code: CABR12

Carex breweri

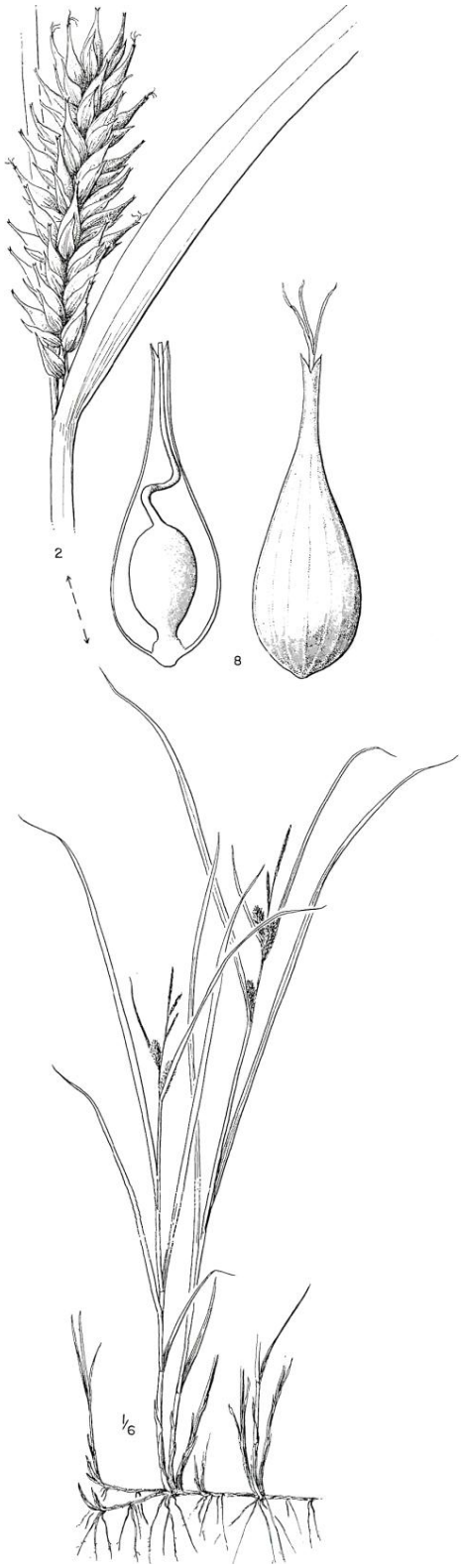


Carex breweri from Hitchcock et al. (1984)

Carex breweri is a short, rhizomatous sedge found in meadows, basins, and open slopes in the subalpine and alpine zones. It occurs on coarse, gravelly or rocky soils in exposed, erosional environments.

Grasses, sedges, and rushes PLANTS code: CAEX5

Carex exsiccata



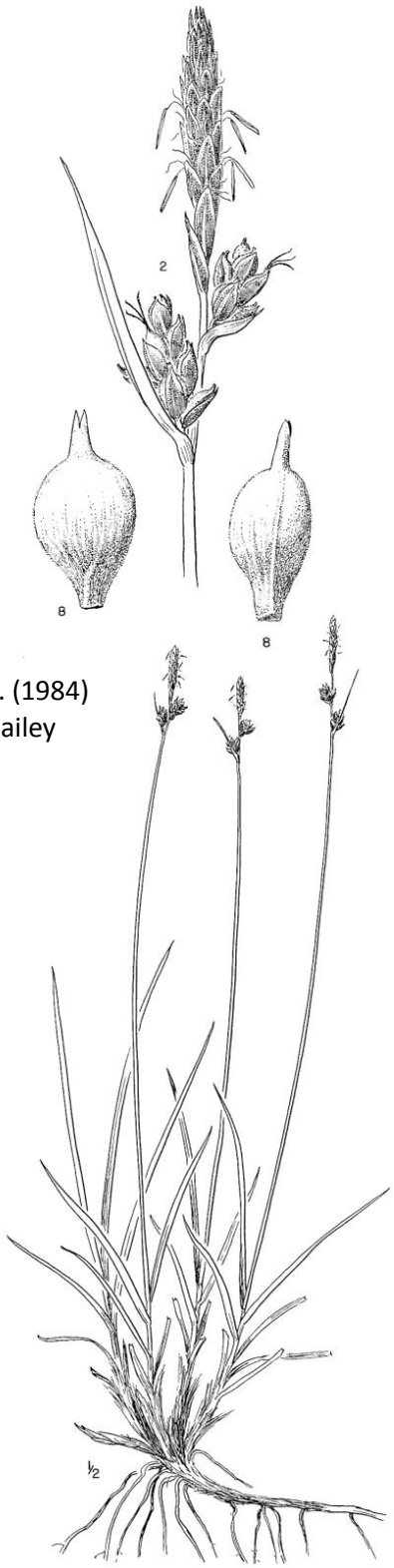
Hitchcock et al. (1984): *Carex vesicaria*
PLANTS Database: *Carex exsiccata* L.H. Bailey

Carex exsiccata is a tall, rhizomatous sedge that grows in damp soil or standing water in wet meadows or bogs and at the margins of ponds or streams, at low to moderate elevations (montane zone).

Note: Recent taxonomic changes affect the identification of *C. vesicaria*— typically *C. vesicaria* on the east side of the Cascades and *C. exsiccata* (old *C. vesicaria* var. *major*) on the west side. The Oregon Flora Project (http://www.oregonflora.org) lists voucher specimens of both species along the Cascade crest. Although we treat most occurrences as *C. exsiccata*, users are cautioned that applying the name along the Cascade crest is problematic.

Grasses, sedges, and rushes PLANTS code: CAIN9

Carex inops



Carex pensylvanica from Hitchcock et al. (1984)
PLANTS Database: *Carex inops* L.H. Bailey

Carex inops is a strongly rhizomatous sedge of relatively short to medium stature. It is fairly shade tolerant (persisting under tree cover) and responds positively to disturbance through vegetative regrowth and germination from the soil seed bank. It occurs throughout the montane and lower subalpine zones, but is most abundant on mesic to dry, south-facing slopes with moderately deep to relatively shallow soils.

Grasses, sedges, and rushes PLANTS Code: CALE8

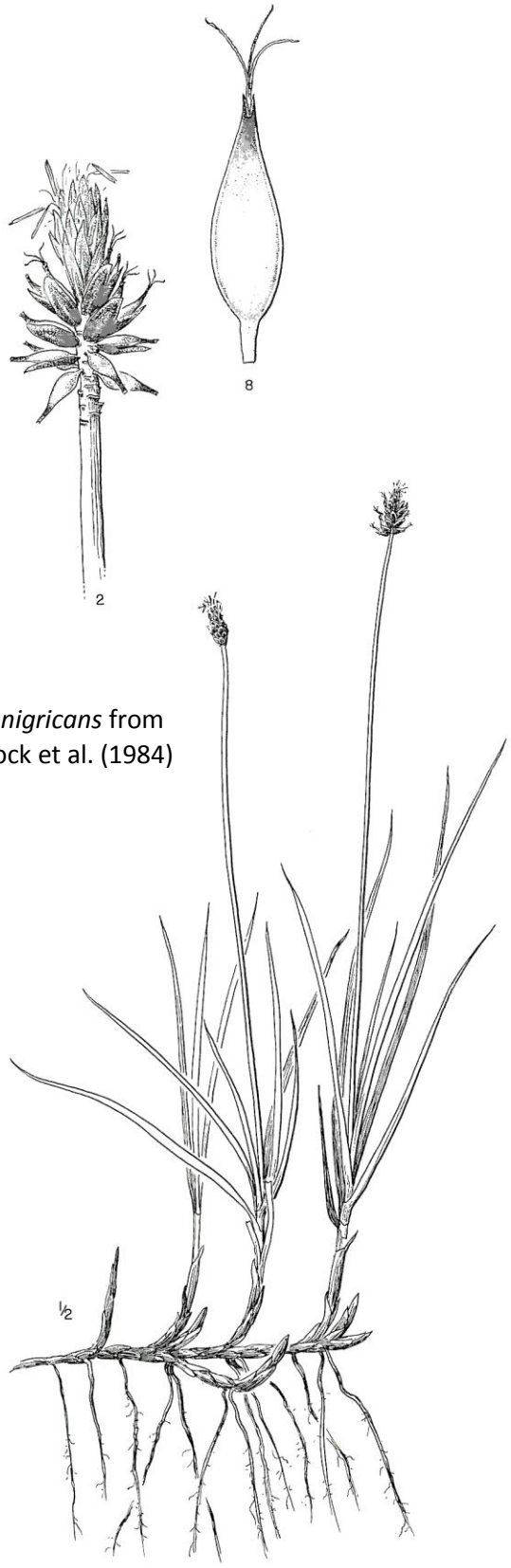
Carex lenticularis

Carex lenticularis from Hitchcock et al. (1984)

Carex lenticularis is a tall, densely tufted sedge that grows in wet meadows and along stream banks and lake shores from sea level to moderate elevations in the mountains (montane zone). It is indicative of a high water table.

Grasses, sedges, and rushes PLANTS code: CANI2

Carex nigricans



Carex nigricans from Hitchcock et al. (1984)

Carex nigricans is short, rhizomatous, turf-forming sedge that grows in moist meadows, basins, and depressions in the subalpine zone. It is indicative of late-lying snow and a short growing season.

Grasses, sedges, and rushes PLANTS code: CASC12

Carex scopulorum

Carex scopulorum from Hitchcock et al. (1984)

Carex scopulorum is a short, strongly rhizomatous, sod-forming sedge that grows in wet meadows and along stream banks and lake shores in the subalpine and alpine zones. It is indicative of cold, seasonally to perennially saturated soils.

Grasses, sedges, and rushes PLANTS code: CASP5

Carex spectabilis

Carex spectabilis from Hitchcock et al. (1984)

Carex spectabilis is a moderately tall sedge with a tufted growth form; shoots emerge from a system of short, stout branching rhizomes. It grows in mesic to moist meadows on gentle slopes or in basins at moderate to high elevations in the subalpine zone.

Grasses, sedges, and rushes PLANTS code: CAUT

Carex utriculata

Hitchcock et al. (1984): *Carex rostrata*
PLANTS Database: *Carex utriculata* Boott.

Carex utriculata is tall, erect sedge whose stems arise singly or in small groups from a stout, deeply seated and elongate rhizome. It grows in wet soil or shallow to deep water at the margins of streams, lakes, and ponds, and in swamps or wet meadows, from the lowlands to moderate elevations in the mountains. It is an indicator of saturated soils, often high in organic matter.

Grasses, sedges, and rushes PLANTS code: DECE

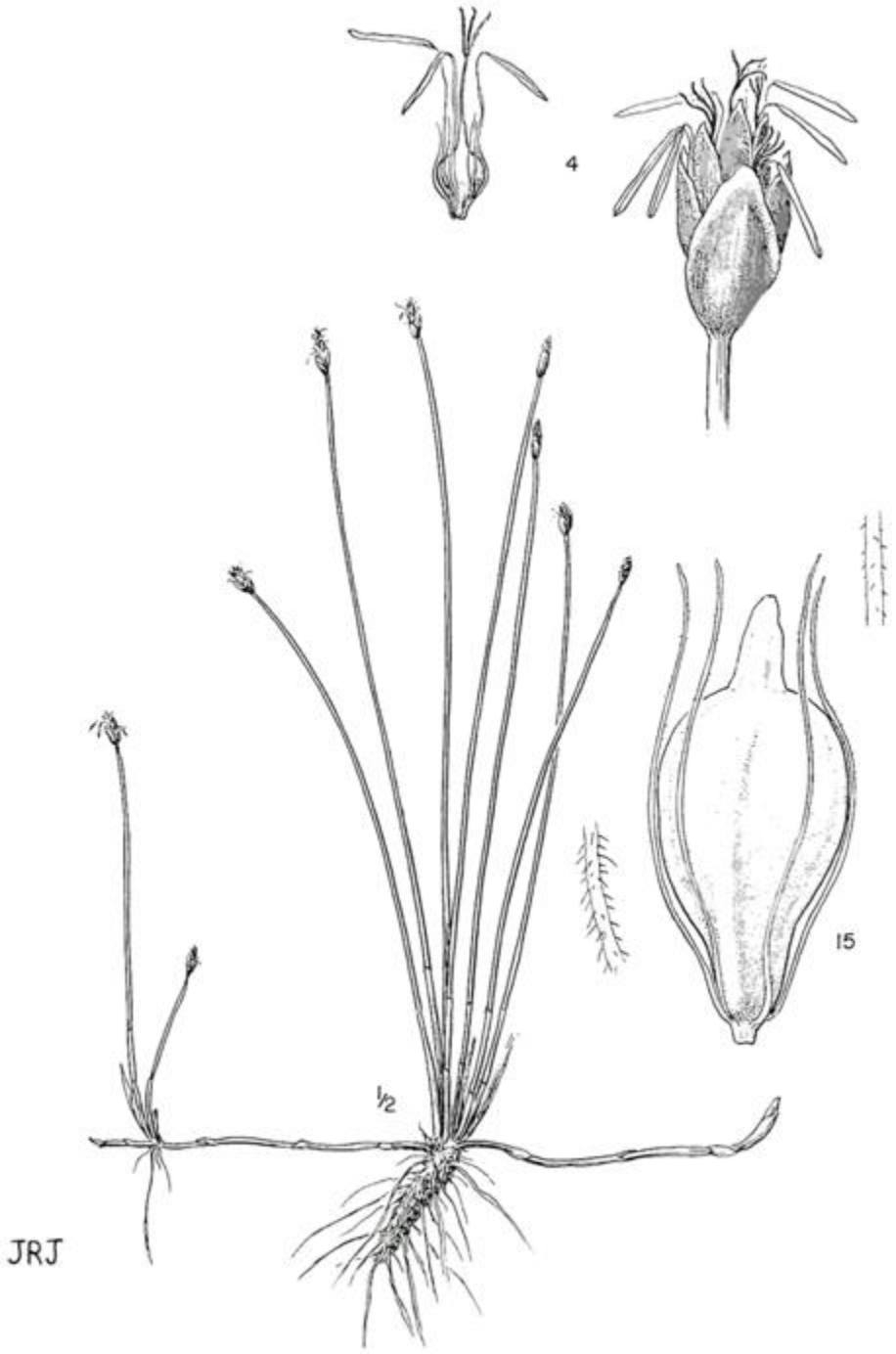
Deschampsia cespitosa

Hitchcock et al. (1984): *Deschampsia caespitosa*
PLANTS Database: *Deschampsia cespitosa* (L.) P. Beauv.

Deschampsia cespitosa is a tall, strongly caespitose perennial grass with a broad elevational distribution (coastal to subalpine). In the Cascades Range it is common and often dominant in seasonally wet meadows, basins, and poorly drained flats in the montane and lower subalpine zones.

Grasses, sedges, and rushes PLANTS code: ELQU2

Eleocharis quinqueflora



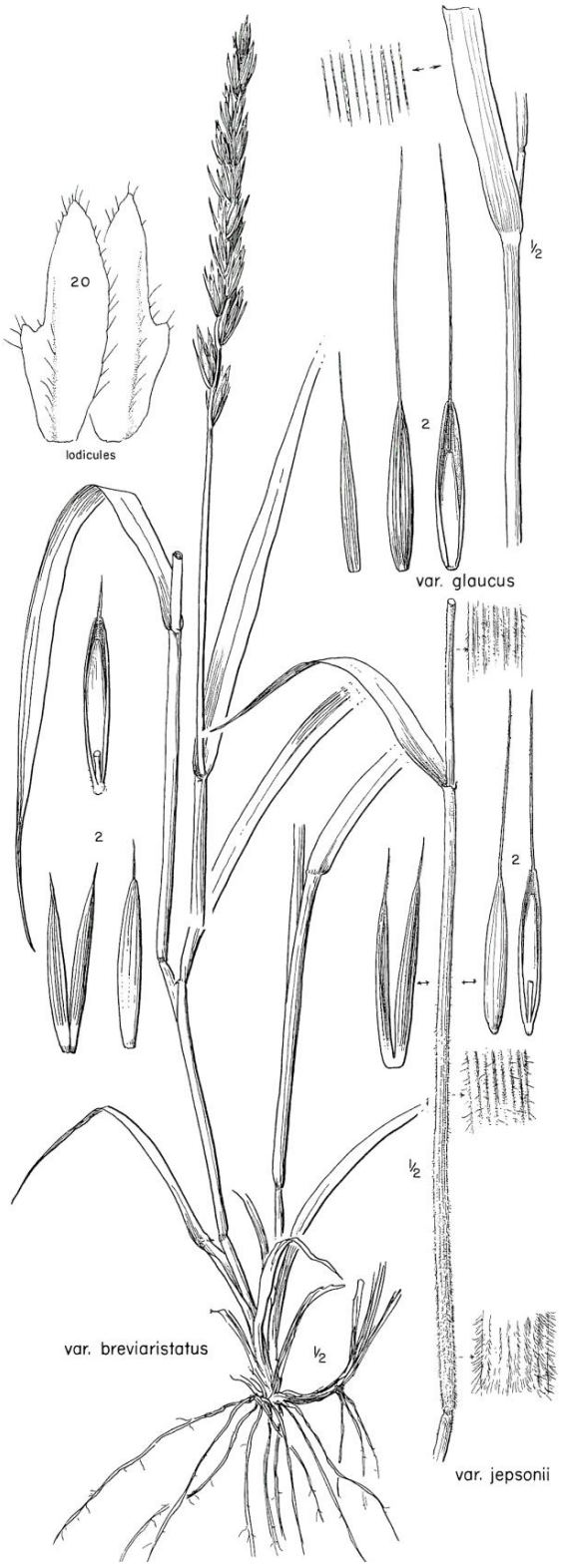
Hitchcock et al. (1984): *Eleocharis pauciflora*
PLANTS Database: *Eleocharis quinqueflora* (Hartmann) O. Schwarz.

Eleocharis quinqueflora is a relatively short-statured spike rush. It has clustered stems that arise from short, stout rhizomes—the latter connected by more slender, elongate rhizomes. It grows in bogs or wet meadows of the montane and lower subalpine zones, where the water table remains elevated during the growing season.

Grasses, sedges, and rushes PLANTS code: ELGL

Elymus glaucus

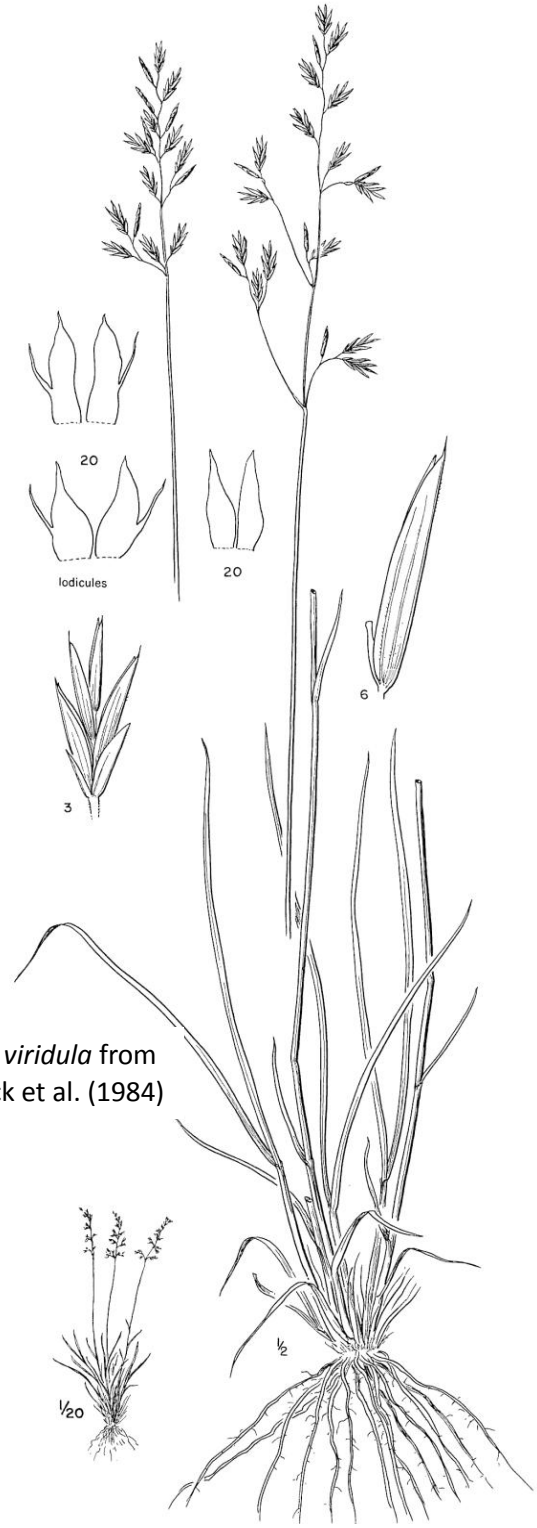
Elymus glaucus is a tall, caespitose perennial grass that forms relatively narrow clumps. It has a broad elevational range, but is typically found in the montane zone on gentle to moderately steep, mesic slopes with relatively deep soils.



Elymus glaucus from Hitchcock et al. (1984)

Grasses, sedges, and rushes PLANTS code: FEVI

Festuca viridula



Festuca viridula from Hitchcock et al. (1984)

Festuca viridula is a caespitose perennial grass of moderate stature. It is widely distributed in the upper montane and subalpine zones. It occurs on moderate to steep slopes with generally warmer aspects and deep, well-drained soils.

Grasses, sedges, and rushes PLANTS code: GLST

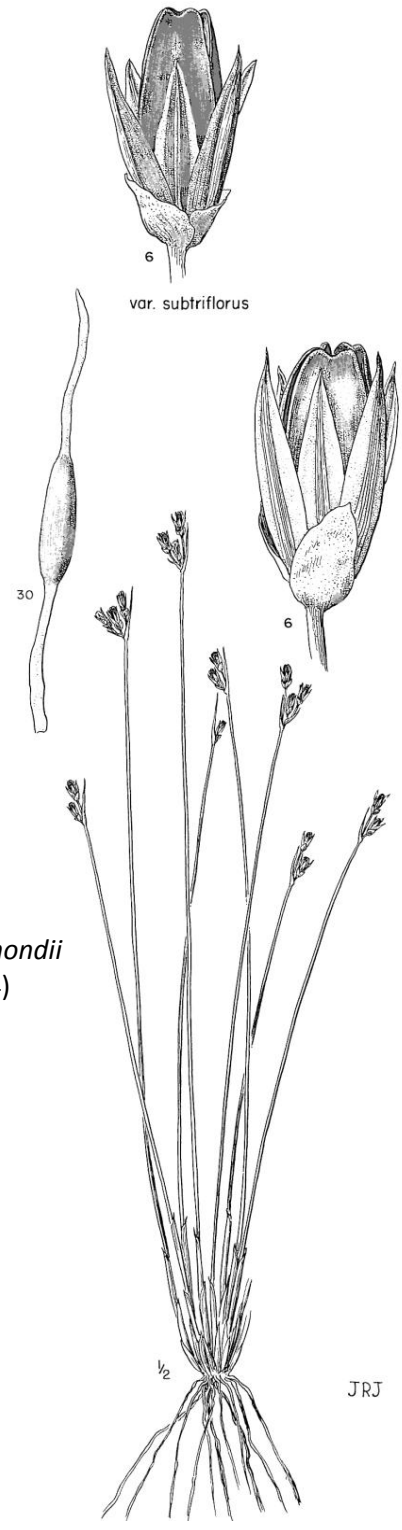
Glyceria striata

Hitchcock et al. (1984): *Glyceria elata*
PLANTS Database: *Glyceria striata* (Lam.) Hitchc.

Glyceria striata is a tall, strongly tufted, rhizomatous perennial grass. It grows in wet meadows and basins and along stream and lake margins in the montane zone. It is indicative of seasonally moist to perennially saturated, organic soils.

Grasses, sedges, and rushes PLANTS code: JUDR

Juncus drummondii

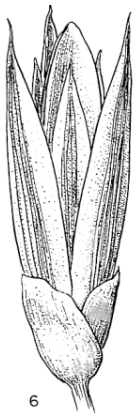


Juncus drummondii var. *drummondii*
from Hitchcock et al. (1984)

Juncus drummondii is a strongly tufted, perennial rush that forms small mats. It occurs in the subalpine and alpine zones in cool, wet environments with rocky soils, including wet meadows, snowmelt channels, and other areas with late-lying snow.

Grasses, sedges, and rushes PLANTS code: JUPA

Juncus parryi

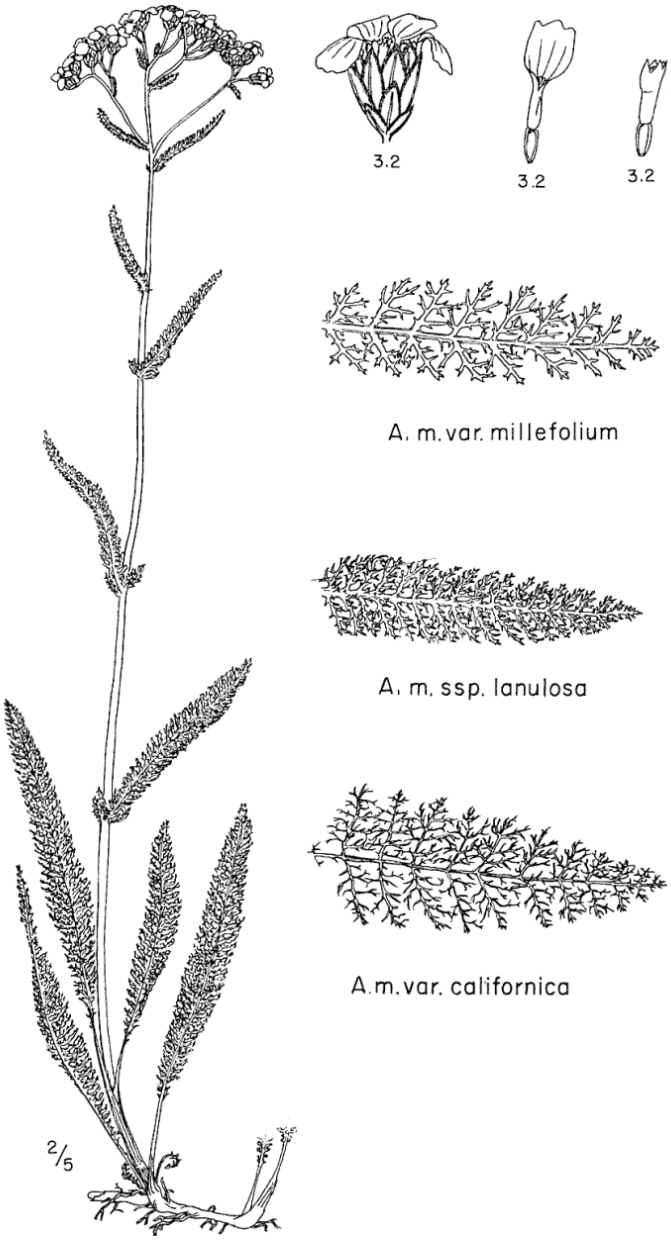


Juncus parryi from Hitchcock et al. (1984)

Juncus parryi is a strongly tufted perennial rush that forms small mats. It is common on gentle slopes and flats in the subalpine zone. It is indicative of relatively dry sites with coarse soils.

Forbs PLANTS code: ACMI2

Achillea millefolium



Achillea millefolium from Hitchcock et al. (1984)

Achillea millefolium is a strongly rhizomatous perennial forb with a broad environmental distribution. It occurs in the montane and subalpine zones on relatively warm sites with coarser textured soils. It often increases with disturbance or grazing.

Forbs PLANTS code: CASU2

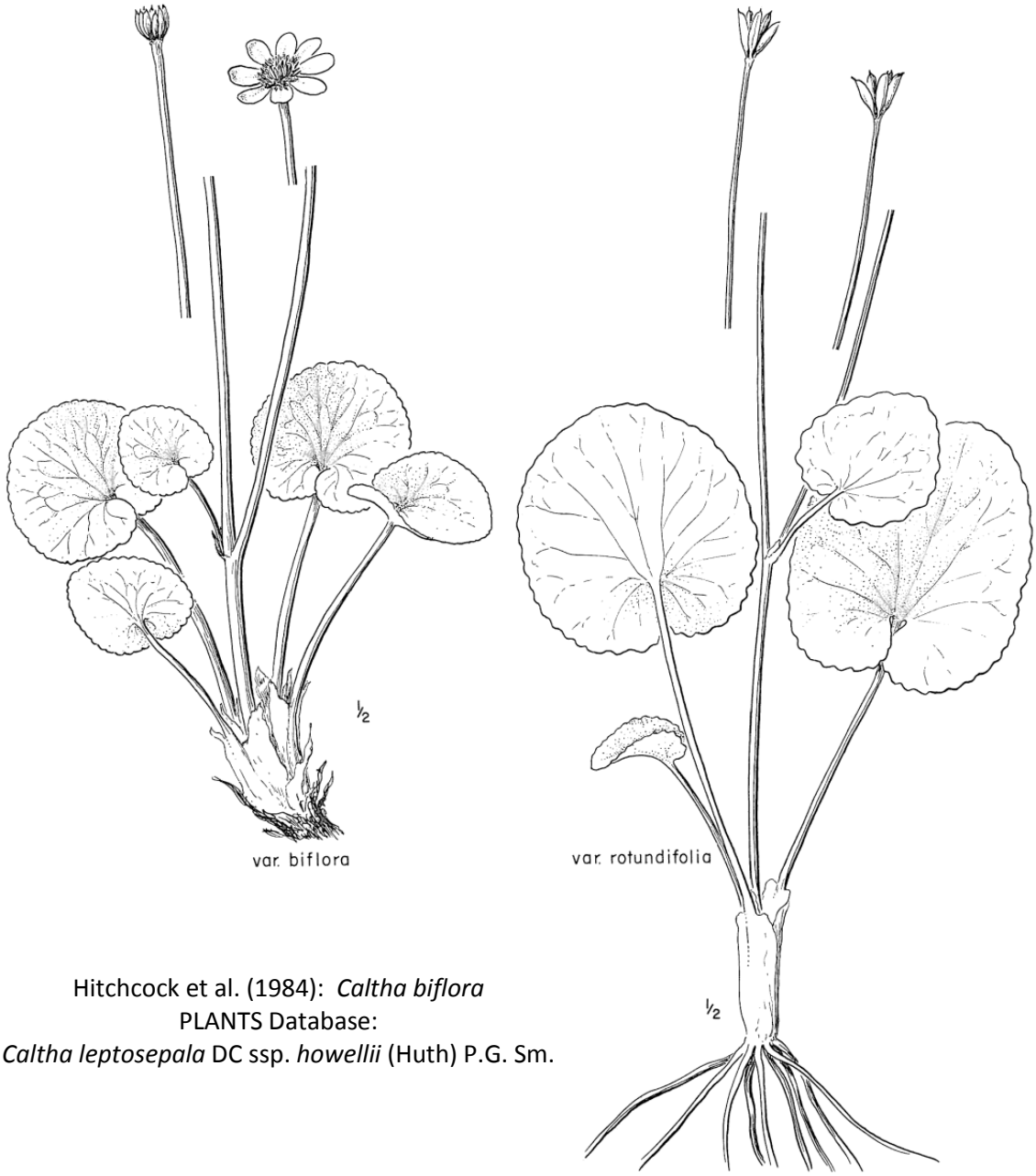
Calochortus subalpinus

Calochortus subalpinus from Hitchcock et al. (1984)

Calochortus subalpinus is a perennial forb that emerges from a deep-seated bulb and flowers early in the growing season. It occurs on steep slopes to flats in the upper montane and subalpine zones, typically on warmer sites with deep, coarse- to medium-textured soils.

Forbs PLANTS code: CALEH2

Caltha leptosepala ssp. *howellii*

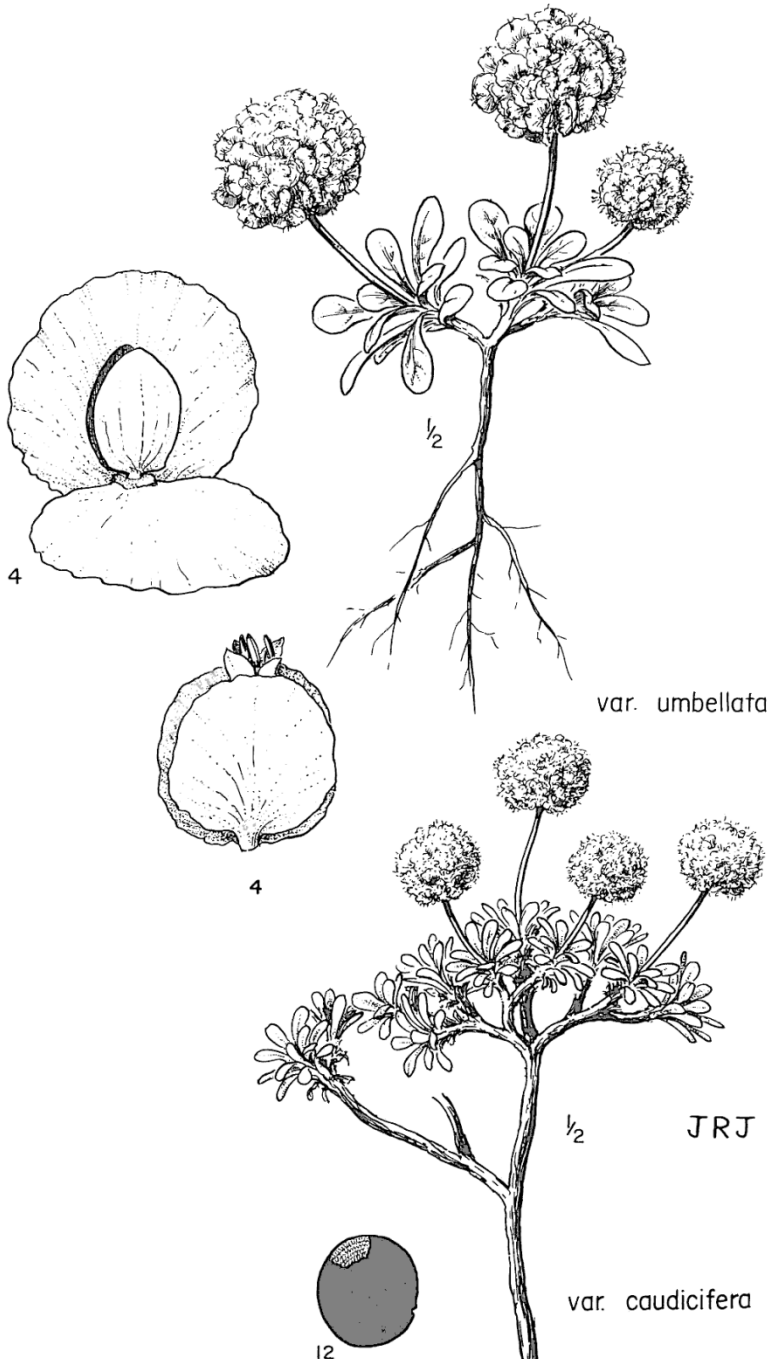


Hitchcock et al. (1984): *Caltha biflora*
PLANTS Database:
Caltha leptosepala DC ssp. *howellii* (Huth) P.G. Sm.

Caltha leptosepala ssp. *howellii* is a fleshy perennial herb that occurs in wet meadows of the montane and lower subalpine zones. It is often found growing in organic soils adjacent to small streams or runoff channels.

Forbs PLANTS code: CIUMU

Cistanthe umbellata var. *umbellata*



Cistanthe umbellata var. *umbellata* is an annual to perennial, mat-forming herb. It is indicative of harsh, dry environments in the subalpine and alpine zones. It is found on exposed slopes and flats characterized by coarse, volcanic (pumice) soils or erosional pavements.

Hitchcock et al. (1984): *Spraguea umbellata*
PLANTS Database: *Cistanthe umbellata* (Torr.) Hershkovitz var. *umbellata*

Forbs PLANTS code: DOJE

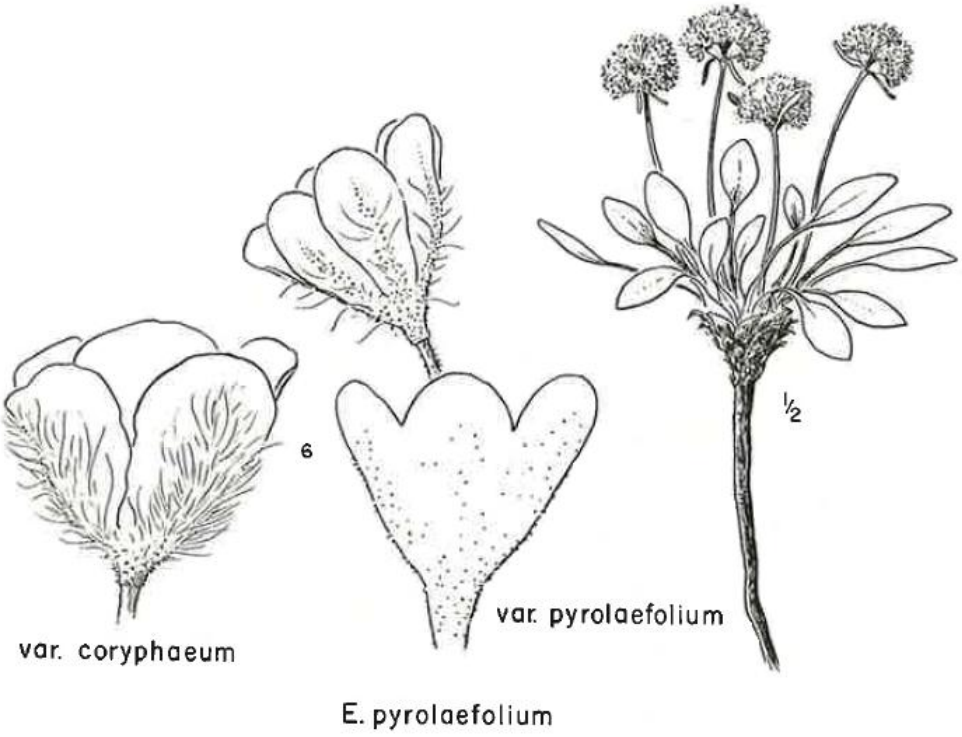
Dodecatheon jeffreyi

Dodecatheon jeffreyi from Hitchcock et al. (1984)

Dodecatheon jeffreyi is a fleshy, perennial herb that can form extensive clumps connected by slender rootstocks. It occurs in wet meadows and bogs or along stream channels in the montane and subalpine zones, in both seasonally and perennially saturated soils.

Forbs PLANTS code: ERPY2

Eriogonum pyrolaefolium



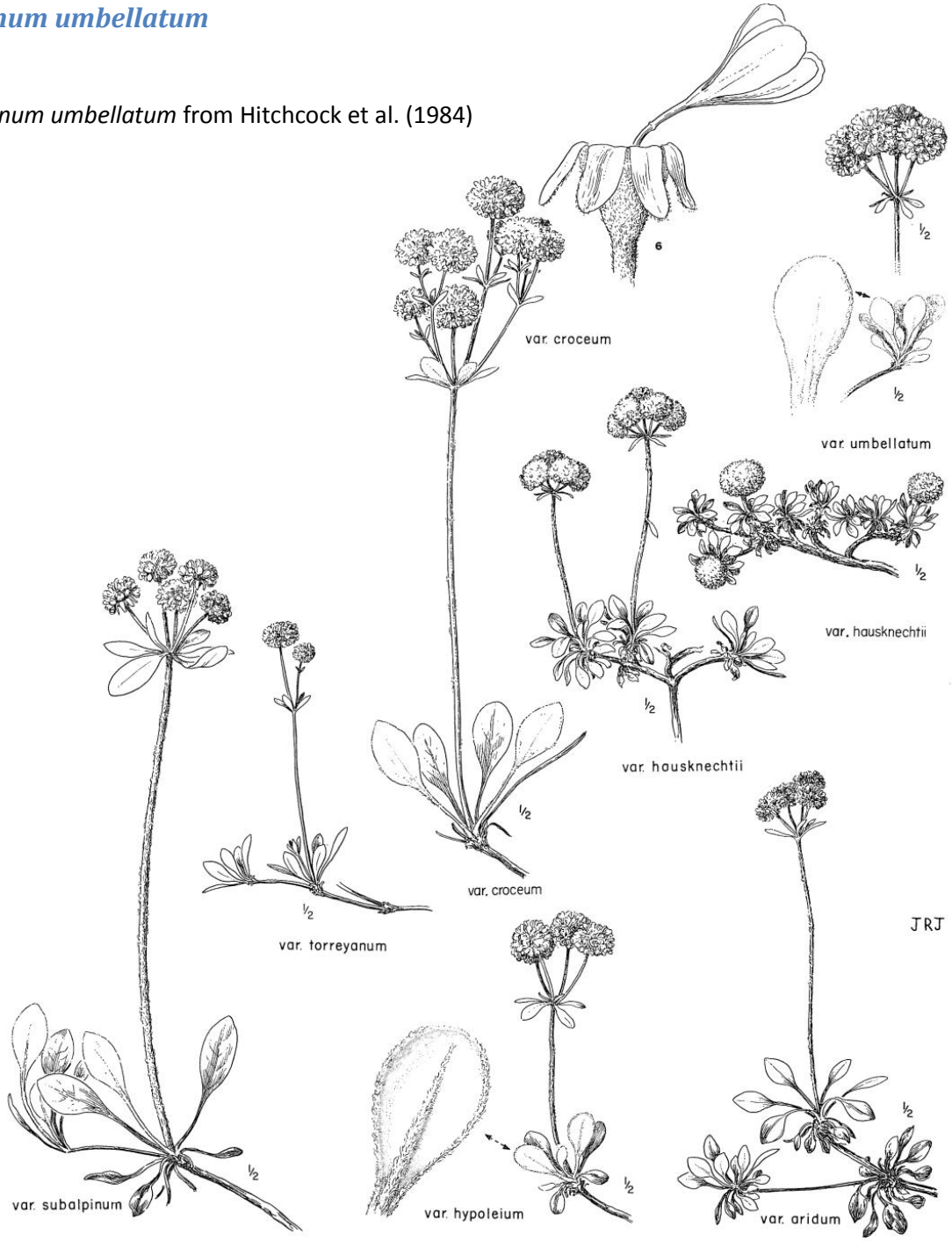
Eriogonum pyrolaefolium from Hitchcock et al. (1984)

Eriogonum pyrolaefolium is a perennial herb with a deep often exposed taproot and a simple to branched woody crown. It occurs in the subalpine and alpine zones on exposed and highly eroded flats or slopes with coarse volcanic soils (pumice or scoria).

Forbs PLANTS code: ERUM

Eriogonum umbellatum

Eriogonum umbellatum from Hitchcock et al. (1984)



Eriogonum umbellatum is a perennial, mat-forming herb with a deep taproot. It is one of the most variable species in western North America, with plants that flower in one of two distinct color phases (cream vs. light to deep yellow). It has a broad elevational distribution (montane to subalpine), but is typically found in dry, exposed habitats (upper slopes and ridgetops) with shallow, lithosolic (skeletal) or otherwise coarse soils.

Forbs PLANTS code: ERLA6

Eriophyllum lanatum

Eriophyllum lanatum from Hitchcock et al. (1984)

Eriophyllum lanatum is a short, multi-stemmed perennial forb that grows in dry, often disturbed habitats in the montane zone. It is commonly found on steep, south-facing slopes and ridge tops with lithosolic or skeletal soils ("rock-garden" habitats).

Forbs PLANTS code: EULEL2

Eucephalus ledophyllus var. *ledophyllus*

Eucephalus ledophyllus var. *ledophyllus* is a tall, perennial forb that emerges from a stout caudex. It has a broad elevational range (montane to subalpine) but is typically found in mesic to dry meadows with deep, coarse to loamy soils.

Hitchcock et al. (1984): *Aster ledophyllus*
PLANTS Database: *Eucephalus ledophyllus* (A. Gray) Greene var. *ledophyllus*

Forbs PLANTS code: HEMA80

Heracleum maximum

Hitchcock et al. (1984): *Heracleum lanatum*
PLANTS Database: *Heracleum maximum* W. Bartram

Heracleum maximum is tall perennial forb that emerges from a stout taproot or cluster of fibrous roots. It occurs in the montane zone in mesic to moist habitats with relatively good drainage, including toe-slopes, the margins of wet basins, stream terraces, alluvial benches, and lake margins.

Forbs PLANTS code: HYTE

Hydrophyllum tenuipes

Hydrophyllum tenuipes from Hitchcock et al. (1984)

Hydrophyllum tenuipes is a moderately tall, perennial forb that emerges from a short to elongate rhizome. It occurs in shrubby, shaded habitats in the montane zone, typically on moist, rocky flats or slopes where soil water is readily available.

Forbs PLANT code: LULA4

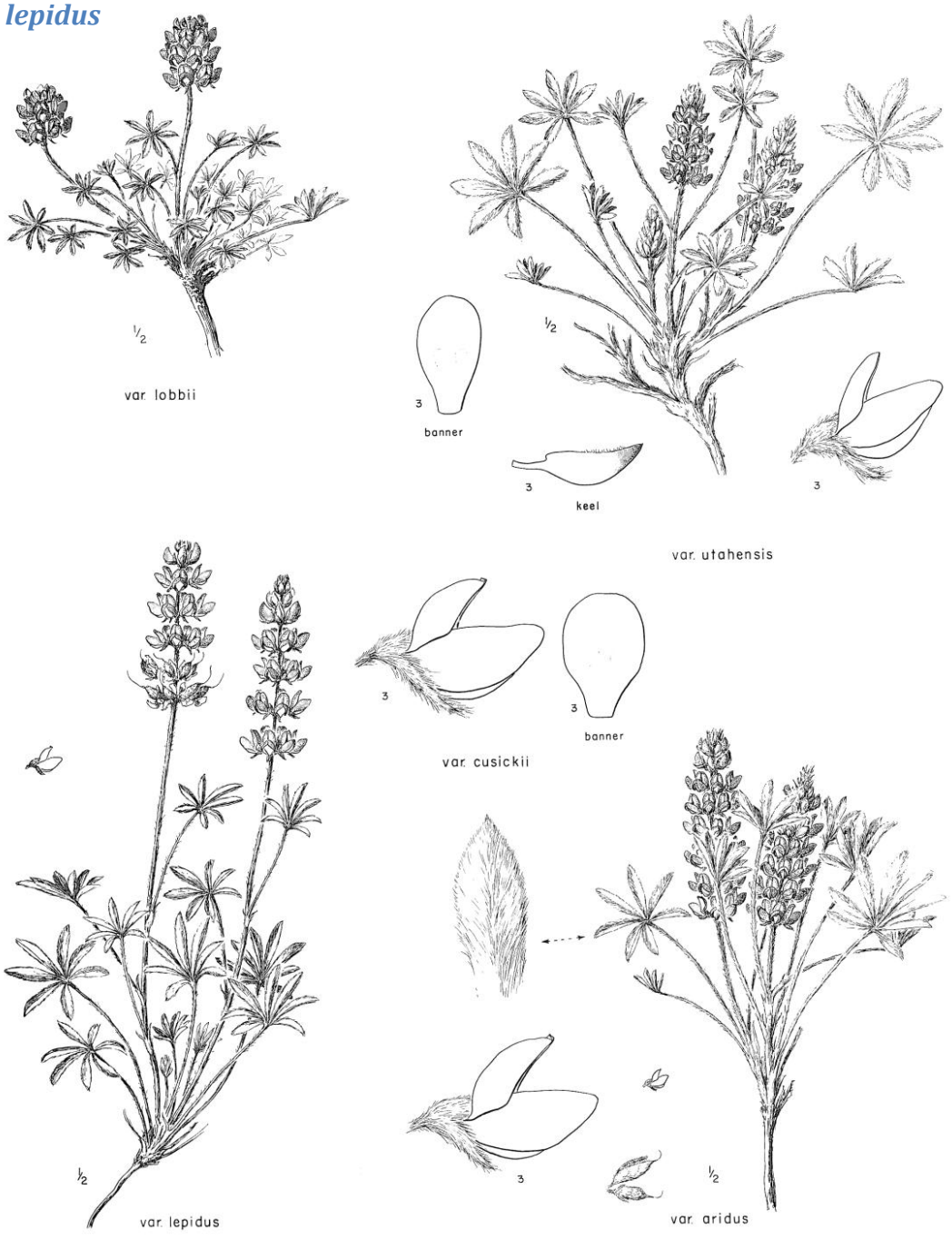
Lupinus latifolius

Lupinus latifolius from Hitchcock et al. (1984)

Lupinus latifolius is perennial forb of moderate stature that emerges from a deep, sometimes branching caudex. It has a broad elevational and habitat distribution. It can be found in relative dry montane meadows with deep coarse soils to cooler, moist-meadow habitats in the subalpine zone.

Forbs PLANT code: LULE2

Lupinus lepidus

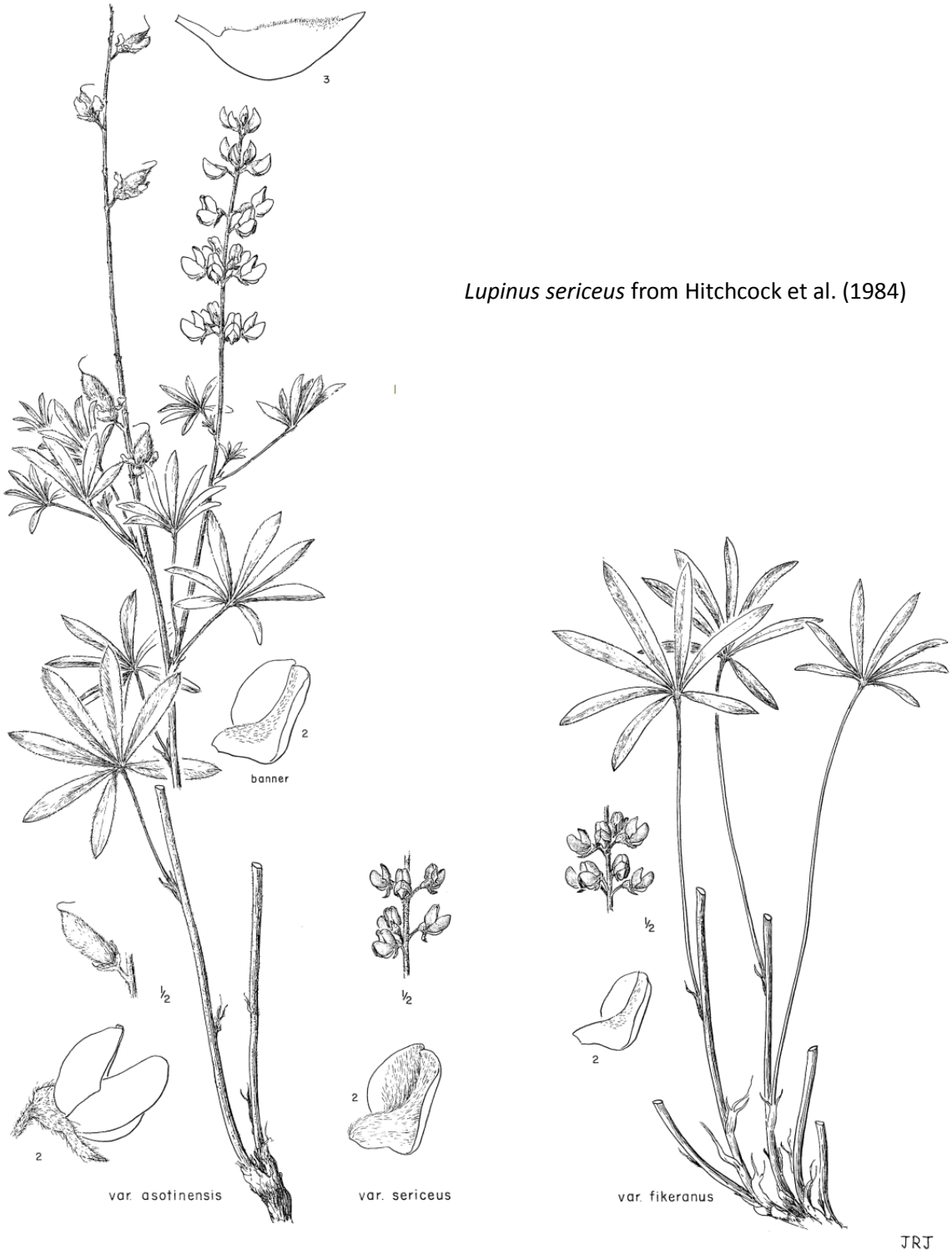


Lupinus lepidus from Hitchcock et al. (1984)

Lupinus lepidus is a low, often matted perennial forb that emerges from a stout caudex. It is found on flats or gentle to steep slopes in the subalpine or alpine zones. It is characteristic of dry exposed habitats with lithosolic (skeletal) or sandy (often pumice) soils.

Forbs PLANT code: LUSE4

Lupinus sericeus



Lupinus sericeus from Hitchcock et al. (1984)

Lupinus sericeus is perennial forb with multiple stems that emerge from a branching crown. It grows in dry, rocky or sandy soils on gentle to steep slopes in the subalpine and alpine zones.

Forbs PLANTS code: LUPE

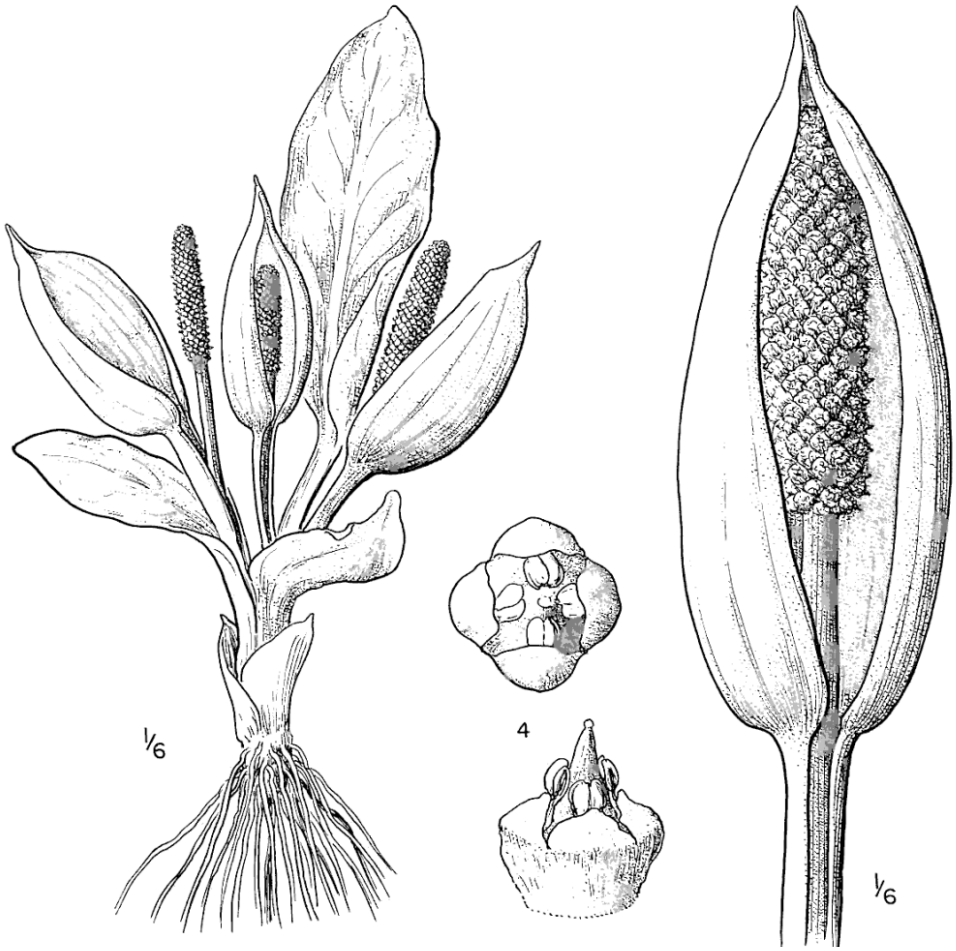
Luetkea pectinata

Luetkea pectinata from Hitchcock et al. (1984)

Luetkea pectinata is a trailing, evergreen semi-shrub (but treated as a forb here). It grows in moist or shaded habitats on gentle slopes or flats in the subalpine and alpine zones, often where snow persists late in the growing season.

Forbs PLANTS code: LYAM3

Lysichiton americanus



Hitchcock et al. (1984): *Lysichitum americanum*
PLANTS Database: *Lysichiton americanus* Hultén & H. St. John

Lysichiton americanus is a stout, perennial forb that emerges from a short, fleshy, underground stem to flower early in the growing season. It is fairly shade tolerant and can be found in association with taller woody plants. It commonly occurs in hydric montane basins with seasonally flooded to perennially saturated soils or along small perennial streams or floodplains.

Forbs PLANTS code: MILE2

Mimulus lewisii

Mimulus lewisii from Hitchcock et al. (1984)

Mimulus lewisii is a tall perennial forb with stems that emerge in clusters from a stout, branching rhizome. It is associated with streams, seeps, and steep snowmelt channels on coarse, rocky substrates in the subalpine and alpine zones.

Forbs PLANTS code: MITI

Mimulus tilingii

Mimulus tilingii from Hitchcock et al. (1984)

Mimulus tilingii a perennial herb that emerges from well-developed, often sod-forming rhizomes or stolons. It grows in very wet places in the subalpine and alpine zones. It is most often found on rocky substrates in or along small cold streams, seeps, or snowmelt channels.

Forbs PLANTS code: ORALA2

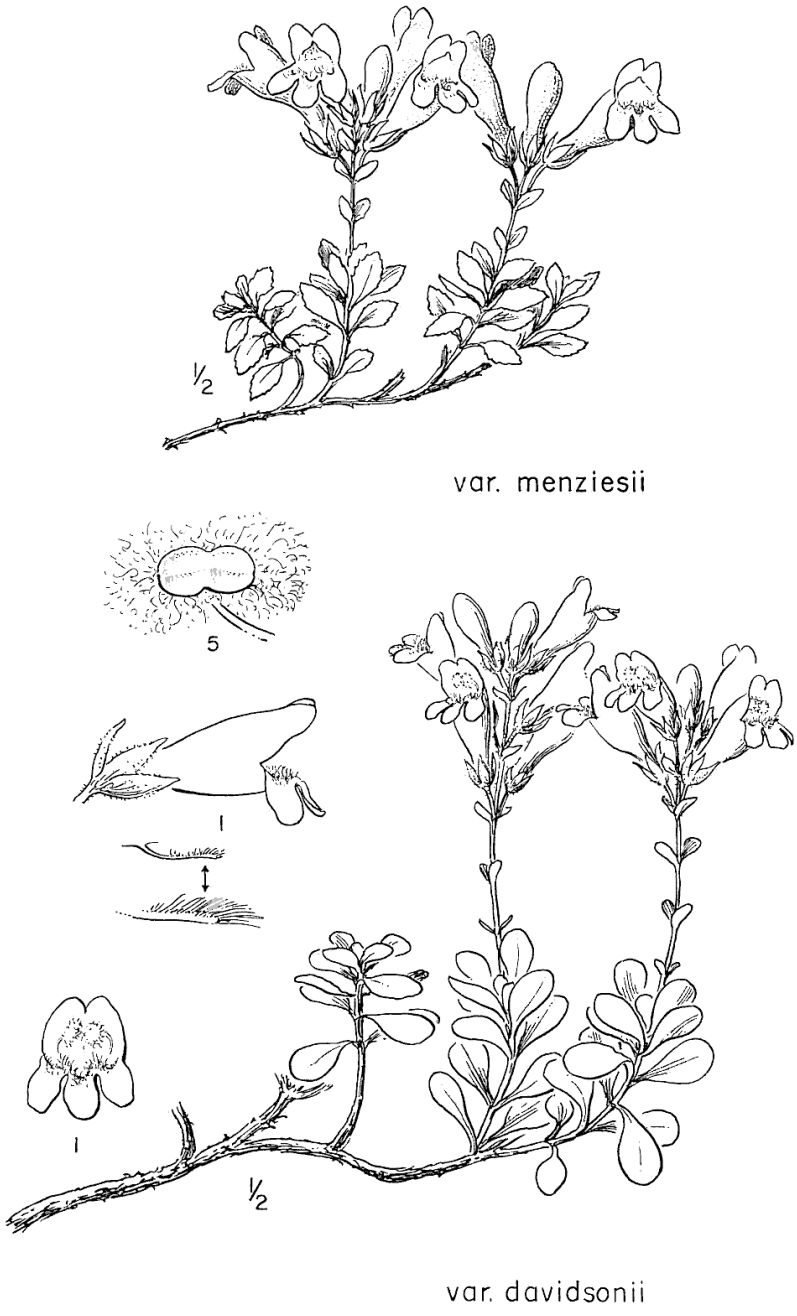
Oreostemma alpigenum var. *alpigenum*

Hitchcock et al. (1984): *Aster alpigenus*
PLANTS Database: *Oreostemma alpigenum* (Torr. & A. Gray) Greene var. *alpigenum*

Oreostemma alpigenum var. *alpigenum* is a short perennial forb with an erect, simple to branching caudex, often with a taproot. It has a broad distribution in the subalpine and alpine zones. It occurs in relatively moist, late snow-lie basins that are well-vegetated to open basins and flats on drier, coarser soils.

Forbs PLANTS code: PEDA2

Penstemon davidsonii



Penstemon davidsonii from Hitchcock et al. (1984)

Penstemon davidsonii is a low-growing sub-shrub (treated as an herb here), with creeping woody stems that form dense mats. It is found on rock outcrops, ledges, and talus slopes with warmer exposures in the upper montane and lower subalpine zones.

Forbs PLANTS code: PEPR2

Penstemon procerus

Penstemon procerus from Hitchcock et al. (1984)

Penstemon procerus is a perennial forb that grows in a tufted form from a loose or compact, surficial woody rhizome or caudex. It has a broad distribution, ranging from drier montane meadows with deeper soils to ridge-top and other rocky habitats with shallow, lithosolic (skeletal) soils.

Forbs PLANTS code: PHDI3

Phlox diffusa

Phlox diffusa var. *longistyla* from Hitchcock et al. (1984)

Phlox diffusa is a deeply tap-rooted, caespitose, mat-forming sub-shrub (treated as an herb here). It occurs in dry meadows and on rocky ridges in the montane zone to steep slopes with warmer aspects and coarse, well-drained soils in the subalpine and alpine slopes.

Forbs PLANTS code: PODA

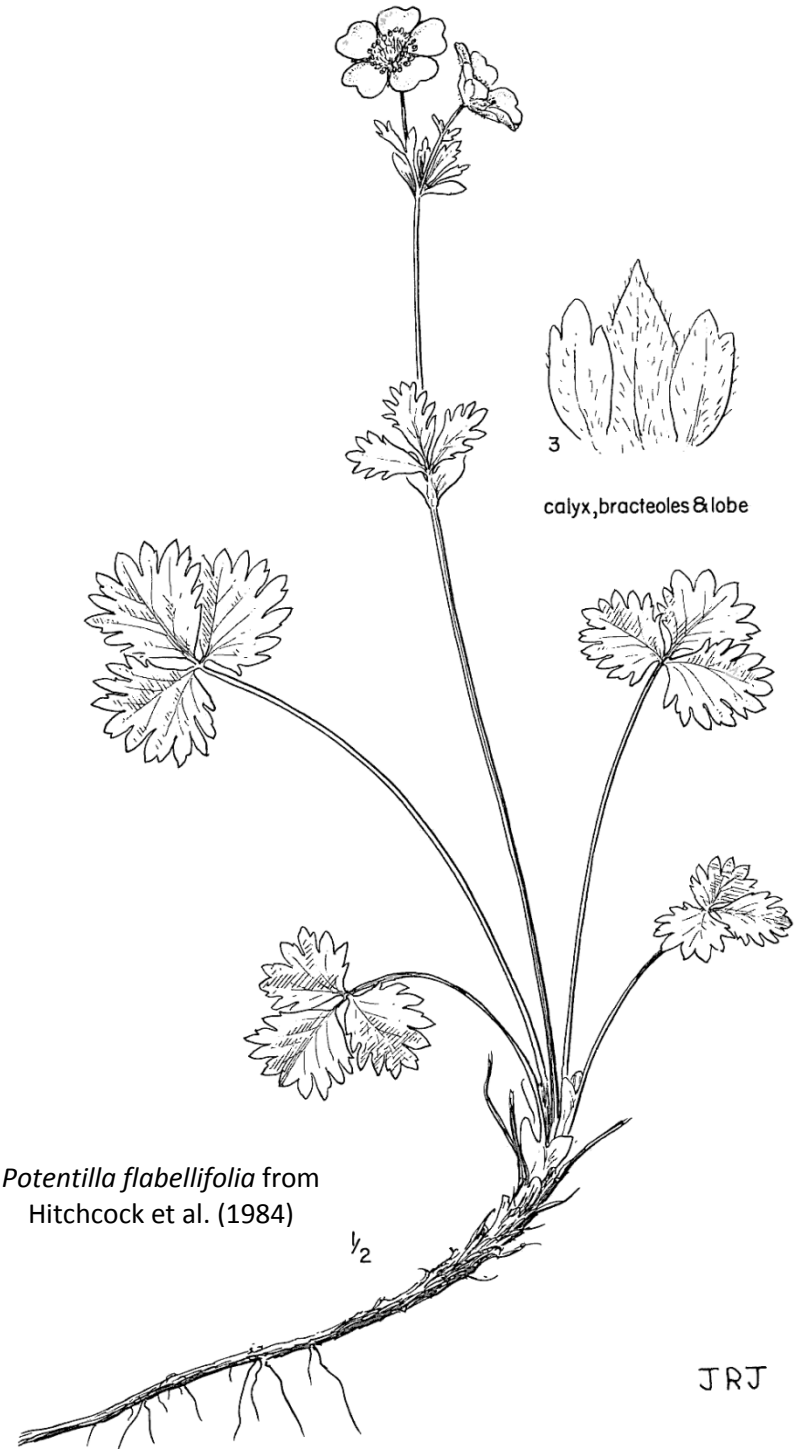
Polygonum davisiae

Hitchcock et al. (1984): *Polygonum newberryi*
PLANTS Database: *Polygonum davisiae* W.H. Brewer ex A. Gray

Polygonum davisiae is a perennial herb that emerges from a thick, fleshy root and branched crown. It is a subalpine species that grows on exposed flats or slopes with deep, coarse, often eroded soils. It can also be found in rockier habitats (ridges and talus).

Forbs PLANTS code: POFL3

Potentilla flabellifolia

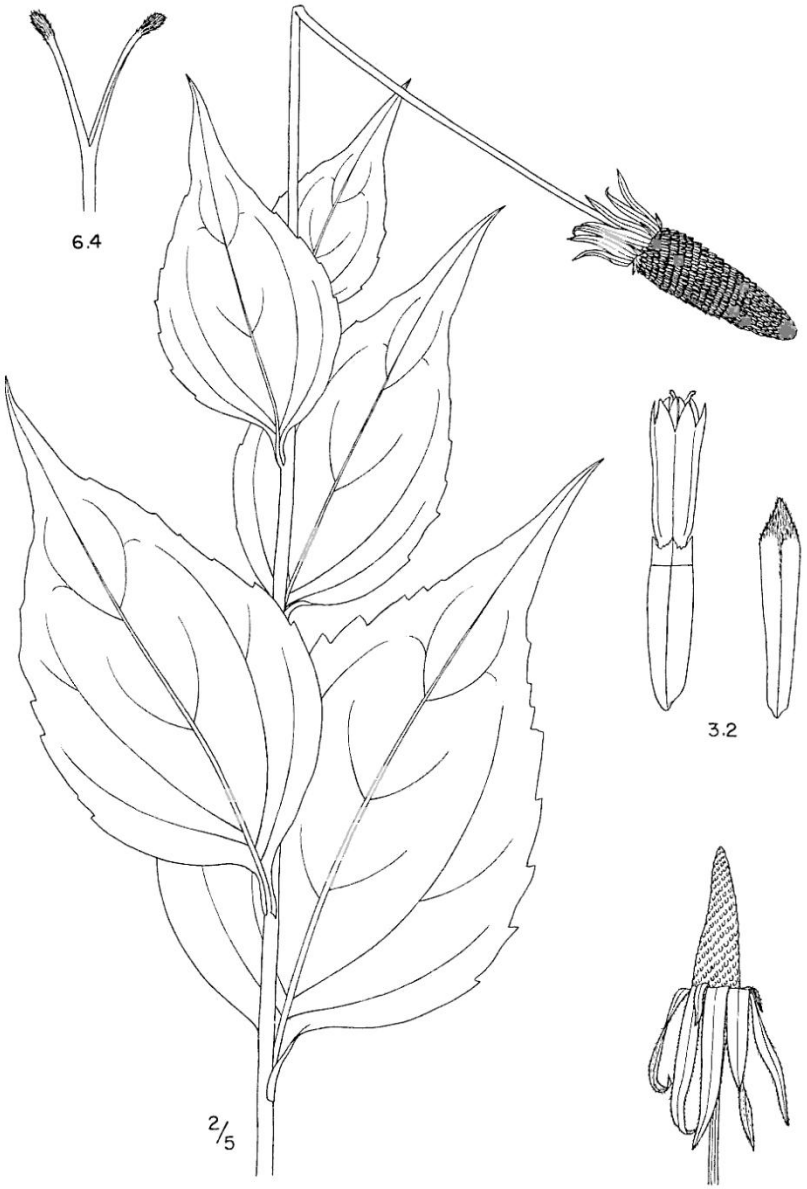


Potentilla flabellifolia from Hitchcock et al. (1984)

Potentilla flabellifolia is a perennial herb with a branched crown and a well-developed rootstock. It grows in wet meadows and along stream banks in areas of relatively late snowlie in the subalpine zone.

Forbs PLANTS code: RUOC2

Rudbeckia occidentalis

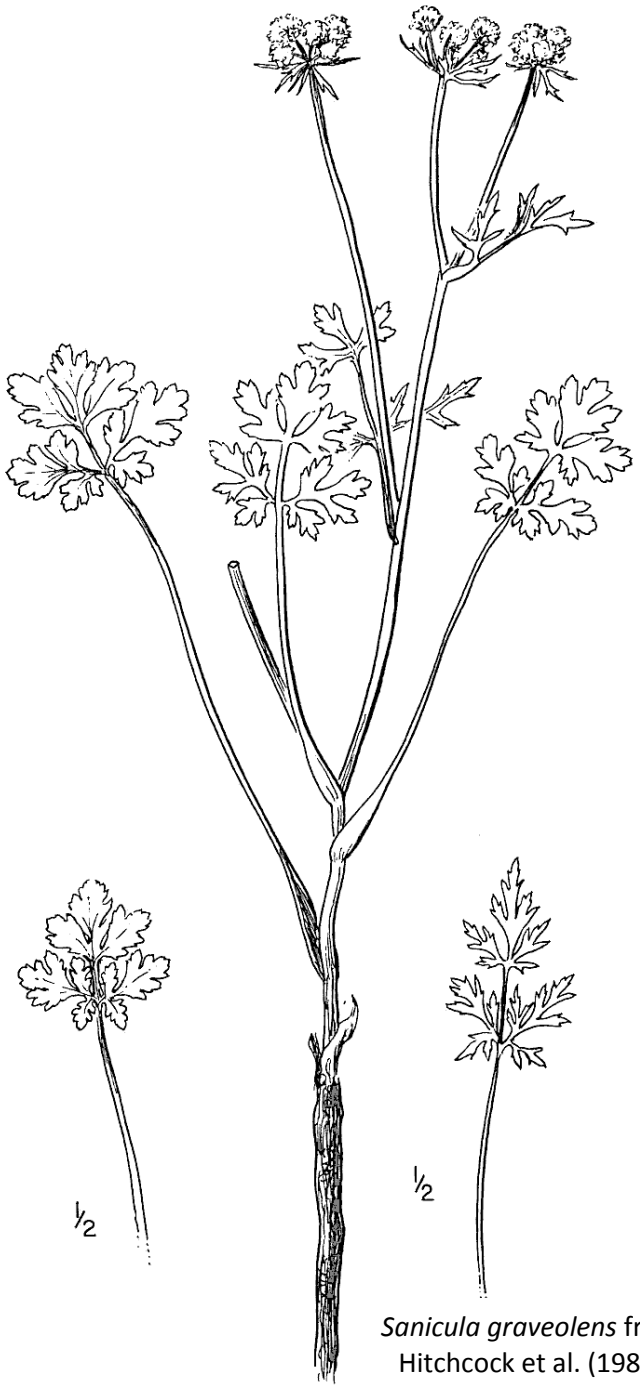


Rudbeckia occidentalis from Hitchcock et al. (1984)

Rudbeckia occidentalis is a tall perennial forb associated with mesic and moist meadows with deep, loamy soils typical of lower to mid-slope positions in the montane zone.

Forbs PLANTS code: SAGR5

Sanicula graveolens

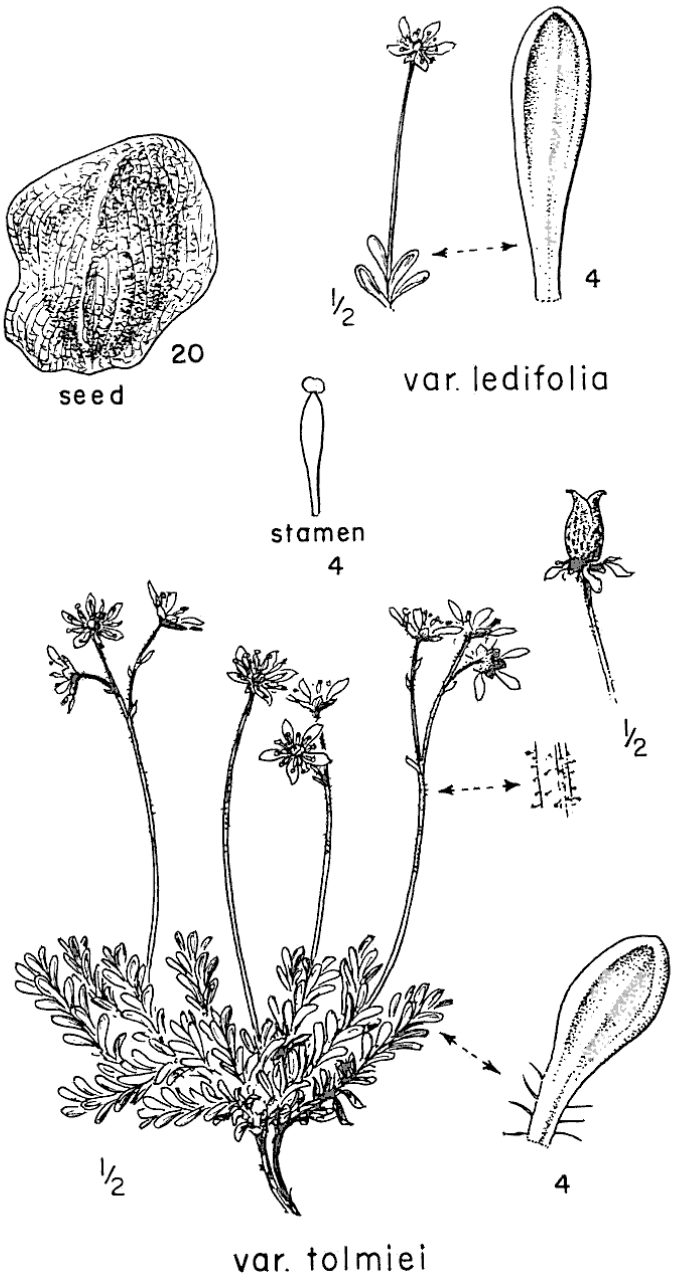


Sanicula graveolens from Hitchcock et al. (1984)

Sanicula graveolens is a taprooted perennial herb that grows in shallow, rocky soils on ridge tops or in warm, dry, upper-slope meadows in the montane zone.

Forbs PLANTS code: SATO2

Saxifraga tolmiei

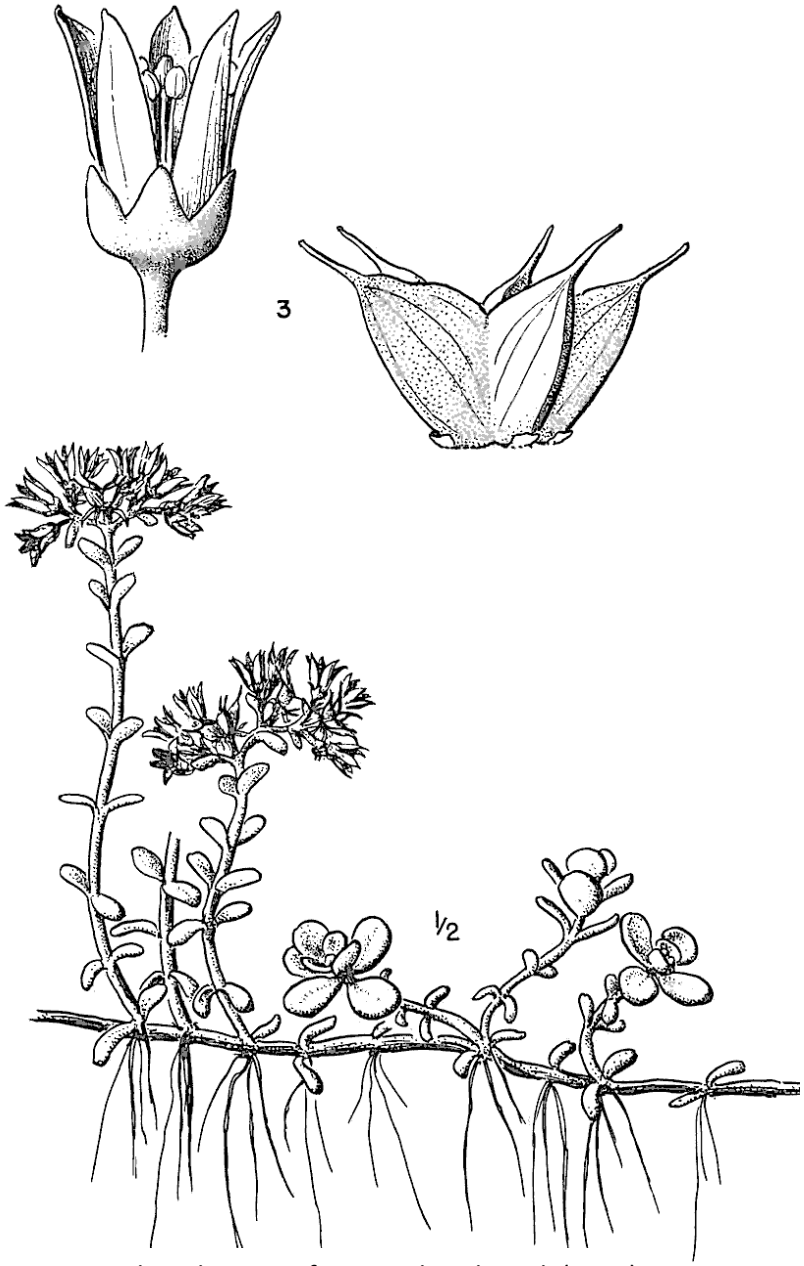


Saxifraga tolmiei from Hitchcock et al. (1984)

Saxifraga tolmiei is a small mat-forming perennial herb. It occurs in wet, late-snowlie environments in the subalpine zone, often along stream banks or rocky drainages and in talus or scree.

Forbs PLANTS code: SEDI

Sedum divergens

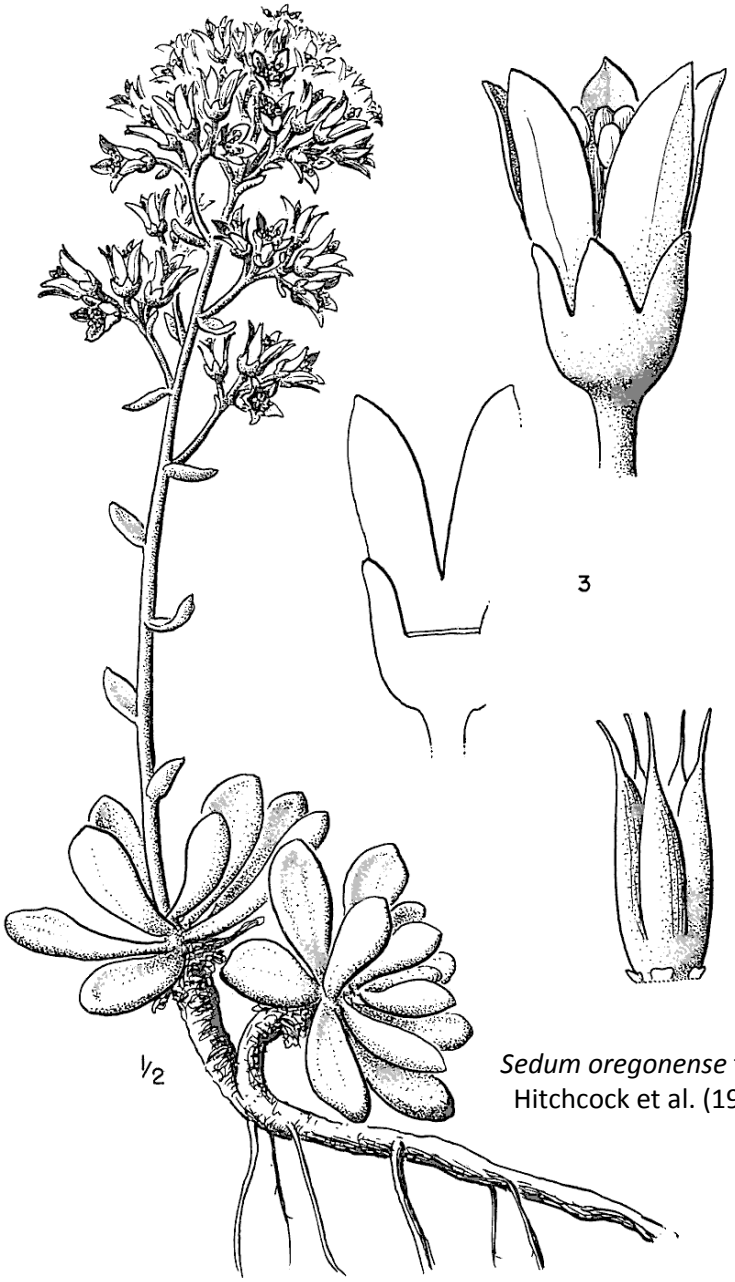


Sedum divergens from Hitchcock et al. (1984)

Sedum divergens is a succulent, mat-forming perennial herb with freely rooting stems. It occurs in the subalpine and alpine zones on ledges, ridges, talus, and steep stony slopes—often with cool, north facing aspects.

Forbs PLANTS code: SEOR2

Sedum oregonense

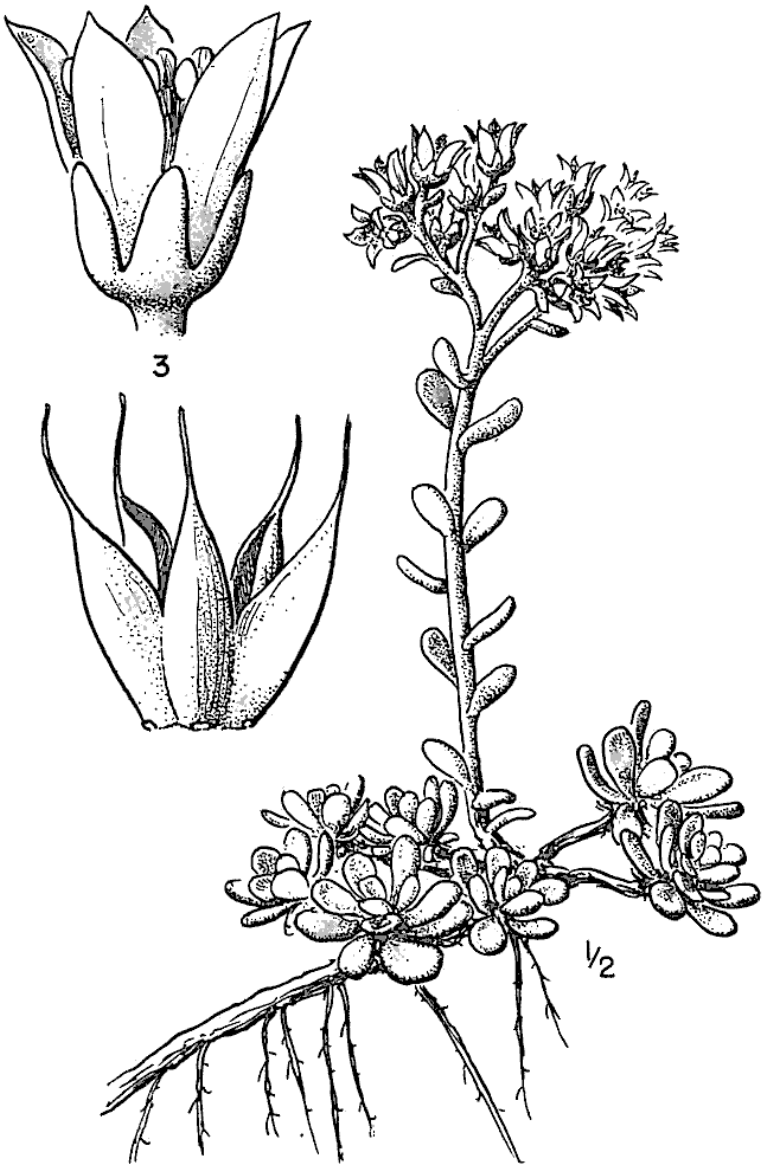


Sedum oregonense from Hitchcock et al. (1984)

Sedum oregonense is a succulent, perennial herb with a stout rootstock. It grows in rock crevices on steep, south-facing slopes or ridgetops ("rock-garden" habitats) in the montane and subalpine zones.

Forbs PLANTS code: SESP

Sedum spathulifolium

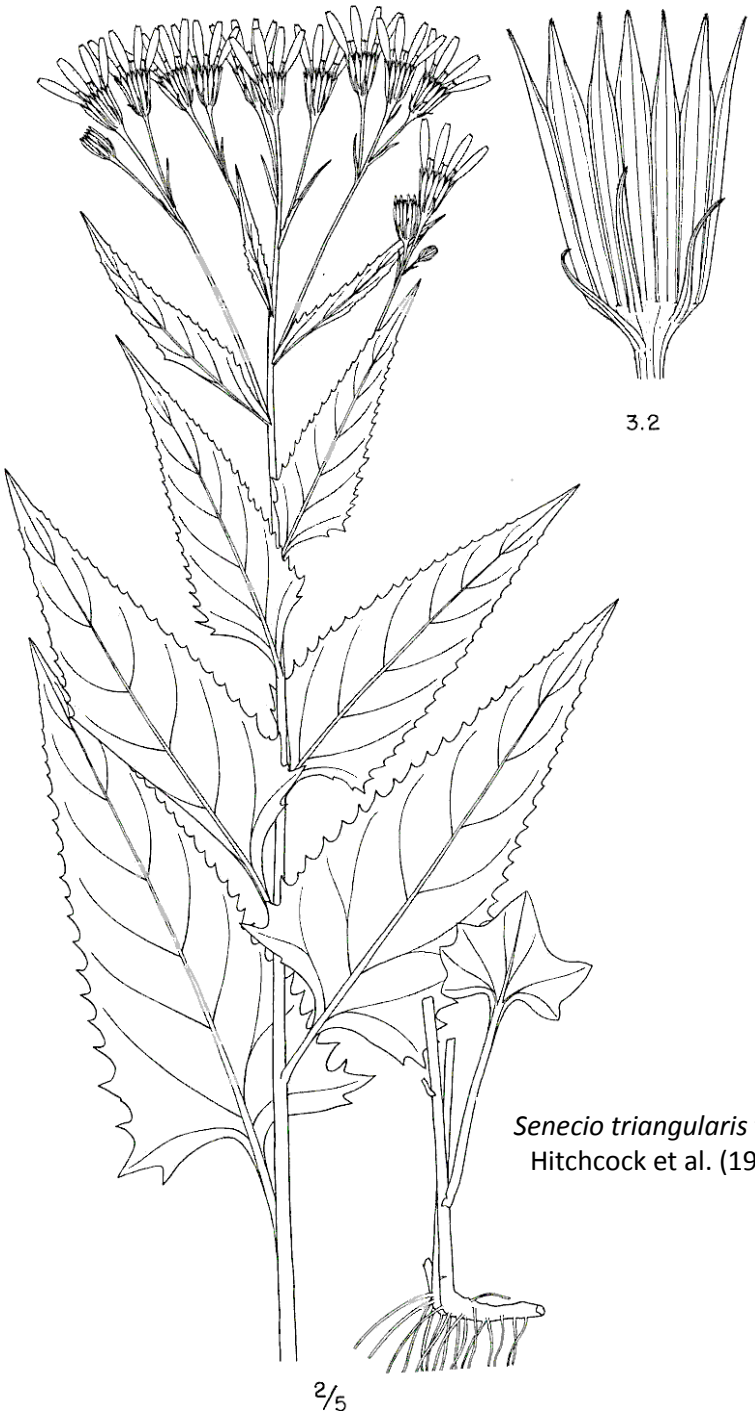


Sedum spathulifolium from Hitchcock et al. (1984)

Sedum spathulifolium is a succulent perennial herb with a stout rootstock. It grows in rock crevices on south-facing slopes or ridges ("rock-garden" habitats) at lower elevations in the montane zone.

Forbs PLANTS code: SETR

Senecio triangularis

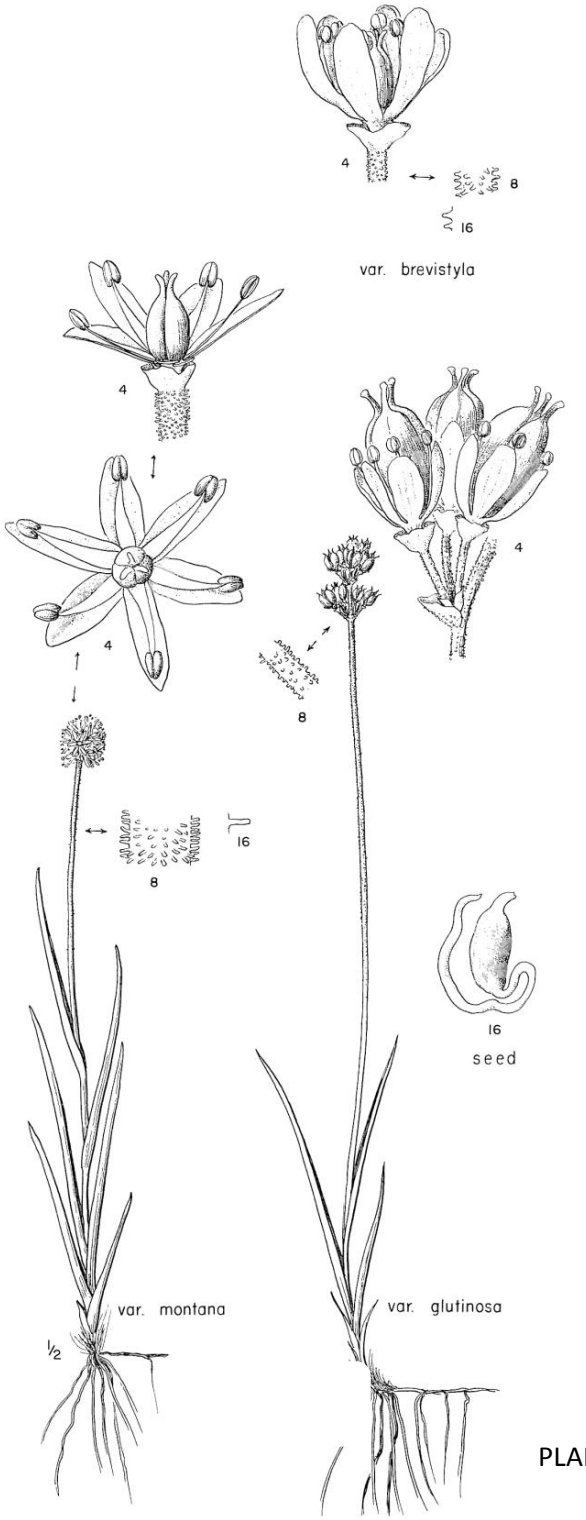


Senecio triangularis from Hitchcock et al. (1984)

Senecio triangularis is a tall perennial herb with fibrous roots. It has a broad elevational distribution. In the montane zone it grows in moist to mesic sites with deep, loamy soils, including the margins of wet basins, stream banks, and lower-slope meadows. It also occurs in the subalpine zone along drainages and on moderate to steep slopes with cool, north-facing aspects, often in rockier soils.

Forbs PLANTS code: TRGL5

Triantha glutinosa



Triantha glutinosa is short-rhizomatous perennial herb. It grows in moist to statured soils in wet meadows, fens, and bogs in the montane and subalpine zones.

Hitchcock et al. (1984): *Tofieldia glutinosa*
PLANTS Database: *Triantha glutinosa* (Michx.) Baker

Forbs PLANTS code: TRLO

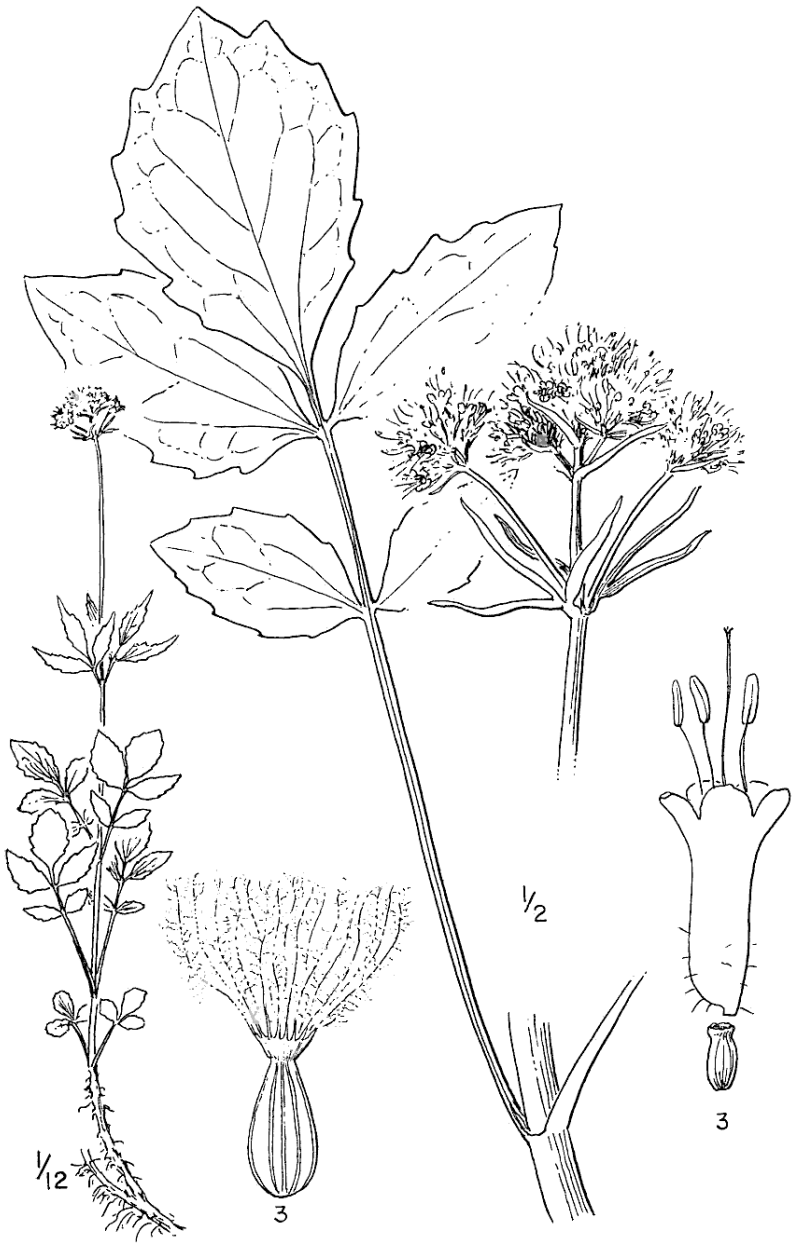
Trifolium longipes

Trifolium longipes from Hitchcock et al. (1984)

Trifolium longipes is a perennial, taprooted herb with a branched crown and stolons or narrow rhizomes that facilitate vegetative spread. It is widely distributed in the subalpine zone on poorly drained flats or in meadow basins where the water table is seasonally elevated.

Forbs PLANTS code: VASI

Valeriana sitchensis



Valeriana sitchensis is fibrous-rooted, perennial herb with a stout, branched rhizome or caudex. It grows in cool, moist to mesic meadows of the subalpine zone (extending into open forest). It is found on gentle to relatively steep terrain and occasionally on talus slopes.

Valeriana sitchensis from Hitchcock et al. (1984)

Forbs PLANTS code: VERAT

Veratrum spp.

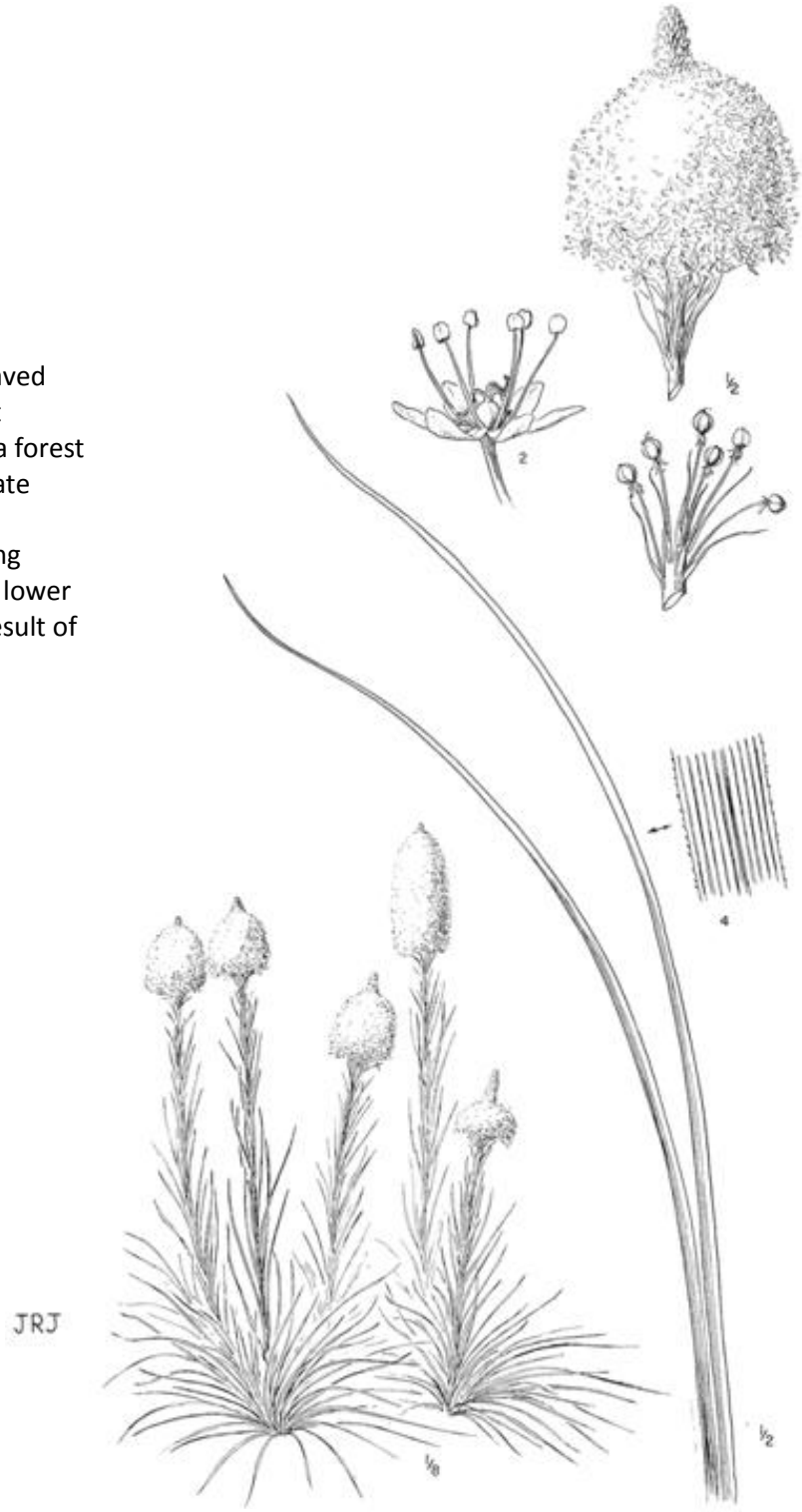
Veratrum californicum from Hitchcock et al. (1984)

Veratrum californicum and *Veratrum viride* are tall, perennial herbs that emerge from thick rhizomes. They grow in mesic to moist soils in the montane and subalpine zones, along the margins of wet basins and streams, and in well watered, toe-slope meadows.

Forbs PLANTS code: XETE

Xerophyllum tenax

Xerophyllum tenax is a coarse-leaved perennial herb with a thick, short rhizome. Although it is primarily a forest understory species, it can dominate meadow openings on gentle to moderately steep slopes and along ridges in the upper montane and lower subalpine zones—possibly as a result of stand-replacing fire.



Xerophyllum tenax from Hitchcock et al. (1984)

Ferns and fern allies PLANTS code: CHGR

Cheilanthes gracillima

Cheilanthes gracillima from Hitchcock et al. (1984)

Cheilanthes gracillima is a small fern with a short, highly branched rhizome. It grows in the crevices of dry cliff-faces and rocky ridgetops in the montane and subalpine zones.

Ferns and fern allies PLANTS code: CRAC3

Cryptogramma achrostichoides

Cryptogramma achrostichoides is a small fern with a short and compactly branched rhizome; the fertile and sterile fronds have distinctly different morphologies. It grows in the crevices of cliffs, on rocky ridges, and in talus slopes from the montane to the alpine zone.

Hitchcock et al. (1984): *Cryptogramma crispa*
PLANTS Database: *Cryptogramma achrostichoides* R. Br.

Ferns and fern allies PLANTS code: PTAQ

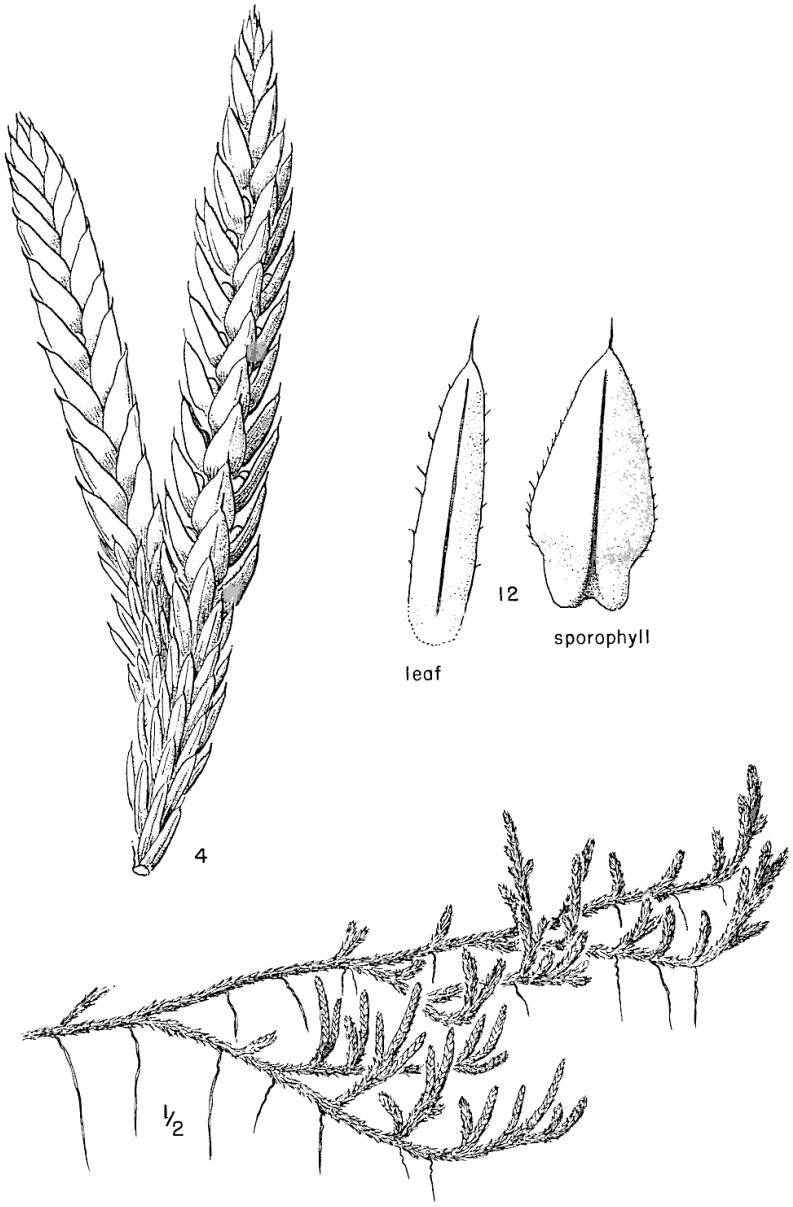
Pteridium aquilinum

Pteridium aquilinum from Hitchcock et al. (1984)

Pteridium aquilinum is mid-sized to tall fern with an extensive and deeply seated rhizome system giving rise to extensive clonal growth. It has a broad elevational distribution, but is most abundant in mesic to relatively dry-site meadows at mid- to upper-slope positions in the montane zone.

Ferns and fern allies PLANTS code: SEWA2

Selaginella wallacei



Selaginella wallacei from Hitchcock et al. (1984)

Selaginella wallacei has short, compact, branched stems that form cushion-mats. It grows on warm, exposed sites in the lower montane zone, rooted in soil pockets on rocky ledges, outcrops, or ridgetops ("rock-garden" habitats).

Appendix D. Glossary of terms

Terms	Definition
aeolian sand	Sand or rock material carried, deposited, produced or eroded by the wind.
alpine	Zone of herbaceous vegetation above timberline.
cobble	Cobbles are 2.5-10.1 inches in diameter and are larger than pebbles (~0.6-2.5 inches), but smaller than boulders (>10.1 inches).
cushion plant	Compact mat-forming plant often found in subalpine and alpine zones.
erosion pavement	Gravel, stone, or coarse particles on the soil surface.
fell field	High elevation stony sites with sparse herbaceous vegetation.
frost heave	Disturbance process in which freezing of water lifts porous surface layer of soil.
glacial outwash	Sand and gravel deposited from water melting from a glacier.
gley soil	Blue/green/gray hydric soil typical of anoxic conditions.
krotovinas	An animal burrow or tunnel filled with organic or mineral material from another soil horizon.
krummholz	Prostrate growth form of trees resulting from the action of wind and snow at high exposed elevations.
montane	The elevational zone below subalpine parkland characterized by a largely forested matrix.
moraines	Unconsolidated soil and rock accumulated on the margins of glaciers.
pedestalling	A remnant, usually with some vegetation on top, that remains after extensive wind, water or animal-caused erosion.
scoria	A highly porous volcanic rock that has a higher density than pumice.
soil mottles	Patchy red or yellow soil colors from exposure of gleyed soil to oxygen; often evidence of fluctuating anaerobic conditions.
subalpine	The elevational zone below timberline characterized by parkland with meadows, tree stringers, and tree islands.
talus	Rock fragments that have broken off of and accumulated from nearby rock faces; often called scree.

Appendix E. Extended constancy and cover tables

Montane dry communities		BRCA5-CAIN9			CAIN9-SAGR5-PEPR2			ERLA6		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ABLA	*Abies lasiocarpa*	14.3	0.1	1.0						
ACMI2	*Achillea millefolium*	28.6	0.4	1.5	33.3	1.0	3.0	69.2	4.2	6.1
ACOC3	*Achnatherum occidentale*	78.6	1.5	1.9	33.3	T	0.1	15.4	0.2	1.6
AGAU2	*Agoseris aurantiaca*	35.7	0.4	1.0				7.7	T	0.6
AGDI	*Agrostis diegoensis*							46.2	4.1	8.8
AGGR	*Agoseris grandiflora*	7.1	0.1	1.0	33.3	0.3	1.0			
ALCR4	*Allium crenulatum*							15.4	0.3	1.8
AMAL2	*Amelanchier alnifolia*	7.1	0.1	2.0	66.7	0.7	1.0	53.8	0.9	1.6
ANAR3	*Angelica arguta*	21.4	0.2	1.1				23.1	0.2	1.0
ANLUA2	*Antennaria luzuloides*	14.3	0.1	0.6	33.3	T	0.1			
ARABI2	*Arabis* spp.				33.3	T	0.1	3.8	T	1.0
ARCA7	*Arenaria capillaris*				33.3	T	T	15.4	0.1	0.8
ARLU	*Artemisia ludoviciana*							15.4	0.3	2.3
ARNE	*Arctostaphylos nevadensis*				66.7	1.0	1.5	19.2	0.8	4.4
ASDE6	*Aspidotis densa*				33.3	0.3	1.0	23.1	0.4	1.6
BRCA5	*Bromus carinatus*	100.0	15.2	15.2	33.3	T	0.1	65.4	3.1	4.7
BROMU	*Bromus* spp.				33.3	T	T	11.5	0.7	6.0
BRVU	*Bromus vulgaris*	14.3	0.6	4.0						
CAHI9	*Castilleja hispida*	7.1	0.1	1.0				46.2	0.6	1.4
CAHO5	*Carex hoodii*	14.3	0.6	4.5				7.7	T	0.6
CAIN9	*Carex inops*	92.9	16.5	17.8	100.0	8.0	8.0	26.9	0.9	3.2
CAMAS	*Camassia* spp.							19.2	0.2	1.2
CAMI12	*Castilleja miniata*							15.4	0.2	1.0
CAMI7	*Carex microptera*							11.5	T	0.4
CAPA14	*Carex pachystachya*	35.7	0.2	0.6	33.3	T	T	11.5	T	0.1
CASU2	*Calochortus subalpinus*	64.3	0.5	0.8	100.0	0.4	0.4	38.5	0.4	1.1
CHANA2	*Chamerion angustifolium* ssp. *angustifolium*	14.3	0.1	0.6				7.7	0.1	1.6
CHGR	*Cheilanthes gracillima*				33.3	0.3	1.0	7.7	T	0.1
CIRE	*Cirsium remotifolium*	57.1	1.2	2.0				19.2	0.8	4.2
CLPE	*Claytonia perfoliata*				33.3	T	T			
COGR2	*Collinsia grandiflora*							11.5	0.2	1.3
COHA5	*Columbiadoria hallii*							11.5	0.5	4.7
COLUM2	*Columbiadoria* spp.							11.5	0.3	2.7
COPA3	*Collinsia parviflora*	7.1	T	0.1	33.3	T	T	34.6	0.2	0.5
COUM	*Comandra umbellata*	14.3	T	0.1	100.0	2.0	2.0	11.5	0.1	0.7
CRAC3	*Cryptogramma acrostichoides*							15.4	0.1	0.8
CRYPT	*Cryptantha* spp.	14.3	0.2	1.6	100.0	0.1	0.1	7.7	0.1	1.1
DACA3	*Danthonia californica*	14.3	0.1	1.0				3.8	T	1.0
DAIN	*Danthonia intermedia*	7.1	0.1	1.0				15.4	0.2	1.3
DEME	*Delphinium menziesii*	35.7	0.2	0.7	66.7	0.7	1.0	50.0	1.0	2.1

Montane dry communities		BRCA5-CAIN9			CAIN9-SAGR5-PEPR2			ERLA6		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ELEL5	*Elymus elymoides*	21.4	0.2	1.0				15.4	0.1	0.8
ELGL	*Elymus glaucus*	64.3	3.2	5.0	33.3	T	0.1	38.5	1.7	4.4
EPBR3	*Epilobium brachycarpum*							15.4	T	0.1
EPMI	*Epilobium minutum*	21.4	T	0.1	33.3	0.7	2.0	30.8	0.2	0.8
ERAL3	*Erigeron aliceae*	57.1	10.0	17.5	66.7	1.3	2.0	7.7	0.2	2.1
ERAR15	*Erysimum arenicola*	21.4	0.3	1.4	66.7	0.4	0.6	3.8	T	0.1
ERCO12	*Eriogonum compositum*				33.3	0.3	1.0	38.5	1.5	4.0
ERGR9	*Erythronium grandiflorum*				33.3	T	0.1			
ERLA6	*Eriophyllum lanatum*							84.6	6.6	7.8
ERMA4	*Eriogonum marifolium*							11.5	0.5	4.3
ERUM	*Eriogonum umbellatum*				66.7	1.3	2.0	23.1	0.4	1.5
EULEL2	*Eucephalus ledophyllus var. ledophyllus*	42.9	2.1	4.9				3.8	0.5	12.0
FEID	*Festuca idahoensis*	14.3	1.4	10.0				38.5	6.9	17.9
FEVI	*Festuca viridula*	64.3	5.1	7.9	33.3	16.7	50.0			
FRVE	*Fragaria vesca*	21.4	0.4	2.0				11.5	0.2	1.4
GADI2	*Gayophytum diffusum*	14.3	0.1	1.0						
GICA5	*Gilia capitata*				33.3	T	0.1	46.2	2.5	5.4
HEMI7	*Heuchera micrantha*							11.5	0.2	1.3
HIAL2	*Hieracium albiflorum*	7.1	0.1	2.0	33.3	T	T	7.7	0.1	1.0
HICY	*Hieracium cynoglossoides*	14.3	0.1	1.0	33.3	0.7	2.0	3.8	T	1.0
HODI	*Holodiscus discolor*							30.8	0.5	1.6
HYOC	*Hydrophyllum occidentale*				33.3	T	0.1			
IPAG	*Ipomopsis aggregata*	35.7	0.7	2.0				11.5	0.1	1.0
JUCO6	*Juniperus communis*							23.1	0.7	2.9
KOMA	*Koeleria macrantha*	7.1	0.1	1.0				19.2	0.8	4.2
LANE3	*Lathyrus nevadensis*	28.6	1.1	3.8	33.3	0.3	1.0	34.6	0.3	0.8
LETR2	*Lewisia triphylla*				33.3	T	T			
LIGR	*Ligusticum grayi*	14.3	1.6	11.5	66.7	1.0	1.6	11.5	0.2	1.4
LIPA5	*Lithophragma parviflorum*				33.3	T	T	7.7	T	0.6
LOMA5	*Lomatium martindalei*							11.5	0.1	1.0
LOTR2	*Lomatium triternatum*							19.2	1.3	7.0
LUCO6	*Luzula comosa*	14.3	0.1	0.6	33.3	T	T	11.5	0.2	1.4
LULA4	*Lupinus latifolius*	71.4	6.1	8.6	33.3	T	0.1	42.3	1.4	3.2
LUPIN	*Lupinus* spp.	14.3	1.2	8.5	33.3	1.3	4.0	11.5	0.3	2.7
MAST4	*Maianthemum stellatum*	21.4	0.2	1.0						
MIBR6	*Mitella breweri*	7.1	T	0.1	33.3	T	T			
MIMO3	*Mimulus moschatus*	14.3	T	0.1				7.7	0.1	1.1
MOMA3	*Moehringia macrophylla*	7.1	T	0.1	66.7	0.4	0.6			
MOPA2	*Montia parvifolia*							15.4	0.7	4.8
ORIM	*Orthocarpus imbricatus*	28.6	0.2	0.6	33.3	T	0.1	15.4	0.3	2.0
ORUN	*Orobanche uniflora*							15.4	0.1	0.3
PAMY	*Paxistima myrsinites*				33.3	3.3	10.0	11.5	T	0.4
PEPR2	*Penstemon procerus*				66.7	35.0	52.5	30.8	0.7	2.3

Montane dry communities		BRCA5-CAIN9			CAIN9-SAGR5-PEPR2			ERLA6		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
PHDI3	*Phlox diffusa*	28.6	T	0.1	33.3	1.0	3.0	19.2	0.3	1.6
PHHA	*Phacelia hastata*	14.3	0.4	2.5						
PHHE2	*Phacelia heterophylla*	35.7	0.2	0.7				42.3	0.4	0.8
PICO	*Pinus contorta*	35.7	1.1	3.0				3.8	T	1.0
POA	*Poa* spp.	7.1	T	0.1	33.3	T	T	11.5	0.2	2.0
POCA9	*Polygonum cascadense*							11.5	T	0.4
PODO4	*Polygonum douglasii*	28.6	0.2	0.6	33.3	0.7	2.0	11.5	T	0.4
POFE	*Poa fendleriana*							11.5	1.2	10.3
POGL9	*Potentilla glandulosa*	28.6	0.9	3.3	33.3	2.3	7.0	46.2	1.2	2.5
POGR9	*Potentilla gracilis*							11.5	0.3	2.7
POMI2	*Polygonum minimum*				33.3	0.3	1.0	26.9	0.4	1.3
POPH	*Polygonum phytolaccifolium*	14.3	T	0.1	33.3	T	T			
PTAQ	*Pteridium aquilinum*	28.6	6.6	23.3	33.3	1.0	3.0	11.5	0.4	3.4
RICE	*Ribes cereum*	21.4	0.4	1.7						
RUAC3	*Rumex acetosella*	42.9	1.3	3.0	33.3	T	0.1	15.4	0.1	0.3
RUPA	*Rubus parviflorus*							15.4	0.1	0.6
RUUR	*Rubus ursinus*							11.5	0.1	1.0
SAGR5	*Sanicula graveolens*	14.3	0.1	0.6	100.0	4.7	4.7	34.6	0.4	1.1
SEIN2	*Senecio integerrimus*	7.1	0.1	1.0	66.7	T	0.1			
SELA	*Sedum lanceolatum*				33.3	T	T			
SEOR	*Sedum oreganum*				33.3	1.0	3.0	15.4	0.6	3.8
SEOR2	*Sedum oregonense*							23.1	0.6	2.7
SESP	*Sedum spathulifolium*							11.5	0.5	4.3
SEST2	*Sedum stenopetalum*							15.4	0.3	1.8
SEWA	*Selaginella wallacei*							11.5	0.2	1.7
SICA5	*Silene campanulata*							11.5	0.1	0.7
SIPA4	*Silene parryi*							15.4	0.1	0.8
SOCA6	*Solidago canadensis*	21.4	0.3	1.4				19.2	1.6	8.3
SOSI2	*Sorbus sitchensis*				33.3	T	0.1			
SYFO2	*Symphyotrichum foliaceum*	42.9	2.2	5.2	33.3	T	0.1	3.8	T	0.1
TRPR4	*Trifolium productum*							11.5	0.5	4.0
VAME	*Vaccinium membranaceum*				33.3	0.7	2.0	7.7	T	0.6
VIAM	*Vicia americana*	14.3	0.1	1.0				11.5	0.1	0.7
VIBA2	*Viola bakeri*	14.3	0.2	1.5						
VISA	*Vicia sativa*							11.5	0.3	2.3
ZIVE	*Zigadenus venenosus*				33.3	T	T	3.8	0.1	2.0

Only species with at least 10% constancy in one of the plant communities are listed. T is trace (<0.05).

Montane dry communities		Rock garden [steep, xeric]			Talus [ACCI-FRPU7]			XETE-FEVI		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ABAM	*Abies amabilis*				16.7	0.2	1.0	50.0	0.5	1.0
ABGR	*Abies grandis*							50.0	0.5	1.0
ABLA	*Abies lasiocarpa*							25.0	0.3	1.0
ACCI	*Acer circinatum*	16.7	0.2	1.0	100.0	8.2	8.2			
ACMA3	*Acer macrophyllum*	66.7	0.7	1.0	33.3	0.3	1.0			
ACMI2	*Achillea millefolium*	16.7	0.2	1.0				25.0	0.8	3.0
AGAU2	*Agoseris aurantiaca*							25.0	0.3	1.0
AGHU	*Agrostis humilis*	16.7	1.0	6.0				25.0	0.3	1.0
AGOSE	*Agoseris* spp.	16.7	0.2	1.0						
AIEL4	*Aspris capillaris*	16.7	0.2	1.0						
ALCR4	*Allium crenulatum*	16.7	0.2	1.0						
ALLIU	*Allium* spp.	16.7	0.3	2.0						
ALRU2	*Alnus rubra*				33.3	0.3	1.0			
AMAL2	*Amelanchier alnifolia*							50.0	0.5	1.0
ANLY	*Anemone lyallii*							75.0	0.8	1.0
ARME	*Arbutus menziesii*	33.3	0.3	1.0						
ARNE	*Arctostaphylos nevadensis*				16.7	0.2	1.0			
ARPA6	*Arctostaphylos patula*				16.7	0.3	2.0			
ASDE6	*Aspidotis densa*	33.3	0.5	1.5						
BRCA5	*Bromus carinatus*	50.0	0.5	1.0						
BRTE	*Bromus tectorum*	16.7	0.2	1.0						
CAIN9	*Carex inops*							50.0	1.3	2.5
CASP5	*Carex spectabilis*							25.0	0.3	1.0
CASTI2	*Castilleja* spp.	16.7	0.2	1.0						
CASU2	*Calochortus subalpinus*							25.0	0.3	1.0
CEGL2	*Cerastium glomeratum*	16.7	0.2	1.0						
CHANA2	*Chamerion angustifolium* ssp. *angustifolium*							75.0	1.0	1.3
CHCHC4	*Chrysolepis chrysophylla var. chrysophylla*	16.7	0.2	1.0	16.7	0.2	1.0			
CHFE	*Cheilanthes feei*				16.7	0.2	1.0			
CHGR	*Cheilanthes gracillima*	16.7	0.2	1.0	33.3	0.3	1.0			
CHUM	*Chimaphila umbellata*	16.7	0.2	1.0						
COHE2	*Collomia heterophylla*				33.3	0.3	1.0			
CRAC3	*Cryptogramma acrostichoides*	33.3	0.3	1.0	83.3	1.5	1.8			
CRMU	*Crocidium multicaule*	16.7	0.3	2.0						
CRST2	*Cryptogramma stelleri*	16.7	0.2	1.0						
CYCR	*Cynosurus cristatus*	16.7	0.2	1.0						
DACA3	*Danthonia californica*	16.7	0.2	1.0						
DEME	*Delphinium menziesii*	16.7	0.3	2.0				25.0	0.3	1.0
DIFO	*Dicentra formosa*				33.3	0.3	1.0			
DODEC	*Dodecatheon* spp.							25.0	0.3	1.0
ELEL5	*Elymus elymoides*				16.7	0.2	1.0			
ELGL	*Elymus glaucus*							25.0	0.3	1.0
EPILO	*Epilobium* spp.							25.0	0.5	2.0

Montane dry communities		Rock garden [steep, xeric]			Talus [ACCI-FRPU7]			XETE-FEVI		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
EPMI	*Epilobium minutum*				16.7	0.2	1.0			
ERLA6	*Eriophyllum lanatum*	16.7	0.3	2.0						
ERPE3	*Erigeron peregrinus*							25.0	0.8	3.0
FEID	*Festuca idahoensis*	16.7	0.2	1.0	16.7	0.2	1.0			
FEOC	*Festuca occidentalis*	50.0	1.0	2.0						
FEOV	*Festuca ovina*	16.7	0.2	1.0						
FERUR2	*Festuca rubra* ssp. *rubra*							25.0	2.0	8.0
FESTU	*Festuca* spp.	16.7	0.2	1.0	16.7	0.2	1.0			
FEVI	*Festuca viridula*							75.0	2.0	2.7
FRAFA2	*Fritillaria affinis* var. *affinis*	16.7	0.2	1.0						
FRFA	*Frasera fastigiata*							25.0	0.3	1.0
FRPU7	*Frangula purshiana*				100.0	2.5	2.5			
FRVE	*Fragaria vesca*	33.3	0.3	1.0						
GAAP2	*Galium aparine*				16.7	0.2	1.0			
GASH	*Gaultheria shallon*	16.7	0.2	1.0						
GATR3	*Galium triflorum*				16.7	0.2	1.0			
GEMO	*Geranium molle*	16.7	0.2	1.0						
HEMI7	*Heuchera micrantha*	50.0	7.3	14.7						
HIHI	*Hierochloe hirta*				16.7	0.2	1.0			
HODI	*Holodiscus discolor*	66.7	1.3	2.0	33.3	1.2	3.5			
HYPE	*Hypericum perforatum*	16.7	0.2	1.0						
JUCO6	*Juniperus communis*							25.0	2.5	10.0
JUPA	*Juncus parryi*				33.3	0.3	1.0			
LIAP	*Ligusticum apiifolium*							25.0	0.3	1.0
LIBO3	*Linnaea borealis*				16.7	0.2	1.0			
LICO	*Lilium columbianum*							75.0	1.0	1.3
LIGR	*Ligusticum grayi*							25.0	0.3	1.0
LIPA5	*Lithophragma parviflorum*	16.7	0.2	1.0						
LOHA	*Lomatium hallii*	50.0	0.5	1.0						
LOMAT	*Lomatium* spp.	16.7	0.2	1.0				25.0	0.3	1.0
LOTR2	*Lomatium triternatum*	16.7	0.2	1.0						
LOUT	*Lomatium utriculatum*	50.0	0.5	1.0						
LUAL3	*Lupinus albicaulis*							25.0	1.3	5.0
LUPIN	*Lupinus* spp.							25.0	0.3	1.0
MAAQ2	*Mahonia aquifolium*	16.7	1.7	10.0						
MANE2	*Mahonia nervosa*	16.7	0.2	1.0						
MARA7	*Maianthemum racemosum*				16.7	0.2	1.0			
MESP	*Melica spectabilis*							25.0	0.3	1.0
MIAL3	*Mimulus alsinoides*	33.3	0.3	1.0	16.7	0.2	1.0			
MIGU	*Mimulus guttatus*	16.7	0.2	1.0						
MOPA2	*Montia parvifolia*	16.7	0.2	1.0						
MUME2	*Muhlenbergia mexicana*							25.0	0.3	1.0
MUMI2	*Muhlenbergia minutissima*	16.7	0.2	1.0						
NONE3	*Nothochelone nemorosa*	16.7	0.2	1.0						
OECE	*Oemleria cerasiformis*	16.7	0.2	1.0						

Montane dry communities		Rock garden [steep, xeric]			Talus [ACCI-FRPU7]			XETE-FEVI		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
PAMY	*Paxistima myrsinites*	33.3	0.5	1.5	50.0	0.5	1.0			
PEDA2	*Penstemon davidsonii*				50.0	0.8	1.7			
PENST	*Penstemon* spp.	16.7	0.2	1.0						
PIMO3	*Pinus monticola*							50.0	0.5	1.0
POHE3	*Polypodium hesperium*	50.0	0.5	1.0	16.7	0.2	1.0			
POLE3	*Poa lettermanii*	16.7	0.2	1.0						
POLO4	*Polystichum lonchitis*				16.7	0.2	1.0			
POMU	*Polystichum munitum*	16.7	0.2	1.0	33.3	0.3	1.0			
POTEN	*Potentilla* spp.	16.7	0.2	1.0						
PSME	*Pseudotsuga menziesii*	83.3	0.8	1.0	83.3	2.3	2.8	50.0	0.5	1.0
PTAQ	*Pteridium aquilinum*	16.7	0.2	1.0						
QUGA4	*Quercus garryana*	33.3	0.3	1.0						
RHIN11	*Rhodiola integrifolia*	16.7	0.2	1.0						
RIAC	*Ribes acerifolium*	16.7	0.2	1.0						
RICR	*Ribes cruentum*				33.3	0.3	1.0			
RISA	*Ribes sanguineum*	16.7	0.2	1.0						
ROCA6	*Romanzoffia californica*	50.0	0.5	1.0						
ROGY	*Rosa gymnocarpa*	16.7	0.2	1.0						
ROTH	*Romanzoffia thompsonii*	16.7	0.2	1.0						
RUAC3	*Rumex acetosella*	33.3	1.2	3.5						
RUUR	*Rubus ursinus*	16.7	0.2	1.0	16.7	0.2	1.0			
SAAN2	*Sanguisorba annua*	16.7	0.2	1.0	33.3	0.3	1.0			
SAXIF	*Saxifraga* spp.	16.7	0.5	3.0						
SEDUM	*Sedum* spp.	16.7	0.2	1.0						
SESP	*Sedum spathulifolium*	66.7	1.3	2.0	33.3	4.0	12.0			
SEWA	*Selaginella wallacei*	83.3	26.3	31.6						
SIHO	*Silene hookeri*							25.0	0.3	1.0
SYAL	*Symphoricarpos albus*	16.7	0.2	1.0						
THPL	*Thuja plicata*				16.7	0.2	1.0			
TROV2	*Trillium ovatum*	16.7	0.2	1.0	16.7	0.2	1.0			
TSHE	*Tsuga heterophylla*				33.3	0.3	1.0			
TSME	*Tsuga mertensiana*							25.0	0.3	1.0
VAME	*Vaccinium membranaceum*				16.7	0.2	1.0			
VEAR	*Veronica arvensis*	16.7	0.2	1.0						
VEHE2	*Veronica hederifolia*	16.7	0.2	1.0						
WOOR	*Woodsia oregana*				16.7	0.2	1.0			
XETE	*Xerophyllum tenax*				16.7	0.2	1.0	100.0	76.3	76.3

Only species with at least 10% constancy in one of the plant communities are listed. T is trace (<0.05).

Montane mesic community		ACCI		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)
ABGR	*Abies grandis*	25.0	0.3	1.0
ACCI	*Acer circinatum*	100.0	79.5	79.5
ACRU2	*Actaea rubra*	25.0	2.5	10.0
ALRU2	*Alnus rubra*	25.0	0.3	1.0
ASCA2	*Asarum caudatum*	25.0	0.3	1.0
BRCA5	*Bromus carinatus*	25.0	0.3	1.0
CHANA2	*Chamerion angustifolium* ssp. *angustifolium*	25.0	0.3	1.0
DIFO	*Dicentra formosa*	50.0	1.5	3.0
FEOC	*Festuca occidentalis*	25.0	0.3	1.0
FESTU	*Festuca* spp.	25.0	0.3	1.0
HEMA80	*Heracleum maximum*	25.0	0.3	1.0
HYTE	*Hydrophyllum tenuipes*	50.0	7.0	14.0
MARA7	*Maianthemum racemosum*	25.0	0.5	2.0
MAST4	*Maianthemum stellatum*	75.0	3.0	4.0
MOPA2	*Montia parvifolia*	25.0	0.3	1.0
POMU	*Polystichum munitum*	25.0	0.3	1.0
PRUNU	*Prunus* spp.	25.0	0.3	1.0
RIAC	*Ribes acerifolium*	25.0	0.3	1.0
RIBES	*Ribes* spp.	50.0	1.0	2.0
RULE	*Rubus leucodermis*	25.0	0.3	1.0
RUSP	*Rubus spectabilis*	25.0	1.3	5.0
SARA2	*Sambucus racemosa*	50.0	6.3	12.5
SCHA2	*Scoliopus hallii*	25.0	0.3	1.0
SORBU	*Sorbus* spp.	25.0	0.3	1.0
TROV2	*Trillium ovatum*	50.0	1.5	3.0
VIGL	*Viola glabella*	25.0	2.5	10.0
VIOLA	*Viola* spp.	25.0	0.3	1.0

Only species with at least 10% constancy in one of the plant communities are listed. T is trace (<0.05).

Montane mesic & moist communities		ELGL-BRCA5			RUOC2			RUPA-NWO Casc			VERAT-HEMA80		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ABAM	*Abies amabilis*	9.1	0.1	1.0	12.5	0.1	1.0	20.0	0.4	2.0			
ABCO	*Abies concolor*							13.3	0.5	3.5			
ABLA	*Abies lasiocarpa*	9.1	0.7	8.0	37.5	0.4	1.0	6.7	0.1	1.0			
ABPR	*Abies procera*							6.7	0.1	1.0	11.1	0.1	1.0
ACCO4	*Aconitum columbianum*				25.0	0.1	0.6				22.2	0.6	2.5
ACMI2	*Achillea millefolium*	27.3	2.6	9.7	50.0	1.1	2.3	6.7	T	T	33.3	1.2	3.7
ACOC3	*Achnatherum occidentale*	9.1	T	0.1				6.7	T	T	11.1	0.1	1.0
ACTR	*Achlys triphylla*				12.5	0.4	3.0						
AGAU2	*Agoseris aurantiaca*	18.2	0.1	0.6									
AGCA5	*Agrostis capillaris*				12.5	0.1	1.0						
AGEX	*Agrostis exarata*	9.1	0.1	1.0							11.1	0.1	1.0
AGHU	*Agrostis humilis*	18.2	0.4	2.0	12.5	0.6	5.0				11.1	0.1	1.0
AGSC5	*Agrostis scabra*				12.5	0.3	2.0						
AGUR	*Agastache urticifolia*	9.1	0.1	1.0							11.1	0.3	3.0
ANAR3	*Angelica arguta*	27.3	0.4	1.3				46.7	0.5	1.2	11.1	0.1	1.0
ANDE3	*Anemone deltoidea*	9.1	0.1	1.0	12.5	0.1	1.0						
ANMA	*Anaphalis margaritacea*	9.1	0.1	1.0	12.5	0.3	2.0	13.3	0.1	1.1	11.1	0.1	1.0
AQFO	*Aquilegia formosa*	18.2	1.1	6.0	12.5	0.1	1.0	46.7	0.3	0.7	11.1	T	0.1
ARENA	*Arenaria* spp.										11.1	0.1	1.0
ARGL	*Arabis glabra*	9.1	0.1	1.0							11.1	T	0.1
ARLU	*Artemisia ludoviciana*							33.3	3.5	10.6			
ASCA2	*Asarum caudatum*	9.1	0.1	1.0	12.5	0.1	1.0						
ASTER	*Aster* spp.	18.2	0.2	1.0									
BAOR	*Barbarea orthoceras*							6.7	T	T	11.1	T	0.1
BOMU	*Botrychium multifidum*										11.1	0.1	1.0
BRCA5	*Bromus carinatus*	81.8	7.7	9.4	37.5	2.1	5.7	100.0	8.7	8.7	11.1	0.4	4.0
BRIN2	*Bromus inermis*	27.3	2.7	10.0				6.7	0.1	2.0	22.2	0.4	2.0
BROMU	*Bromus* spp.	18.2	0.5	3.0	25.0	1.5	6.0						
BRSI	*Bromus sitchensis*	18.2	1.3	7.0									
BRVU	*Bromus vulgaris*	9.1	0.5	5.0	12.5	0.3	2.0						
CAAN15	*Carex angustata*										11.1	0.4	4.0
CAAQD	*Carex aquatilis* var. *dives*										22.2	3.0	13.5
CABO2	*Carex bolanderi*				12.5	0.4	3.0	13.3	T	0.1			
CACA4	*Calamagrostis canadensis*				12.5	2.5	20.0				33.3	1.0	3.0
CAFR2	*Carex fracta*	9.1	0.1	1.0	12.5	0.4	3.0						
CAHO5	*Carex hoodii*	27.3	0.6	2.0	12.5	0.3	2.0	20.0	0.3	1.7			
CAIL	*Carex illota*	9.1	2.7	30.0	12.5	0.4	3.0				11.1	0.1	1.0
CAIN9	*Carex inops*	9.1	0.1	1.0				40.0	3.5	8.7			
CALU7	*Carex luzulina*	18.2	0.9	5.0	12.5	0.6	5.0				11.1	0.2	2.0
CAME6	*Carex mertensii*				25.0	0.1	0.6	6.7	T	0.1	22.2	0.2	1.0
CAMI12	*Castilleja miniata*	18.2	0.5	3.0	25.0	0.8	3.0	13.3	0.1	1.0			
CAOB3	*Carex obnupta*										11.1	0.2	2.0
CAPA14	*Carex pachystachya*	9.1	0.2	2.0				40.0	0.9	2.2	22.2	0.7	3.1
CAREX	*Carex* spp.	9.1	1.8	20.0	12.5	0.3	2.0	20.0	0.2	1.0	11.1	0.1	1.0

Montane mesic & moist communities		ELGL-BRCA5			RUOC2			RUPA-NWO Casc			VERAT-HEMA80		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
CASU2	*Calochortus subalpinus*	27.3	0.1	0.4	12.5	T	0.1	20.0	0.1	0.7			
CATU3	*Carex tumulicola*				25.0	0.3	1.0				11.1	0.1	1.0
CHANA2	*Chamerion angustifolium* ssp. *angustifolium*							33.3	1.3	3.8			
CIAR4	*Cirsium arvense*				37.5	0.5	1.3	6.7	0.1	1.0			
CILA2	*Cinna latifolia*				12.5	0.3	2.0						
CIRE	*Cirsium remotifolium*	27.3	1.2	4.3	12.5	0.3	2.0	53.3	1.0	1.8	11.1	0.2	2.0
CIRSI	*Cirsium* spp.	18.2	0.3	1.5				13.3	0.4	3.0			
CIVU	*Cirsium vulgare*	9.1	1.4	15.0				13.3	0.1	1.0			
CLSIS	*Claytonia sibirica* var. *sibirica*	9.1	0.1	1.0	37.5	0.4	1.0				11.1	0.2	2.0
COLI2	*Collomia linearis*	18.2	0.2	1.0							11.1	T	0.1
COPA3	*Collinsia parviflora*	9.1	T	0.1				20.0	T	0.1	11.1	0.1	1.0
COSC4	*Corydalis scouleri*										11.1	T	0.1
CRYPT	*Cryptantha* spp.	9.1	T	0.1	12.5	T	0.1	46.7	0.2	0.3			
DAGL	*Dactylis glomerata*				12.5	0.1	1.0						
DECE	*Deschampsia cespitosa*										22.2	0.3	1.5
DEME	*Delphinium menziesii*	9.1	0.4	4.0				40.0	0.3	0.7	11.1	0.1	1.0
DESC2	*Delphinium scopulorum*										11.1	1.1	10.0
DETR2	*Delphinium trolliifolium*				12.5	0.5	4.0						
DIFO	*Dicentra formosa*										11.1	T	0.1
ELGL	*Elymus glaucus*	100.0	9.3	9.3	87.5	4.1	4.7	86.7	10.3	11.8	44.4	5.6	12.5
ELTR7	*Elymus trachycaulus*	18.2	1.8	10.0									
EPCIG	*Epilobium ciliatum* ssp. *glandulosum*	9.1	0.2	2.0	12.5	0.1	1.0				11.1	0.1	1.0
EPCIW	*Epilobium ciliatum* ssp. *watsonii*										22.2	0.4	2.0
EPGL	*Epilobium glaberrimum*				12.5	0.6	5.0						
EPILO	*Epilobium* spp.	9.1	0.1	1.0				26.7	0.1	0.3			
EPMI	*Epilobium minutum*	9.1	T	0.1	12.5	0.1	1.0	6.7	T	T	11.1	T	0.1
EQAR	*Equisetum arvense*										11.1	0.2	2.0
ERAL3	*Erigeron aliceae*	36.4	1.2	3.3	12.5	0.1	1.0	40.0	1.1	2.7	11.1	0.2	2.0
ERAR15	*Erysimum arenicola*	9.1	T	0.1				46.7	0.2	0.5			
ERFO2	*Erigeron foliosus*				12.5	0.1	1.0						
ERGR9	*Erythronium grandiflorum*				12.5	0.1	1.0	6.7	T	0.1			
ERLA6	*Eriophyllum lanatum*	9.1	0.1	1.0	12.5	0.1	1.0						
ERPE3	*Erigeron peregrinus*	18.2	0.3	1.5	25.0	0.6	2.5	13.3	0.2	1.5	11.1	0.1	1.0
ERST3	*Erigeron strigosus*				12.5	0.1	1.0						
FEOC	*Festuca occidentalis*	18.2	1.2	6.5				6.7	0.3	4.0			
FESU2	*Festuca subuliflora*										11.1	0.2	2.0
FEVI	*Festuca viridula*				12.5	0.6	5.0	6.7	T	T	11.1	0.2	2.0
FRAGA	*Fragaria* spp.				12.5	0.4	3.0						
FRVI	*Fragaria virginiana*	9.1	0.4	4.0	12.5	0.1	1.0	13.3	0.1	1.0	11.1	T	0.1
GABI	*Galium bifolium*	9.1	0.5	5.0	12.5	2.5	20.0	60.0	2.1	3.6	22.2	0.3	1.5
GALIU	*Galium* spp.										11.1	0.1	1.0

Montane mesic & moist communities		ELGL-BRCA5			RUOC2			RUPA-NWO Casc			VERAT-HEMA80		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
GAOR	*Galium oreganum*	9.1	0.1	1.0	50.0	0.8	1.5	13.3	0.2	1.5	11.1	0.1	1.0
GATR3	*Galium triflorum*				25.0	0.1	0.6				11.1	T	0.1
GEMA4	*Geum macrophyllum*				25.0	0.8	3.0				22.2	0.2	1.0
GLGR	*Glyceria grandis*				12.5	0.1	1.0						
HEMA80	*Heracleum maximum*	36.4	3.1	8.5	62.5	3.4	5.4	40.0	0.3	0.9	100.0	23.7	23.7
HIAL2	*Hieracium albiflorum*				12.5	0.1	1.0						
HYFE	*Hydrophyllum fendleri*										11.1	T	0.1
HYOC	*Hydrophyllum occidentale*							6.7	0.1	2.0	22.2	0.1	0.6
HYSC5	*Hypericum scouleri*	9.1	0.1	1.0	12.5	0.6	5.0				11.1	0.3	3.0
HYTE	*Hydrophyllum tenuipes*				12.5	0.1	1.0				22.2	3.9	17.5
IPAG	*Ipomopsis aggregata*							13.3	0.2	1.5			
LANE3	*Lathyrus nevadensis*	27.3	0.6	2.3	12.5	0.6	5.0	73.3	2.5	3.4	11.1	0.6	5.0
LAPO3	*Lathyrus polyphyllus*	18.2	0.3	1.5	37.5	1.4	3.7						
LIAP	*Ligusticum apiifolium*										11.1	0.1	1.0
LICO	*Lilium columbianum*				37.5	0.4	1.0	13.3	0.1	0.6			
LIGR	*Ligusticum grayi*	9.1	0.2	2.0	25.0	0.8	3.0	33.3	2.6	7.8			
LOCO6	*Lotus corniculatus*				12.5	0.1	1.0	6.7	0.1	1.0			
LOCR	*Lotus crassifolius*							13.3	0.2	1.5			
LONE4	*Lotus nevadensis*										11.1	0.1	1.0
LOTR2	*Lomatium triternatum*	27.3	0.6	2.3	12.5	0.1	1.0				11.1	0.1	1.0
LUARL5	*Lupinus argenteus* ssp. *argenteus* var. *laxiflorus*				12.5	0.1	1.0	13.3	0.1	1.0			
LUCO6	*Luzula comosa*	9.1	T	0.1	12.5	0.1	1.0	26.7	T	0.1	11.1	T	0.1
LULA4	*Lupinus latifolius*	9.1	0.1	1.0				33.3	1.0	3.0	11.1	T	0.1
LUPA4	*Luzula parviflora*				12.5	0.3	2.0						
LUPO2	*Lupinus polyphyllus*	27.3	1.2	4.3	12.5	0.1	1.0	13.3	0.1	1.0	11.1	1.7	15.0
MAST4	*Maianthemum stellatum*	27.3	0.6	2.3				40.0	0.5	1.2	22.2	0.8	3.5
MEBE	*Mertensia bella*				12.5	0.1	1.0				44.4	0.7	1.5
MEPA	*Mertensia paniculata*	18.2	0.5	2.5	25.0	0.5	2.0						
MEPL	*Mertensia platyphylla*							20.0	0.5	2.3	11.1	0.7	6.0
MERTE	*Mertensia* spp.	9.1	0.9	10.0				33.3	1.1	3.4	22.2	1.1	5.0
MESU	*Melica subulata*							13.3	T	0.1			
MIBR6	*Mitella breweri*							6.7	T	T	11.1	0.1	1.0
MICA5	*Mitella caulescens*										11.1	1.1	10.0
MIGR	*Microsteris gracilis*	9.1	0.1	1.0				20.0	0.1	0.4			
MIGU	*Mimulus guttatus*	9.1	0.1	1.0	12.5	0.3	2.0				22.2	1.0	4.5
MIMO3	*Mimulus moschatus*	9.1	0.3	3.0	25.0	0.5	2.0	40.0	4.1	10.4	11.1	0.2	2.0
MIOV	*Mitella ovalis*										11.1	T	0.1
MIPE	*Mitella pentandra*				12.5	T	0.1						
MOCH	*Montia chamissoi*										11.1	2.2	20.0
MOMA3	*Moehringia macrophylla*							13.3	0.1	0.6			
MUFI2	*Muhlenbergia filiformis*				12.5	0.6	5.0				11.1	T	0.1
MYLA	*Myosotis laxa*	9.1	T	0.1	12.5	0.5	4.0	26.7	0.6	2.3	11.1	T	0.1
OPHO	*Oplopanax horridus*										11.1	0.1	1.0

Montane mesic & moist communities		ELGL-BRCA5			RUOC2			RUPA-NWO Casc			VERAT-HEMA80		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
OSBE	*Osmorhiza berteroi*				12.5	0.3	2.0	13.3	0.3	2.5	11.1	0.1	1.0
OSOC	*Osmorhiza occidentalis*	9.1	0.1	1.0	12.5	0.1	1.0						
PEBR	*Pedicularis bracteosa*				12.5	T	0.1				22.2	0.7	3.0
PEGR2	*Pedicularis groenlandica*				12.5	0.1	1.0						
PHAL2	*Phleum alpinum*	18.2	0.5	3.0									
PHHE2	*Phacelia heterophylla*	36.4	0.3	0.8	25.0	0.1	0.6	53.3	0.2	0.4			
PLDID	*Platanthera dilatata* var. *dilatata*										11.1	0.1	1.0
PLRE2	*Pleuropogon refractus*										22.2	0.2	1.0
PLST4	*Platanthera stricta*				12.5	0.1	1.0				11.1	0.1	1.0
POBI6	*Polygonum bistortoides*				12.5	0.1	1.0				22.2	0.1	0.6
POCA4	*Polemonium carneum*	9.1	0.1	1.0	25.0	0.3	1.0	33.3	0.4	1.2	22.2	0.6	2.5
PODR	*Potentilla drummondii*										22.2	0.2	1.0
POGL9	*Potentilla glandulosa*	9.1	T	0.1				6.7	0.1	1.0	11.1	T	0.1
POLE2	*Poa leptocoma*	9.1	0.2	2.0							11.1	0.1	1.0
POMI2	*Polygonum minimum*	9.1	T	0.1				13.3	T	T			
POPH	*Polygonum phytolaccifolium*	45.5	3.0	6.6	12.5	0.9	7.0	86.7	7.2	8.3	33.3	0.9	2.7
POPR	*Poa pratensis*	9.1	0.1	1.0							11.1	T	0.1
PRHO	*Prosartes hookeri*										11.1	0.1	1.0
PRVU	*Prunella vulgaris*	9.1	0.1	1.0	12.5	0.1	1.0						
PTAQ	*Pteridium aquilinum*	36.4	14.6	40.3	50.0	22.9	45.8	93.3	22.6	24.2	11.1	1.7	15.0
RAOC	*Ranunculus occidentalis*				12.5	0.1	1.0						
RAUN	*Ranunculus uncinatus*	9.1	0.1	1.0							11.1	T	0.1
RILA	*Ribes lacustre*										11.1	0.2	2.0
RUAC2	*Rumex acetosa*	9.1	0.1	1.0	12.5	0.1	1.0						
RUAC3	*Rumex acetosella*	45.5	0.5	1.0				26.7	1.1	4.0			
RUAQ	*Rumex aquaticus*	9.1	0.9	10.0				6.7	1.3	20.0	11.1	1.1	10.0
RUOC2	*Rudbeckia occidentalis*	45.5	4.5	10.0	100.0	22.3	22.3	33.3	2.3	7.0	33.3	3.7	11.0
RUPA	*Rubus parviflorus*	9.1	0.1	1.0	12.5	0.1	1.0	93.3	46.3	49.6			
RUSP	*Rubus spectabilis*				12.5	0.3	2.0				11.1	0.1	1.0
RUUR	*Rubus ursinus*				12.5	0.3	2.0						
SAGR5	*Sanicula graveolens*	18.2	0.1	0.6									
SAOR2	*Saxifraga oregano*										11.1	0.1	1.0
SARA2	*Sambucus racemosa*							6.7	0.1	1.0	11.1	0.3	3.0
SAXIF	*Saxifraga* spp.				12.5	0.3	2.0						
SENEC	*Senecio* spp.										11.1	0.1	1.0
SETR	*Senecio triangularis*	18.2	0.3	1.5	75.0	4.4	5.8	6.7	0.1	1.0	88.9	17.3	19.5
SICU	*Sidalcea cusickii*				12.5	0.6	5.0				11.1	0.1	1.0
SOCA6	*Solidago canadensis*	18.2	1.6	9.0	12.5	1.9	15.0	6.7	T	0.1	11.1	0.1	1.0
STCHC3	*Stachys chamissonis* var. *cooleyae*	9.1	0.1	1.0	62.5	2.1	3.4	6.7	0.1	1.0	22.2	0.2	1.0
STELL	*Stellaria* spp.				12.5	0.1	1.0						
STME2	*Stellaria media*	9.1	0.1	1.0	12.5	0.4	3.0	33.3	2.1	6.2	22.2	2.1	9.5
STUM	*Stellaria umbellata*				12.5	0.6	5.0						
SYFO2	*Symphyotrichum foliaceum*	18.2	0.3	1.5	12.5	0.1	1.0	26.7	0.4	1.6	44.4	2.7	6.0

Montane mesic & moist communities		ELGL-BRCA5			RUOC2			RUPA-NWO Casc			VERAT-HEMA80		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
SYSP	*Symphyotrichum spathulatum*				12.5	0.6	5.0						
TAOF	*Taraxacum officinale*										11.1	T	0.1
TEGR2	*Tellima grandiflora*										11.1	T	0.1
THOC	*Thalictrum occidentale*							6.7	T	0.1	33.3	0.3	1.0
TOME	*Tolmiea menziesii*										11.1	0.1	1.0
TRCA21	*Trisetum canescens*	9.1	0.1	1.0							11.1	0.1	1.0
TRHO	*Trifolium howellii*				12.5	0.1	1.0				11.1	0.1	1.0
TRIFO	*Trifolium* spp.				12.5	0.6	5.0						
TSME	*Tsuga mertensiana*				12.5	0.3	2.0						
VASI	*Valeriana sitchensis*										11.1	0.1	1.0
VECA2	*Veratrum californicum*	45.5	1.1	2.4				13.3	0.1	1.0	44.4	17.2	38.8
VERAT	*Veratrum* spp.				12.5	T	0.1	13.3	T	0.1	44.4	21.7	48.8
VERON	*Veronica* spp.										11.1	T	0.1
VESE	*Veronica serpyllifolia*				12.5	T	0.1				22.2	0.1	0.6
VEVI	*Veratrum viride*	27.3	2.8	10.3	25.0	0.4	1.5				11.1	3.9	35.0
VIAD	*Viola adunca*	18.2	0.2	1.0							11.1	0.6	5.0
VIAM	*Vicia americana*	18.2	0.2	1.0	12.5	0.3	2.0	46.7	1.3	2.9	11.1	0.6	5.0
VIAMA3	*Vicia americana* ssp. *americana*	9.1	0.2	2.0	25.0	0.3	1.0						
VICIA	*Vicia* spp.	9.1	0.1	1.0				6.7	0.1	1.0	11.1	0.1	1.0
VIGL	*Viola glabella*	9.1	0.1	1.0	50.0	0.5	1.0	6.7	0.1	1.0	33.3	7.8	23.3
VIMA2	*Viola macloskeyi*										11.1	T	0.1
VIOLA	*Viola* spp.				25.0	0.1	0.6	6.7	0.1	1.0	33.3	0.8	2.3
VIPA4	*Viola palustris*										11.1	T	0.1
VISA	*Vicia sativa*	18.2	0.4	2.0	12.5	0.1	1.0	13.3	0.1	1.0			
XETE	*Xerophyllum tenax*	18.2	0.4	2.0									

Only species with at least 10% constancy in one of the plant communities are listed. T is trace (<0.05).

Montane wet communities		ALIN2/GLST			ALVIS			CALE8			SETR		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ABLA	*Abies lasiocarpa*				7.7	0.1	1.0	10.0	0.10	1.0			
ACCI	*Acer circinatum*				15.4	5.4	35.0						
ACCO4	*Aconitum columbianum*				7.7	0.1	1.0	10.0	0.20	2.0	71.4	2.3	3.2
ACMI2	*Achillea millefolium*							10.0	0.20	2.0			
AGEX	*Agrostis exarata*										28.6	1.9	6.5
AGHU	*Agrostis humilis*							40.0	1.2	3.0	28.6	0.3	1.0
AGROS2	*Agrostis* spp.							10.0	0.10	1.0			
ALIN2	*Alnus incana*	100.0	73.3	73.3									
ALVIS	*Alnus viridis* ssp. *sinuata*				100.0	66.0	66.0						
ANGE2	*Angelica genuflexa*										14.3	1.4	10.0
ANGEL	*Angelica* spp.	33.3	0.03	0.10									
ARMO4	*Arnica mollis*							10.0	0.01	0.1	14.3	0.01	0.1
ASTER	*Aster* spp.	33.3	3.3	10.0									
ATFI	*Athyrium filix-femina*	100.0	3.7	3.7	15.4	3.5	22.5				14.3	0.2	1.0
BAVU	*Barbarea vulgari*							10.0	0.10	1.0			
BOMA3	*Boykinia major*							10.0	0.3	3.0	42.9	2.4	5.7
BRCA5	*Bromus carinatus*							10.0	0.10	1.0			
BRIN2	*Bromus inermis*							10.0	0.2	2.0			
CAAQD	*Carex aquatilis* var. *dives*	33.3	0.03	0.1				40.0	8.0	20.0	28.6	12.2	42.5
CAAR2	*Carex arcta*										14.3	0.2	1.0
CALEH2	*Caltha leptosepala* ssp. *howellii*							10.0	1.0	10.0	42.9	1.6	3.7
CABO2	*Carex bolanderi*	33.3	0.3	1.0									
CABR15	*Carex brunnescens*	33.3	0.03	0.1							14.3	0.3	2.0
CACA11	*Carex canescens*							10.0	0.3	3.0			
CACA4	*Calamagrostis canadensis*				23.1	0.4	1.7	20.0	1.5	7.5	71.4	15.4	21.6
CACO70	*Calliergon cordifolium*							10.0	0.01	0.1			
CAECE	*Carex echinata* ssp. *echinata*							10.0	0.1	1.0			
CAEX5	*Carex exsiccata*							40.0	1.6	4.0	14.3	2.9	20.0
CAFR2	*Carex fracta*	33.3	0.3	1.0									
CAHY4	*Carex hystericina*							20.0	0.8	4.0			
CAIL	*Carex illota*							10.0	0.10	1.0	14.3	0.3	2.0
CALA13	*Carex laeviculmis*							10.0	1.0	10.0			
CALE10	*Carex leptalea*							10.0	4.0	40.0			
CALE8	*Carex lenticularis*							100.0	51.7	51.7	14.3	0.7	5.0
CALU7	*Carex luzulina*							40.0	3.1	7.8	28.6	0.3	1.1
CAMI12	*Castilleja miniata*										14.3	0.1	1.0
CANI2	*Carex nigricans*										14.3	0.3	2.0
CAOB3	*Carex obnupta*							20.0	0.3	1.5			
CASA10	*Carex saxatilis*										28.6	2.2	7.5
CASCB	*Carex scopulorum* var. *bracteosa*							10.0	0.4	4.0	14.3	0.2	1.0
CASU11	*Castilleja suksdorfii*										28.6	1.7	6.0
CAUT	*Carex utriculata*							20.0	3.1	15.5			

Montane wet communities		ALIN2/GLST			ALVIS			CALE8			SETR		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
CHANA2	*Chamerion angustifolium* ssp. *angustifolium*										14.3	0.01	0.1
CIAR4	*Cirsium arvense* var. *argenteum*							10.0	0.2	2.0			
CIDO	*Cicuta douglasii*							20.0	0.2	1.0			
CLSIS	*Claytonia sibirica* var. *sibirica*				30.8	0.7	2.3				14.3	0.2	1.0
COPA28	*Comarum palustre*							20.0	1.0	5.0			
DECE	*Deschampsia cespitosa*							10.0	0.5	5.0	28.6	0.7	2.5
DEME	*Delphinium menziesii*							10.0	0.10	1.0			
DIFO	*Dicentra formosa*				61.5	1.7	2.8						
DOHE	*Dodecatheon hendersonii*							10.0	0.10	1.0			
DOJE	*Dodecatheon jeffreyi*							10.0	1.5	15.0	14.3	0.3	2.0
DOPUM3	*Dodecatheon pulchellum* var. *monanthum*							10.0	0.5	5.0			
DRCA11	*Dryopteris carthusiana*				7.7	1.2	16.0	10.0	0.5	5.0			
ELGL	*Elymus glaucus*	33.3	0.03	0.10							14.3	3.6	25.0
ELQU2	*Eleocharis quinqueflora*							10.0	0.3	3.0			
EPAL	*Epilobium alpinum*	33.3	0.03	0.1							14.3	0.3	2.0
EPCIG	*Epilobium ciliatum* ssp. *glandulosum*	66.7	0.4	0.6				20.0	0.1	0.6	57.2	1.43	2.5
EPCIW	*Epilobium ciliatum* ssp. *watsonii*										14.3	2.6	18.0
EPGL	*Epilobium glaberrimum*										14.3	0.3	2.0
EQAR	*Equisetum arvense*	33.3	0.03	0.1				30.0	1.6	5.4	14.3	0.2	1.0
ERPE3	*Erigeron peregrinus*										28.6	0.7	2.6
EULEL2	*Eucephalus ledophyllus var. ledophyllus*							10.0	0.10	1.0			
GABI	*Galium bifolium*							20.0	0.20	1.0			
GALIU	*Galium* spp.							10.0	0.01	0.1			
GAOR	*Galium oreganum*				15.4	0.3	2.0						
GATR3	*Galium triflorum*	66.7	0.7	1.0							14.3	0.01	0.1
GEMA4	*Geum macrophyllum*							10.0	0.1	1.0	14.3	2.2	15.0
GLGR	*Glyceria grandis*				7.7	0.1	1.0	10.0	0.2	2.0	28.6	0.9	3.0
GLST	*Glyceria striata*	100.0	13.0	13.0							14.3	0.01	0.1
HADI2	*Hackelia diffusa*							10.0	0.1	1.0			
HEMA80	*Heracleum maximum*				23.1	0.9	3.7	30.0	1.1	3.7			
HOBR2	*Hordeum brachyantherum*							10.0	1.0	10.0			
HYAN2	*Hypericum anagalloides*							30.0	1.1	3.7			
HYSC5	*Hypericum scouleri*							10.0	0.2	2.0	28.6	0.30	1.1
HYTE	*Hydrophyllum tenuipes*				76.9	5.9	7.7						
JUARL	*Juncus arcticus* ssp. *littoralis*							10.0	0.5	5.0			
JUEN	*Juncus ensifolius* var. *major*										42.9	0.4	1.0
JUOR	*Juncus orthophyllus*										14.3	0.2	1.0
LIAP	*Ligusticum apiifolium*							10.0	0.10	1.0			

Montane wet communities		ALIN2/GLST			ALVIS			CALE8			SETR		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
LOTR2	*Lomatium triternatum*							20.0	0.5	2.5			
LUCO6	*Luzula comosa* var. *subsessilis*										14.3	0.01	0.1
LULA4	*Lupinus latifolius*							10.0	0.2	2.0			
LUPO2	*Lupinus polyphyllus*							10.0	0.2	2.0	14.3	0.3	2.0
LYAM3	*Lysichiton americanus*	33.3	3.3	10.0	7.7	1.2	15.0	10.0	0.2	2.0			
LYUN	*Lycopus uniflorus*							20.0	0.2	1.0			
MARA7	*Maianthemum racemosum*				15.4	0.3	1.5						
MAST4	*Maianthemum stellatum*	33.3	2.3	7.0	61.5	2.2	3.6				14.3	0.2	1.0
MEPA	*Mertensia paniculata*	33.3	1.0	3.0									
METR3	*Menyanthes trifoliata*							30.0	1.3	4.3			
MIBR6	*Mitella breweri*	66.7	0.1	0.1	7.7	0.4	5.0				28.6	0.03	0.1
MIDE3	*Mimulus dentatus*							10.0	0.1	1.0			
MIGU	*Mimulus guttatus*	66.7	6.0	9.0				30.0	0.5	1.7	57.2	1.43	2.5
MIMO3	*Mimulus moschatus*	33.3	0.03	0.1									
MUFI2	*Muhlenbergia filiformis*										14.3	0.3	2.0
MUHLE	*Muhlenbergia* spp.							10.0	1.0	10.0			
OPHO	*Oplopanax horridus*				23.1	2.0	8.7						
ORSE	*Orthilia secunda*										14.3	0.2	1.0
OXOR	*Oxalis oregana*				23.1	2.1	9.0						
PEGA3	*Perideridia gairdneri*										14.3	0.01	0.1
PEGR2	*Pedicularis groenlandica*							10.0	1.7	17.0	14.3	0.3	2.0
PHCA11	*Physocarpus capitatus*	33.3	0.03	0.1									
PIEL2	*Piperia elegans*										14.3	0.2	1.0
PIEN	*Picea engelmannii*	33.3	0.3	1.0				10.0	0.01	0.1	14.3	0.2	1.0
PLDID	*Platanthera dilatata* var. *dilatata*				7.7	0.2	2.0	10.0	0.01	0.1	14.3	0.2	1.0
PLRE2	*Pleuropogon refractus*										42.9	1.7	4.0
PLST4	*Platanthera stricta*	66.7	0.7	1.0							28.6	0.6	2.0
POBI6	*Polygonum bistortoides*	33.3	0.03	0.1	7.8	0.1	1.0	60.0	0.9	1.5	42.9	2.0	4.7
POCA4	*Polemonium carneum*							10.0	0.1	1.0			
POPH	*Polygonum phytolaccifolium*				15.4	0.5	3.0	10.0	0.1	1.0			
POPR	*Poa pratensis*							10.0	0.1	1.0			
PRHOH	*Prosartes hookeri* var. *hookeri*				23.1	2.15	9.3						
PTAQ	*Pteridium aquilinum*				46.2	5.5	11.8				14.3	0.2	1.0
RAAL	*Ranunculus alismifolius*							10.0	0.2	2.0	14.3	1.7	12.0
RAFL2	*Ranunculus flammula*							10.0	1.5	15.0			
RAGO	*Ranunculus gormanii*							10.0	0.5	5.0			
RIBR	*Ribes bracteosum*				61.5	5.23	8.5						
ROCU	*Rorippa curvisiliqua*							10.0	0.1	1.0			
RUMEX	*Rumex* spp.							10.0	0.2	2.0			
RUPA	*Rubus parviflorus*				15.4	0.5	3.0						
RUSA	*Rumex salicifolius*							10.0	0.1	1.0			

Montane wet communities		ALIN2/GLST			ALVIS			CALE8			SETR		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
RUSP	*Rubus spectabilis*				69.2	19.3	27.9				14.3	0.2	1.0
SAFE	*Saxifraga ferruginea*							10.0	0.1	1.0			
SALIX	*Salix* spp.				7.7	2.1	27.0	20.0	0.9	4.5			
SALUL	*Salix lucida* ssp. *lasiandra*							10.0	0.1	1.0	14.3	0.2	1.0
SANE3	*Saxifraga nelsoniana*	66.7	0.4	0.6							14.3	1.4	10.0
SAOR2	*Saxifraga oregano*										14.3	2.2	15.0
SARA2	*Sambucus racemosa*				53.9	3.2	6.0						
SASC	*Salix scouleriana*							10.0	0.1	1.0			
SASI2	*Salix sitchensis*										14.3	0.3	2.0
SCIRP	*Scirpus* spp.										14.3	0.3	2.0
SCMI2	*Scirpus microcarpus*	33.3	26.7	80.0				10.0	0.2	2.0			
SETR	*Senecio triangularis*	66.7	8.3	12.5	15.4	0.2	1.0	30.0	0.4	1.3	100.0	13.7	13.7
SHAR2	*Sherardia arvensis*							10.0	0.1	1.0			
SICU	*Sidalcea cusickii*										28.6	0.3	1.1
SOSC2	*Sorbus scopulina*							10.0	0.1	1.0			
SPDO	*Spiraea douglasii*							20.0	0.4	2.0			
SPHAG2	*Sphagnum* spp.							10.0	0.5	5.0			
SPSPS	*Spiraea splendens* var. *splenden*							10.0	0.1	1.0			
SPSQ70	*Sphagnum squarrosum*							10.0	9.5	95.0			
STAM2	*Streptopus amplexifolius*	33.3	0.03	0.1	7.7	0.01	0.1						
STCHC3	*Stachys chamissonis* var. *cooleyae*	66.7	15.0	22.5	61.5	4.1	6.6	10.0	0.2	2.0	42.9	1.2	2.7
STCR2	*Stellaria crispa*										14.3	0.01	0.1
STLA16	*Streptopus lanceolatus*				15.4	0.4	2.5				14.3	0.01	0.1
STME	*Stachys mexicana*	33.3	3.3	10.0	7.7	0.01	0.1						
SYFO2	*Symphyotrichum foliaceum*										14.3	0.3	2.0
TAOFC	*Taraxacum officinale* ssp. *ceratophorum*							10.0	0.1	1.0			
THALI2	*Thalictrum* spp.							10.0	0.1	1.0			
THOC	*Thalictrum occidental*				15.4	0.5	3.0						
TITR	*Tiarella trifoliata*				7.7	0.1	1.0				14.3	0.01	0.1
TITRU	*Tiarella trifoliata* var. *unifoliata*										14.3	0.2	1.0
TOME	*Tolmiea menziesii*				38.5	6.7	17.4						
TRCA	*Trautvetteria caroliniensis*	33.3	10.0	30.0	7.7	0.01	0.1						
TRCA21	*Trisetum canescens*										28.6	1.3	4.5
TREUA	*Trientalis europaea* ssp. *arctica*	33.3	0.03	0.1									
TRHO	*Trifolium howellii*										14.3	0.2	1.0
TRLO	*Trifolium longipes*							20.0	0.5	2.5	42.9	2.6	6.03
TROV2	*Trillium ovatum*				15.4	0.2	1.0						
TSHE	*Tsuga heterophylla*				15.4	0.2	1.0	10.0	0.10	1.0			
VAMY2	*Vaccinium myrtillus*										14.3	0.2	1.0
VAUL	*Vaccinium uliginosum*							10.0	0.1	1.0			
VEAM2	*Veronica americana*	66.7	0.4	0.6				20.0	0.1	0.6	28.6	0.3	1.0

Montane wet communities		ALIN2/GLST			ALVIS			CALE8			SETR		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
VECA2	*Veratrum californicum*				15.4	0.2	1.5	10.0	0.1	1.0	14.3	0.2	1.0
VERON	*Veronica* spp.	33.3	1.0	3.0							14.3	0.01	0.1
VEVI	*Veratrum viride*										28.6	1.7	6.0
VEWO2	*Veronica wormskjoldii*										14.3	0.01	0.1
VIAD	*Viola adunca*				15.4	0.5	3.5						
VICIA	*Vicia* spp.										14.3	0.3	2.0
VIGL	*Viola glabella*	33.3	0.3	1.0	23.1	8.2	35.3				14.3	0.2	1.0
VIMA2	*Viola macloskeyi*							20.0	0.4	2.0	14.3	0.3	2.0
VIOLA	*Viola* spp.				38.5	1.5	3.8	20.0	2.0	10.0			
VIPA4	*Viola palustris*							10.0	0.1	1.0			
VISE3	*Viola sempervirens*				15.4	0.3	2.0						

Only species with at least 10% constancy in one of the plant communities are listed. T is trace (<0.05).

Montane wet communities		CAAQD			CAAQD (LYAM phase)			CAUT		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ABCO	*Abies concolor*				14.3	0.1	1.0			
ABLA	*Abies lasiocarpa*				14.3	0.4	3.0	11.1	0.1	1.0
ACCO4	*Aconitum columbianum*				28.6	0.6	2.1			
ACMI2	*Achillea millefolium*							11.1	T	0.1
AGEX	*Agrostis exarata*	3.6	T	0.1				11.1	0.3	3.0
AGHU	*Agrostis humilis*	7.1	0.1	1.0	28.6	9.3	32.5			
AGOR	*Agrostis oregonensis*	3.6	0.1	4.0				11.1	2.2	20.0
AGSC5	*Agrostis scabra*							11.1	0.1	1.0
ALVIS	*Alnus viridis* ssp. *sinuata*	7.1	1.1	15.5	28.6	2.7	9.5	22.2	7.8	35.0
ANAR3	*Angelica arguta*				57.1	2.4	4.3			
ANGE2	*Angelica genuflexa*	7.1	T	0.1				11.1	T	0.1
ARMO4	*Arnica mollis*				28.6	0.4	1.5	11.1	T	0.1
ASTER	*Aster* spp.	3.6	0.4	10.0				11.1	0.1	1.0
ATFI	*Athyrium filix-femina*	7.1	0.1	1.1	14.3	0.3	2.0			
BOMA3	*Boykinia major*	3.6	T	1.0				11.1	0.4	4.0
CAAQD	*Carex aquatilis* var. *dives*	100.0	62.5	62.5	100.0	74.9	74.9	33.3	4.6	13.7
CALEH2	*Caltha leptosepala* ssp. *howellii*	32.1	3.3	10.1	14.3	3.6	25.0	22.2	1.9	8.6
CABR6	*Cardamine breweri*				14.3	0.1	1.0			
CACA11	*Carex canescens*	10.7	0.6	5.4						
CACA4	*Calamagrostis canadensis*	17.9	2.8	15.4	28.6	0.9	3.0	44.4	7.9	17.8
CAECE	*Carex echinata* ssp. *echinata*	21.4	1.1	5.2				11.1	0.1	1.0
CAJO	*Carex jonesii*	7.1	0.1	1.5				11.1	0.3	3.0
CALA11	*Carex lasiocarpa*							11.1	1.7	15.0
CALE4	*Caltha leptosepala*							11.1	2.2	20.0
CALE8	*Carex lenticularis*	3.6	0.1	2.0				11.1	1.3	12.0
CALI7	*Carex limosa*	3.6	T	1.0	14.3	0.1	1.0			
CALU7	*Carex luzulina*	21.4	1.1	5.2				11.1	T	0.1
CAMI12	*Castilleja miniata*							11.1	0.4	4.0
CAMO32	*Canadanthus modestus*	7.1	0.3	4.5				11.1	0.2	2.0
CAREX	*Carex* spp.	7.1	0.8	11.0	28.6	0.2	0.6			
CASI2	*Carex simulata*	3.6	0.1	3.0	28.6	0.2	0.6			
CASTI3	*Calamagrostis stricta* ssp. *inexpansa*	3.6	0.7	20.0	57.1	5.4	9.5			
CAUT	*Carex utriculata*	32.1	6.8	21.2				100.0	47.2	47.2
CIDO	*Cicuta douglasii*	7.1	0.2	3.0	28.6	7.1	25.0	11.1	0.1	1.0
CLSIS	*Claytonia sibirica* var. *sibirica*				14.3	T	0.1			
COCA13	*Cornus canadensis*				14.3	0.1	1.0			
COPA28	*Comarum palustre*	10.7	0.2	1.7	14.3	1.0	7.0			
DECE	*Deschampsia cespitosa*	32.1	1.9	6.0				22.2	0.6	2.6
DOJE	*Dodecatheon jeffreyi*	39.3	3.3	8.5	71.4	5.6	7.8	11.1	T	0.1
ELGL	*Elymus glaucus*				14.3	0.4	3.0			

Montane wet communities		CAAQD			CAAQD (LYAM phase)			CAUT		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ELQU2	*Eleocharis quinqueflora*	25.0	2.8	11.3						
EPAL	*Epilobium alpinum*	3.6	T	0.1	14.3	0.1	1.0	11.1	0.1	1.0
EPCIC	*Epilobium ciliatum* ssp. *ciliatum*							11.1	T	0.1
EPCIG	*Epilobium ciliatum* ssp. *glandulosum*	10.7	0.1	1.0				11.1	T	0.1
EPCIW	*Epilobium ciliatum* ssp. *watsonii*	14.3	0.2	1.6	71.4	1.4	2.0	11.1	T	0.1
EQAR	*Equisetum arvense*	28.6	0.9	3.1	42.9	0.6	1.3	11.1	0.1	1.0
FRVE	*Fragaria vesca*	3.6	T	0.1	14.3	T	0.1			
GABI	*Galium bifolium*	10.7	0.1	1.0	28.6	T	0.1	22.2	1.1	5.0
GATR2	*Galium trifidum*				28.6	0.2	0.6			
GATR3	*Galium triflorum*							11.1	0.1	1.0
GEMA4	*Geum macrophyllum*	3.6	T	1.0	14.3	T	T	11.1	T	0.1
GESC	*Gentiana sceptrum*	10.7	0.4	3.7						
GLST	*Glyceria striata*				28.6	2.4	8.5			
HYAN2	*Hypericum anagalloides*	42.9	7.3	17.1	57.1	2.1	3.8	22.2	3.4	15.5
HYSC5	*Hypericum scouleri*	3.6	T	1.0	42.9	0.4	1.0	11.1	0.1	1.0
JUEN	*Juncus ensifolius*	14.3	0.2	1.6				11.1	0.1	1.0
KOMA	*Koeleria macrantha*							11.1	T	0.1
LIAP	*Ligusticum apiifolium*							11.1	0.3	3.0
LOIN5	*Lonicera involucrata*	3.6	T	0.1				11.1	0.1	1.0
LUZUL	*Luzula* spp.				14.3	0.1	1.0			
LYAM3	*Lysichiton americanus*	17.9	0.1	0.5	100.0	6.1	6.1	11.1	T	0.1
MAST4	*Maianthemum stellatum*				14.3	T	0.1			
MEPA	*Mertensia paniculata*				14.3	0.1	1.0			
METR3	*Menyanthes trifoliata*	3.6	0.5	15.0				11.1	0.1	1.0
MIBO	*Microseris borealis*	10.7	0.1	1.4						
MIBR6	*Mitella breweri*				14.3	T	T			
MIGU	*Mimulus guttatus*	10.7	0.1	0.7	42.9	3.0	7.0	11.1	0.1	1.0
MIOV	*Mitella ovalis*				14.3	0.1	1.0			
MIPR	*Mimulus primuloides*							11.1	0.2	2.0
MUFI2	*Muhlenbergia filiformis*	10.7	0.1	1.0	28.6	0.2	0.6			
OESA	*Oenanthe sarmentosa*	3.6	0.7	20.0	28.6	0.6	2.0			
PEGR2	*Pedicularis groenlandica*	14.3	0.1	1.0	14.3	0.4	3.0	11.1	0.3	3.0
PERA	*Pedicularis racemosa*				14.3	T	0.1			
PHAL2	*Phleum alpinum*							11.1	T	0.1
PIEN	*Picea engelmannii*	7.1	0.1	2.0	14.3	0.6	4.0	22.2	0.6	2.5
PIMO3	*Pinus monticola*							11.1	0.1	1.0
PLDI3	*Platanthera dilatata*	39.3	0.3	0.8	42.9	0.3	0.7	22.2	0.1	0.6
PLST4	*Platanthera stricta*				14.3	0.4	3.0			
POBI6	*Polygonum bistortoides*	32.1	1.2	3.7	42.9	2.6	6.0	22.2	1.0	4.5
PYAS	*Pyrola asarifolia*	3.6	T	0.1				11.1	T	0.1
RAGO	*Ranunculus gormanii*	10.7	0.4	3.3				11.1	0.2	2.0

Montane wet communities		CAAQD			CAAQD (LYAM phase)			CAUT		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
RHMA3	*Rhododendron macrophyllum*				14.3	0.1	1.0			
RIBR	*Ribes bracteosum*				14.3	0.1	1.0			
RULA2	*Rubus lasiococcus*	3.6	T	0.1	14.3	T	0.1			
RUOC2	*Rudbeckia occidentalis*				14.3	T	T			
RUSP	*Rubus spectabilis*				14.3	0.1	1.0			
SABO2	*Salix boothii*	14.3	3.1	21.5	28.6	2.9	10.0			
SACO2	*Salix commutata*	7.1	2.9	40.1				22.2	5.9	26.5
SAGE2	*Salix geyeriana*	14.3	3.3	22.8	42.9	16.4	38.3	11.1	0.2	2.0
SAOR2	*Saxifraga oregana*	3.6	T	1.0				11.1	0.1	1.0
SASI2	*Salix sitchensis*	3.6	0.1	2.0	14.3	5.7	40.0			
SCCO	*Scirpus congdonii*							11.1	T	0.1
SETR	*Senecio triangularis*	10.7	0.3	2.4	57.1	5.1	9.0	22.2	0.7	3.0
SOSI2	*Sorbus sitchensis*				14.3	0.3	2.0			
SPDO	*Spiraea douglasii*	17.9	1.4	8.0	42.9	5.7	13.3			
SPHAG2	*Sphagnum* spp.	42.9	8.6	20.1	14.3	2.9	20.0	11.1	0.1	1.0
SPSPS	*Spiraea splendens* var. *splendens*	7.1	0.6	8.5				11.1	0.6	5.0
SPSQ70	*Sphagnum squarrosum*	3.6	2.5	70.0				11.1	0.6	5.0
STME2	*Stellaria media*				14.3	T	T			
SYFO2	*Symphyotrichum foliaceum*	3.6	T	1.0	28.6	T	0.1			
SYSP	*Symphyotrichum spathulatum*				14.3	0.1	1.0	11.1	0.1	1.0
TITR	*Tiarella trifoliata*				14.3	0.1	1.0			
TOPA6	*Torreyochloa pallida*	3.6	T	1.0				11.1	0.1	1.0
TREUA	*Trientalis europaea* ssp. *arctica*	3.6	T	1.0	14.3	0.9	6.0			
TRGL5	*Triantha glutinosa*	14.3	0.3	1.8						
TRLO	*Trifolium longipes*	3.6	T	0.1	14.3	0.3	2.0	11.1	T	0.1
TSHE	*Tsuga heterophylla*	3.6	T	0.1				11.1	0.1	1.0
VAME	*Vaccinium membranaceum*				42.9	0.9	2.0			
VAOV	*Vaccinium ovalifolium*							11.1	0.3	3.0
VAUL	*Vaccinium uliginosum*	35.7	6.5	18.3				11.1	0.1	1.0
VEAM2	*Veronica americana*	21.4	0.4	1.8	28.6	0.2	0.6			
VERAT	*Veratrum* spp.				14.3	0.1	1.0			
VERON	*Veronica* spp.				14.3	0.1	1.0			
VESE	*Veronica serpyllifolia*				28.6	0.1	0.5			
VIAD	*Viola adunca*	3.6	0.3	8.0	14.3	0.1	1.0			
VIMA2	*Viola macloskeyi*	7.1	0.1	2.0	57.1	11.3	19.8			
VIOR	*Viola orbiculata*							11.1	0.1	1.0
VIPA4	*Viola palustris*	14.3	0.2	1.1	28.6	2.0	7.0	11.1	0.3	3.0

Only species with at least 10% constancy in one of the plant communities are listed. T is trace (<0.05).

Montane wet communities		CALEH2-DOJE			ELQU2		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ABLA	*Abies lasiocarpa*	27.3	0.7	2.7	16.7	0.2	1.1
AGHU	*Agrostis humilis*	18.2	1.3	7.0	25.0	0.4	1.4
AGROS2	*Agrostis* spp.				16.7	0.2	1.0
CAAQD	*Carex aquatilis* var. *dives*	36.4	4.8	13.3	58.3	11.0	18.9
CALEH2	*Caltha leptosepala* ssp. *howellii*	100.0	21.3	21.3	50.0	4.3	8.5
CAEC	*Carex echinata*	18.2	0.7	4.0	33.3	2.7	8.0
CAIL	*Carex illota*	18.2	2.1	11.6	8.3	T	0.1
CAJO	*Carex jonesii*	18.2	2.3	12.5	41.7	1.2	2.8
CALE8	*Carex lenticularis*	27.3	1.0	3.7	8.3	2.1	25.0
CALI7	*Carex limosa*				16.7	0.7	4.0
CALU7	*Carex luzulina*	45.5	2.3	5.0	50.0	5.9	11.8
CASC12	*Carex scopulorum*	9.1	0.7	8.0	33.3	1.8	5.5
CASI2	*Carex simulate*				25.0	1.1	4.4
CAUT	*Carex utriculata*	9.1	0.1	1.0	50.0	1.1	2.2
COPA28	*Comarum palustre*				25.0	0.2	0.7
DACA3	*Danthonia californica*				16.7	T	0.1
DAIN	*Danthonia intermedia*				16.7	0.1	0.6
DECE	*Deschampsia cespitosa*	27.3	0.4	1.3	50.0	0.4	0.7
DOAL	*Dodecatheon alpinum*				16.7	0.6	3.5
DOJE	*Dodecatheon jeffreyi*	90.9	9.8	10.8	75.0	4.5	6.0
DRAN	*Drosera anglica*				25.0	3.3	13.0
ELGL	*Elymus glaucus*	18.2	0.2	1.0			
ELQU2	*Eleocharis quinqueflora*	18.2	1.4	7.5	91.7	39.0	42.5
EPAL	*Epilobium alpinum*	9.1	0.1	1.0	41.7	T	0.1
EPILO	*Epilobium* spp.	9.1	T	0.1	16.7	T	0.1
EQAR	*Equisetum arvense*	36.4	0.6	1.5	50.0	0.5	1.1
ERPE3	*Erigeron peregrinus*	18.2	0.2	1.1			
HYAN2	*Hypericum anagalloides*	36.4	0.6	1.8	66.7	2.4	3.7
JUARL	*Juncus arcticus* var. *littoralis*	18.2	4.1	22.5	8.3	1.3	15.0
JUEF	*Juncus effusus*	9.1	0.2	2.0	16.7	T	0.1
JUEN	*Juncus ensifolius*	9.1	0.5	5.0	25.0	0.1	0.4
LIGR	*Ligusticum grayi*	36.4	0.7	2.0	8.3	0.1	1.0
LUCO6	*Luzula comosa*	9.1	0.1	1.0	16.7	0.2	1.1
METR3	*Menyanthes trifoliata*				16.7	0.3	1.6
MIBO	*Microseris borealis*				41.7	0.2	0.5
MIGU	*Mimulus guttatus*	18.2	T	0.1	8.3	0.3	3.0
MIPR	*Mimulus primuloides*				33.3	0.2	0.6
MUFI2	*Muhlenbergia filiformis*	27.3	0.6	2.3	41.7	2.2	5.2
ORALA2	*Oreostemma alpigenum* var. *alpigenum*	18.2	0.9	5.0	50.0	0.4	0.9
PEGR2	*Pedicularis groenlandica*	72.7	0.9	1.3	50.0	0.8	1.5
PICO	*Pinus contorta*	18.2	0.2	1.0	8.3	T	0.1
PIEN	*Picea engelmannii*	18.2	0.2	1.0	8.3	0.1	1.0

Montane wet communities		CALEH2-DOJE			ELQU2		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
PLDID	*Platanthera dilatata* var. *dilatata*	18.2	0.1	0.6	41.7	0.2	0.5
PLST4	*Platanthera stricta*	18.2	0.5	3.0			
POBI6	*Polygonum bistortoides*	45.5	5.5	12.2	41.7	1.8	4.2
POFL3	*Potentilla flabellifolia*	27.3	1.0	3.7			
RAGO	*Ranunculus gormanii*				41.7	2.7	6.4
SACO2	*Salix commutata*	27.3	10.9	40.0	25.0	3.8	15.0
SAGE2	*Salix geyeriana*	9.1	1.4	15.0	16.7	0.1	0.6
SAOR2	*Saxifraga oregano*				33.3	0.4	1.1
SAPL2	*Salix planifolia*	18.2	0.3	1.5			
SCCO	*Scirpus congdonii*	9.1	0.1	1.0	25.0	0.4	1.4
SETR	*Senecio triangularis*	54.5	4.1	7.5	16.7	0.1	0.6
SPHAG2	*Sphagnum* spp.	9.1	0.4	4.0	66.7	18.8	28.3
SPRO	*Spiranthes romanzoffiana*	9.1	T	0.1	25.0	T	0.1
SPSPS	*Spiraea splendens* var. *splendens*	9.1	0.7	8.0	25.0	1.0	4.0
SYSP	*Symphyotrichum spathulatum*	9.1	0.7	8.0	16.7	0.1	0.6
TRGL5	*Triantha glutinosa*	27.3	0.4	1.3	75.0	2.1	2.8
TRLO	*Trifolium longipes*	36.4	1.7	4.8	8.3	0.4	5.0
UTMA	*Utricularia macrorhiza*				16.7	0.3	1.6
VAUL	*Vaccinium uliginosum*	9.1	0.2	2.0	75.0	5.0	6.7
VECA2	*Veratrum californicum*	18.2	T	0.1			
VERAT	*Veratrum* spp.				16.7	T	0.1
VIMA2	*Viola macloskeyi*	27.3	0.7	2.7	8.3	0.8	10.0

Only species with at least 10% constancy in one of the plant communities are listed. T is trace (<0.05).

Montane wet communities		DECE			DECE (SPHAG phase)			DECE-TRLO		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ACMI2	*Achillea millefolium*							25.6	2.0	7.8
AGHU	*Agrostis humilis*	7.1	0.1	1.0				20.5	0.7	3.4
CAAQD	*Carex aquatilis* var. *dives*	7.1	0.1	1.0	75.0	8.6	11.4	10.3	0.8	7.8
CALEH2	*Caltha leptosepala* ssp. *howellii*	7.1	0.7	10.0	31.3	2.2	7.0	12.8	0.4	3.4
CABU6	*Carex buxbaumii*	14.3	3.9	27.5	6.3	0.9	15.0	7.7	1.3	16.7
CACA4	*Calamagrostis canadensis*	7.1	1.1	15.0	12.5	0.1	0.6	5.1	0.4	8.5
CAECE	*Carex echinata* ssp. *echinata*	7.1	0.4	5.0	37.5	2.6	7.0	2.6	0.1	2.0
CAEX5	*Carex exsiccata*	57.1	13.4	23.5						
CAJO	*Carex jonesii*				25.0	1.0	4.0	5.1	0.3	5.5
CALA11	*Carex lasiocarpa*	14.3	2.6	18.5						
CALE8	*Carex lenticularis*	14.3	0.4	2.6				2.6	0.2	8.0
CALE9	*Carex leporinella*							17.9	1.3	7.0
CALU7	*Carex luzulina*	7.1	0.7	10.0	50.0	12.9	25.8	35.9	2.4	6.8
CAPA14	*Carex pachystachya*	7.1	0.1	1.0				20.5	2.8	13.9
CASC12	*Carex scopulorum*				6.3	0.3	5.0	20.5	0.5	2.4
CASI2	*Carex simulate*				18.8	0.8	4.3			
CAUT	*Carex utriculata*	28.6	1.2	4.0	56.3	8.1	14.3	2.6	0.1	3.0
COPA28	*Comarum palustre*				12.5	0.1	0.5	2.6	0.3	10.0
DACA3	*Danthonia californica*				6.3	0.1	1.0	23.1	1.2	5.3
DAIN	*Danthonia intermedia*							41.0	2.4	6.0
DECE	*Deschampsia cespitosa*	100.0	51.3	51.3	100.0	43.6	43.6	100.0	42.1	42.1
DOJE	*Dodecatheon jeffreyi*	7.1	0.4	5.0	75.0	6.4	8.5	12.8	0.4	2.8
ELPA3	*Eleocharis palustris*	14.3	1.6	11.0						
ELQU2	*Eleocharis quinqueflora*				68.8	10.3	14.9	7.7	1.0	13.0
EPAL	*Epilobium alpinum*				31.3	0.3	0.8	15.4	0.2	1.2
EQAR	*Equisetum arvense*				12.5	1.0	8.0	2.6	T	0.1
GABI	*Galium bifolium*	7.1	T	0.1	18.8	0.1	0.7	10.3	1.0	9.3
HOBR2	*Hordeum brachyantherum*							12.8	0.3	2.4
HYAN2	*Hypericum anagalloides*				68.8	6.5	9.5	12.8	0.3	2.0
JUARL	*Juncus arcticus* var. *littoralis*	42.9	2.2	5.2	12.5	4.7	37.5	17.9	1.4	7.7
JUNEN	*Juncus nevadensis* var. *nevadensis*				12.5	4.4	35.0			
JUOR	*Juncus orthophyllus*				12.5	0.3	2.5			
KOMA	*Koeleria macrantha*							12.8	0.5	3.6
LIGR	*Ligusticum grayi*				12.5	T	0.1	28.2	1.5	5.2
LUCO6	*Luzula comosa*				12.5	0.1	0.6	7.7	0.1	0.7
METR3	*Menyanthes trifoliata*				12.5	0.4	3.0			
MIBO	*Microseris borealis*				37.5	5.3	14.0	10.3	0.5	4.5
MIGU	*Mimulus guttatus*							10.3	0.1	0.8
MIPR	*Mimulus primuloides*				37.5	3.5	9.3	10.3	0.5	5.1
MUFI2	*Muhlenbergia filiformis*	14.3	1.1	7.6	68.8	6.6	9.6	30.8	1.6	5.2
ORALA2	*Oreostemma alpigenum* var. *alpigenum*	28.6	0.7	2.5	31.3	0.9	3.0	33.3	2.1	6.3
PAST10	*Packera streptanthifolia*				25.0	1.8	7.0	7.7	0.1	0.7

Montane wet communities		DECE			DECE (SPHAG phase)			DECE-TRLO		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
PEAT	*Pedicularis attollens*				6.3	0.2	3.0	15.4	0.3	1.7
PEGR2	*Pedicularis groenlandica*				43.8	2.1	4.7	7.7	0.2	2.3
PEPR2	*Penstemon procerus*							20.5	1.0	4.8
PHAL2	*Phleum alpinum*							38.5	1.0	2.7
PICO	*Pinus contorta*				12.5	0.1	1.1	7.7	0.1	1.3
PLDID	*Platanthera dilatata* var. *dilatata*	7.1	0.1	2.0	12.5	0.1	0.6	5.1	0.1	2.6
POBI6	*Polygonum bistortoides*				25.0	1.6	6.5	23.1	1.1	4.8
PODR	*Potentilla drummondii*				18.8	0.3	1.3	43.6	3.0	6.9
POFL3	*Potentilla flabellifolia*							25.6	1.4	5.4
RAAL	*Ranunculus alismifolius*	7.1	T	0.1	18.8	0.7	3.7	12.8	0.6	4.4
RAGO	*Ranunculus gormanii*	7.1	0.2	3.0	43.8	8.0	18.3	23.1	2.2	9.3
RAPO	*Ranunculus populago*							25.6	1.1	4.2
SAAN2	*Sanguisorba annua*				12.5	0.3	2.0			
SABO2	*Salix boothii*				12.5	0.2	1.5			
SAGE2	*Salix geyeriana*	7.1	0.1	1.0	31.3	0.6	1.8			
SALIX	*Salix* spp.	14.3	0.1	1.0						
SCCO	*Scirpus congdonii*	14.3	2.1	15.0	43.8	0.6	1.3	17.9	1.1	6.3
SPDO	*Spiraea douglasii*	28.6	0.4	1.5						
SPHAG2	*Sphagnum* spp.				87.5	33.1	37.8	5.1	0.5	10.0
SPRO	*Spiranthes romanzoffiana*	7.1	T	0.1	31.3	0.1	0.3	5.1	T	0.6
SPSPS	*Spiraea splendens* var. *splendens*	7.1	0.5	7.0	12.5	0.1	1.0	2.6	T	0.1
SYFO2	*Symphyotrichum foliaceum*	14.3	T	0.1	31.3	0.5	1.5	41.0	3.3	8.1
SYSP	*Symphyotrichum spathulatum*	28.6	2.3	8.0	6.3	0.1	2.0	25.6	1.4	5.4
TRGL5	*Triantha glutinosa*				43.8	1.8	4.1	2.6	T	1.0
TRLO	*Trifolium longipes*	14.3	0.2	1.1	37.5	1.5	4.0	84.6	14.3	16.9
VAUL	*Vaccinium uliginosum*	28.6	0.4	1.3	68.8	3.0	4.4	2.6	T	0.1
VESE	*Veronica serpyllifolia*							10.3	0.1	0.8
VEWO2	*Veronica wormskjoldii*				6.3	T	0.1	17.9	0.1	0.6
VIAD	*Viola adunca*				6.3	0.2	3.0	10.3	0.1	1.0
VIMA2	*Viola macloskeyi*				18.8	0.6	3.0	2.6	T	1.0
VIOR	*Viola orbiculata*	7.1	0.1	1.0				10.3	0.2	1.8

Only species with at least 10% constancy in one of the plant communities are listed. T is trace (<0.05).

Montane wet communities		CAEX5			SPDO			VAUL/TRCA21		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ABPR	*Abies procera*				12.5	0.1	1.0			
AGEX	*Agrostis exarata*				12.5	0.3	2.5			
AGGLG	*Agoseris glauca* var. *glauca*				12.5	0.3	2.0			
AGHA2	*Agrostis hallii*				12.5	0.2	1.5			
AGHU	*Agrostis humilis*	12.5	0.1	1.0	6.3	0.3	4.0	46.7	0.9	1.9
ALIN2	*Alnus incana*	12.5	1.9	15.0	6.3	1.9	30.0	13.3	0.1	0.6
ALRU2	*Alnus rubra*	25.0	0.3	1.0						
ALVIS	*Alnus viridis* ssp. *sinuate*	12.5	0.3	2.0	12.5	0.3	2.6	13.3	0.1	0.6
ANAR3	*Angelica arguta*	12.5	0.1	1.0						
ANGE2	*Angelica genuflexa*	12.5	0.1	1.0				6.7	0.1	1.0
ATFI	*Athyrium filix-femina*	12.5	0.1	1.0						
AUPA70	*Aulacomnium palustre*							20.0	10.3	51.7
BEGL	*Betula glandulosa*	12.5	0.6	5.0				6.7	0.1	1.0
BLSP	*Blechnum spicant*							13.3	0.2	1.6
BOMA3	*Boykinia major*	12.5	0.1	1.0				6.7	0.3	5.0
CAAP3	*Carex aperta*	12.5	0.6	5.0				6.7	0.1	1.0
CAAQD	*Carex aquatilis* var. *dives*				37.5	1.5	4.0	73.3	9.0	12.3
CAAR2	*Carex arcta*	12.5	1.3	10.0						
CAAU3	*Carex aurea*	12.5	0.1	1.0				13.3	0.1	0.6
CALEH2	*Caltha leptosepala* ssp. *howellii*				12.5	1.9	15.5	66.7	9.1	13.7
CACA4	*Calamagrostis canadensis*	12.5	0.1	1.0	37.5	7.3	19.5	6.7	0.1	2.0
CACO8	*Carex comosa*	12.5	1.6	13.0				6.7	1.3	20.0
CACU5	*Carex cusickii*	12.5	1.3	10.0				6.7	0.3	5.0
CAECE	*Carex echinata* ssp. *echinata*	25.0	0.6	2.5				20.0	0.9	4.3
CAEX5	*Carex exsiccata*	100.0	57.0	57.0	50.0	5.0	10.0	20.0	1.1	5.3
CAHY4	*Carex hystericina*	12.5	2.5	20.0	6.3	0.1	2.0			
CAIL	*Carex illota*	12.5	0.1	1.0				13.3	0.2	1.5
CALE8	*Carex lenticularis*	12.5	0.1	1.0	25.0	0.7	2.8	6.7	0.1	2.0
CALE9	*Carex leporinella*	12.5	1.9	15.0						
CALU7	*Carex luzulina*	12.5	0.4	3.0	25.0	3.4	13.5	53.3	1.3	2.4
CAME6	*Carex mertensii*				12.5	0.1	1.0			
CAMI12	*Castilleja miniata*	12.5	0.3	2.0	12.5	0.1	1.1			
CAOB3	*Carex obnupta*							13.3	0.7	5.5
CATU3	*Carex tumulicola*	12.5	0.1	1.0	6.3	0.2	3.0			
CAUT	*Carex utriculata*	12.5	1.9	15.0	6.3	0.1	1.0	26.7	3.5	13.0
CIDO	*Cicuta douglasii*	25.0	4.1	16.5						
COSES	*Cornus sericea* ssp. *sericea*	12.5	0.1	1.0						
DECE	*Deschampsia cespitosa*	25.0	0.4	1.5	31.3	0.8	2.4	33.3	0.8	2.4
DOJE	*Dodecatheon jeffreyi*	12.5	0.1	1.0	31.3	5.7	18.2	86.7	5.7	6.6
DRRO	*Drosera rotundifolia*							26.7	1.3	5.0
ELRO2	*Eleocharis rostellata*							13.3	1.7	13.0
EPCIG	*Epilobium ciliatum* ssp. *glandulosum*	25.0	0.5	2.0	6.3	0.3	5.0	13.3	0.1	1.0
EPGL	*Epilobium glaberrimum*	12.5	1.3	10.0	6.3	0.3	5.0			

Montane wet communities		CAEX5			SPDO			VAUL/TRCA21		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
EQAR	*Equisetum arvense*				6.3	T	0.1	26.7	1.4	5.3
ERANA3	*Eriophorum angustifolium* ssp. *angustifolium*							20.0	2.1	10.4
ERGR8	*Eriophorum gracile*							13.3	0.1	1.1
ERPE3	*Erigeron peregrinus*	25.0	0.3	1.0						
GALIU	*Galium* spp.	25.0	0.4	1.5						
GAOV2	*Gaultheria ovatifolia*							13.3	T	0.1
GATR2	*Galium trifidum*				12.5	0.1	0.6			
GATR3	*Galium triflorum*	12.5	0.1	1.0	6.3	0.1	1.0			
GESC	*Gentiana sceptrum*				18.8	1.1	5.7	20.0	T	0.1
GLGR	*Glyceria grandis*	37.5	1.1	3.0	6.3	0.1	1.0			
HYAN2	*Hypericum anagalloides*	12.5	0.1	1.0	18.8	0.2	1.0	60.0	11.3	18.8
HYSC5	*Hypericum scouleri*	37.5	0.9	2.3	6.3	0.1	2.0	6.7	0.1	1.0
JUARL	*Juncus arcticus* var. *littoralis*				12.5	0.1	1.0			
JUEF	*Juncus effusus*	25.0	0.4	1.5				6.7	0.1	1.0
JUEN	*Juncus ensifolius*	12.5	0.6	5.0	12.5	0.2	1.5	13.3	0.1	1.0
JUPA2	*Juncus patens*				12.5	0.4	3.0			
LIGR	*Ligusticum grayi*							13.3	0.3	2.1
LUCO6	*Luzula comosa*							20.0	T	0.1
LYAM3	*Lysichiton americanus*	25.0	0.4	1.5	18.8	0.8	4.0	13.3	0.1	1.0
METR3	*Menyanthes trifoliata*	12.5	0.6	5.0				13.3	0.5	3.5
MIGU	*Mimulus guttatus*	25.0	0.5	2.0				6.7	0.1	1.0
MUFI2	*Muhlenbergia filiformis*				6.3	0.1	1.0	13.3	1.1	8.5
ORALA2	*Oreostemma alpigenum* var. *alpigenum*				6.3	T	0.1	20.0	1.1	5.7
PAFI3	*Parnassia fimbriata*							13.3	0.5	3.5
PAST10	*Packera streptanthifolia*							20.0	1.0	5.0
PEGR2	*Pedicularis groenlandica*				6.3	0.1	1.0	66.7	1.2	1.8
PLDID	*Platanthera dilatata* var. *dilatata*	12.5	0.1	1.0	6.3	0.1	1.0	46.7	0.9	2.0
POBI6	*Polygonum bistortoides*	12.5	0.1	1.0	12.5	T	0.1	26.7	0.3	1.0
PODR	*Potentilla drummondii*				12.5	0.1	1.0	6.7	0.3	4.0
PYAS	*Pyrola asarifolia*	12.5	0.1	1.0	6.3	0.1	1.0			
ROPI2	*Rosa pisocarpa*	12.5	0.1	1.0	6.3	0.2	3.0			
SALIX	*Salix* spp.	12.5	0.6	5.0	12.5	0.4	3.5	26.7	0.5	2.0
SAOF3	*Sanguisorba officinalis*				6.3	T	0.1	13.3	2.1	16.0
SAOR2	*Saxifraga oregano*	12.5	0.1	1.0				13.3	0.1	1.0
SCCO	*Scirpus congdonii*				12.5	0.3	2.0			
SCMI2	*Scirpus microcarpus*	25.0	1.9	7.5	18.8	3.0	16.0			
SETR	*Senecio triangularis*	12.5	0.3	2.0	18.8	0.9	4.7	20.0	0.1	0.7
SPAN2	*Sparganium angustifolium*	12.5	0.1	1.0						
SPDO	*Spiraea douglasii*	37.5	0.9	2.4	93.8	62.5	66.7	13.3	0.2	1.5
SPHAG2	*Sphagnum* spp.				18.8	1.8	9.3	46.7	9.1	19.6
SPRO	*Spiranthes romanzoffiana*							40.0	0.5	1.2
SPSPS	*Spiraea splendens* var.				6.3	2.2	35.0	13.3	0.7	5.5

Montane wet communities		CAEX5			SPDO			VAUL/TRCA21		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
	splendens									
SYFO2	*Symphyotrichum foliaceum*	12.5	0.1	1.0	12.5	0.3	2.0			
THPL	*Thuja plicata*							13.3	0.3	2.0
TRCE3	*Trichophorum cespitosum*							26.7	9.3	35.0
TREUA	*Trientalis europaea* ssp. *arctica*				12.5	0.1	0.6	6.7	T	0.1
TRGL5	*Triantha glutinosa*	12.5	0.3	2.0				93.3	2.7	2.9
VAUL	*Vaccinium uliginosum*	12.5	2.5	20.0	25.0	2.8	11.3	100.0	17.3	17.3
VEAM2	*Veronica americana*	25.0	1.4	5.5	18.8	0.4	2.4	6.7	0.1	1.0
VIED	*Viburnum edule*							13.3	0.1	1.1
VIGL	*Viola glabella*				12.5	2.9	23.5			
VIOLA	*Viola* spp.	12.5	0.9	7.0	12.5	0.4	3.0	13.3	0.3	2.5

Only species with at least 10% constancy in one of the plant communities are listed. T is trace (<0.05).

Subalpine dry communities		CAIN9-ARNE			LUSE4			PODA-ERPY2			PODA-EULEL2		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ABAM	*Abies amabilis*				9.1	0.1	1.0	11.1	0.1	1.0			
ABLA	*Abies lasiocarpa*	25.0	0.3	1.0							30.0	0.4	1.3
ACMI2	*Achillea millefolium*				45.5	0.5	1.0						
ACOC3	*Achnatherum occidentale*	50.0	1.0	2.0				11.1	0.1	1.0	10.0	0.1	1.0
AGDI	*Agrostis diegoensis*				90.9	3.7	4.1				10.0	0.2	2.0
AGHU	*Agrostis humilis*							11.1	0.1	1.0			
AMAL2	*Amelanchier alnifolia*	25.0	0.3	1.0									
ARCA7	*Arenaria capillaris*							22.2	0.4	2.0	20.0	0.3	1.5
ARDI7	*Arnica ×diversifolia*										10.0	0.1	1.0
ARLY	*Arabis lyallii*										10.0	0.2	2.0
ARNE	*Arctostaphylos nevadensis*	100.0	5.5	5.5	18.2	5.0	27.5						
ARPL	*Arabis platysperma*	25.0	0.3	1.0							20.0	0.3	1.5
BRSI	*Bromus sitchensis*				36.4	0.5	1.5						
CAAR11	*Castilleja arachnoidea*							22.2	1.1	5.0			
CABE	*Cardamine bellidifolia*							11.1	T	T	10.0	0.1	1.0
CAHA2	*Carex halliana*	25.0	0.3	1.0	18.2	1.1	6.0	11.1	0.2	2.0	10.0	0.1	1.0
CAHA6	*Carex haydeniana*										10.0	0.1	1.0
CAIN9	*Carex inops*	100.0	14.0	14.0									
CAMI7	*Carex microptera*							11.1	T	T			
CAPA14	*Carex pachystachya*										10.0	1.1	11.0
CAPH2	*Carex phaeocephala*										10.0	1.0	10.0
CASTI2	*Castilleja* spp.							11.1	0.1	1.0			
CASU11	*Castilleja suksdorfii*				18.2	0.2	1.0						
CASU2	*Calochortus subalpinus*				27.3	0.4	1.3				20.0	0.2	1.0
CHGR	*Cheilanthes gracillima*	75.0	1.3	1.7									
CHUM	*Chimaphila umbellata*	25.0	0.3	1.0									
CIUMU	*Cistanthe umbellata* var. *umbellata*							44.4	1.0	2.3	50.0	1.0	2.0
CRAC3	*Cryptogramma acrostichoides*										10.0	0.4	4.0
ELEL5	*Elymus elymoides*	75.0	1.0	1.3	54.5	0.9	1.7	55.6	0.7	1.2	50.0	0.6	1.2
EPAL	*Epilobium alpinum*										10.0	0.1	1.0
ERBL2	*Ericameria bloomeri*										10.0	0.4	4.0
ERMA4	*Eriogonum marifolium*	25.0	0.5	2.0				11.1	0.1	1.0			
ERPY2	*Eriogonum pyrolifolium*							100.0	5.9	5.9	20.0	0.2	1.0
ERUM	*Eriogonum umbellatum*				81.8	2.8	3.4	22.2	1.2	5.5	10.0	0.5	5.0
EULEL2	*Eucephalus ledophyllus* var. *ledophyllus*	25.0	0.3	1.0	90.9	9.5	10.5	11.1	0.1	1.0	100.0	6.3	6.3
EURA11	*Eurybia radulina*							11.1	0.1	1.0			
FEVI	*Festuca viridula*	25.0	0.3	1.0	18.2	0.6	3.5	22.2	0.6	2.5	40.0	0.4	1.0
HIAL2	*Hieracium albiflorum*	25.0	0.3	1.0									
HIGR	*Hieracium gracile*										10.0	0.1	1.0
HODI	*Holodiscus discolor*	75.0	0.8	1.0									
JUCO6	*Juniperus communis*	25.0	2.5	10.0	18.2	5.5	30.0				10.0	0.1	1.0
JUDR	*Juncus drummondii*	25.0	0.3	1.0							10.0	0.2	2.0

Subalpine dry communities		CAIN9-ARNE			LUSE4			PODA-ERPY2			PODA-EULEL2		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
JUPA	*Juncus parryi*	25.0	0.3	1.0				11.1	0.2	2.0			
LOMA5	*Lomatium martindalei*	25.0	0.3	1.0	27.3	0.3	1.0	66.7	0.7	1.0	40.0	0.4	1.0
LUGLH	*Luzula glabrata* var. *hitchcockii*										10.0	0.2	2.0
LULA4	*Lupinus latifolius*							44.4	0.9	2.0	70.0	6.7	9.6
LULE2	*Lupinus Lepidus*				9.1	0.1	1.0	11.1	0.2	2.0			
LUPA4	*Luzula parviflora*										10.0	0.4	4.0
LUPE	*Luetkea pectinata*				9.1	0.6	7.0	11.1	0.1	1.0	40.0	0.9	2.3
LUSE4	*Lupinus sericeus*				100.0	10.7	10.7				20.0	0.2	1.0
NOAL2	*Nothocalais alpestris*							66.7	0.6	0.9	10.0	0.1	1.0
PAMY	*Paxistima myrsinites*	50.0	1.8	3.5									
PECA16	*Penstemon cardwellii*	25.0	1.0	4.0									
PEDA2	*Penstemon davidsonii*	25.0	0.5	2.0									
PEPR2	*Penstemon procerus*				18.2	0.2	1.0				20.0	0.3	1.5
PERY	*Penstemon rydbergii*										10.0	0.4	4.0
PHDI3	*Phlox diffusa*	25.0	3.0	12.0	9.1	0.5	5.0						
PHEM	*Phyllodoce empetriformis*										10.0	0.1	1.0
PHHA	*Phacelia hastata*	25.0	0.3	1.0							20.0	0.5	2.5
PIAL	*Pinus albicaulis*	50.0	1.5	3.0	9.1	0.1	1.0				20.0	0.2	1.0
PICO	*Pinus contorta*	50.0	2.0	4.0									
PODA	*Polygonum davisiae*	25.0	1.8	7.0	81.8	2.5	3.1	100.0	9.7	9.7	100.0	13.1	13.1
PODO4	*Polygonum douglasii*										10.0	0.1	1.0
POPU3	*Polemonium pulcherrimum*				36.4	2.9	8.0						
POSU10	*Poa suksdorfii*										20.0	0.8	4.0
PUOC	*Pulsatilla occidentalis*										10.0	0.4	4.0
RICE	*Ribes cereum*	25.0	0.3	1.0									
SEOR2	*Sedum oregonense*	75.0	4.0	5.3									
SETR	*Senecio triangularis*										10.0	0.1	1.0
SIOR3	*Silene oregana*	25.0	1.0	4.0									
SOSI2	*Sorbus sitchensis*				9.1	6.4	70.0				20.0	0.2	1.0
TAOF	*Taraxacum officinale*							11.1	T	T			
TRSP2	*Trisetum spicatum*				9.1	0.2	2.0				10.0	0.1	1.0
TSME	*Tsuga mertensiana*	100.0	1.8	1.8				33.3	1.0	3.0	30.0	0.5	1.7
VAAT2	*Vahlodea atropurpurea*				9.1	0.1	1.0				10.0	0.5	5.0
VAME	*Vaccinium membranaceum*	25.0	2.5	10.0									

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Subalpine mesic communities		FEVI (AGPA8 phase)			FEVI (CASP5-LULA4 phase)			FEVI-EULEL2			LUPE		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ABLA	*Abies lasiocarpa*				5.9	0.2	3.0	12.0	0.1	1.0	8.8	0.1	1.0
ACMI2	*Achillea millefolium*	57.1	1.1	2.0	5.9	0.1	1.0	4.0	T	1.0	23.5	0.2	1.0
AGAU2	*Agoseris aurantiaca*	57.1	1.0	1.8	29.4	0.6	2.0	24.0	0.3	1.3			
AGDI	*Agrostis diegoensis*	100.0	9.6	9.6	11.8	0.2	2.0	4.0	T	1.0	8.8	0.3	3.0
ANAL4	*Antennaria alpina*	14.3	0.1	1.0				4.0	T	1.0	17.6	0.7	4.0
ARCA7	*Arenaria capillaris*	71.4	1.4	2.0	17.6	0.7	4.0	12.0	0.2	1.4	29.4	0.9	3.1
CAIN9	*Carex inops*							12.0	0.1	0.7			
CAMI12	*Castilleja miniata*	28.6	2.1	7.5	5.9	0.1	1.0	8.0	0.6	8.0	5.9	0.1	1.0
CANI2	*Carex nigricans*				5.9	0.1	2.0				38.2	1.0	2.7
CAPA14	*Carex pachystachya*							12.0	0.1	1.0			
CAPA26	*Castilleja parviflora*	57.1	1.4	2.5	17.6	0.2	1.3	12.0	0.4	3.3	55.9	2.1	3.8
CASP5	*Carex spectabilis*	85.7	4.4	5.2	100.0	16.1	16.1	48.0	4.3	8.9	50.0	2.5	4.9
CASU2	*Calochortus subalpinus*	28.6	0.3	1.0	17.6	0.2	1.0	52.0	2.5	4.8			
CIUMU	*Cistanthe umbellata* var. *umbellata*				5.9	0.1	1.0	12.0	0.1	0.8	5.9	0.1	1.0
ELEL5	*Elymus elymoides*				5.9	0.1	2.0	12.0	0.2	1.5	5.9	0.1	1.0
ERPE3	*Erigeron peregrinus*	28.6	1.6	5.5	11.8	0.5	4.0	4.0	0.2	5.0	20.6	0.6	3.1
EULEL2	*Eucephalus ledophyllus* var. *ledophyllus*	42.9	4.0	9.3	58.8	6.5	11.1	100.0	13.6	13.6	14.7	0.3	1.8
FEVI	*Festuca viridula*	100.0	25.0	25.0	100.0	20.2	20.2	96.0	23.0	24.0	2.9	0.1	2.0
HIGR	*Hieracium gracile*	71.4	0.7	1.0	17.6	0.2	1.3	40.0	0.4	1.0	23.5	0.3	1.2
JUCO6	*Juniperus communis*	14.3	5.0	35.0				4.0	2.4	60.0			
JUDR	*Juncus drummondii*				17.6	0.2	1.0	16.0	0.7	4.1	32.4	1.9	5.8
JUPA	*Juncus parryi*	28.6	2.3	8.0	11.8	0.1	0.6	20.0	0.6	3.0	23.5	0.3	1.4
LIGR	*Ligusticum grayi*	57.1	1.1	2.0	52.9	0.7	1.3	20.0	0.3	1.4	8.8	0.1	0.9
LOMA5	*Lomatium martindalei*				5.9	0.1	1.0	24.0	0.2	1.0	14.7	0.1	1.0
LUGLH	*Luzula glabrata* var. *hitchcockii*	14.3	0.1	1.0	29.4	2.5	8.6	16.0	0.8	4.8	20.6	0.3	1.4
LULA4	*Lupinus latifolius*	71.4	5.7	8.0	100.0	19.8	19.8	64.0	8.4	13.2	23.5	1.5	6.3
LULE2	*Lupinus Lepidus*							4.0	T	1.0	14.7	0.3	1.8
LUPA4	*Luzula parviflora*	14.3	1.0	7.0	5.9	0.1	2.0	4.0	0.8	20.0	8.8	0.1	1.0
LUPE	*Luetkea pectinata*	42.9	2.4	5.7	11.8	0.8	7.0	20.0	1.5	7.6	100.0	25.1	25.1
LUSE4	*Lupinus sericeus*	14.3	1.4	10.0							2.9	T	1.0
NOAL2	*Nothocalais alpestris*	28.6	0.3	1.0	29.4	0.5	1.8	24.0	0.7	2.8	2.9	T	1.0
ORALA2	*Oreostemma alpigenum* var. *alpigenum*	14.3	0.1	1.0	5.9	2.4	40.0				26.5	2.5	9.3
PEDA2	*Penstemon davidsonii*										11.8	0.1	1.0
PEPR2	*Penstemon procerus*	57.1	0.6	1.0	11.8	0.1	1.1				11.8	0.1	1.0
PHAL2	*Phleum alpinum*	14.3	0.1	1.0									
PHEM	*Phyllodoce empetriformis*	28.6	2.3	8.0							17.6	0.4	2.4
PIAL	*Pinus albicaulis*							4.0	0.1	2.0	20.6	0.3	1.6
POBI6	*Polygonum bistortoides*	28.6	2.9	10.0	17.6	1.5	8.7	32.0	2.3	7.3			
PODA	*Polygonum davisiae*				23.5	1.2	5.0	36.0	3.0	8.2	55.9	1.5	2.6
PODR	*Potentilla drummondii*	14.3	0.7	5.0	17.6	0.2	1.3	8.0	0.3	3.5			
POFL3	*Potentilla flabellifolia*	28.6	1.0	3.5	29.4	0.5	1.6	20.0	0.6	3.0	5.9	0.1	1.7

Subalpine mesic communities		FEVI (AGPA8 phase)			FEVI (CASP5-LULA4 phase)			FEVI-EULEL2			LUPE		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
POPU3	*Polemonium pulcherrimum*				5.9	0.3	5.0	12.0	0.5	4.0	2.9	T	1.0
PUOC	*Pulsatilla occidentalis*	57.1	3.0	5.3	47.1	7.4	15.8	36.0	5.3	14.7	8.8	0.4	5.0
RIAC	*Ribes acerifolium*				11.8	0.1	1.0						
SATO2	*Saxifraga tolmiei*										23.5	1.5	6.3
SETR	*Senecio triangularis*	14.3	0.1	1.0	35.3	2.4	6.7	28.0	0.4	1.4	29.4	0.4	1.5
SOSI2	*Sorbus sitchensis*	28.6	0.3	1.0	11.8	0.1	1.0						
TRSP2	*Trisetum spicatum*	28.6	0.3	1.0	5.9	0.6	10.0	4.0	0.1	2.0	2.9	T	1.0
TSME	*Tsuga mertensiana*				17.6	0.5	3.0	12.0	0.4	3.7	38.2	0.7	1.7
VASI	*Valeriana sitchensis*	28.6	4.7	16.5	11.8	0.9	8.0	4.0	0.4	10.0	5.9	0.1	1.0
VEVI	*Veratrum viride*				35.3	1.3	3.7	16.0	1.0	6.5	8.8	0.1	1.3
XETE	*Xerophyllum tenax*	28.6	1.3	4.5				12.0	1.4	12.0			

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Subalpine mesic communities		FEVI (CAIN9 phase)			FEVI (PODA phase)		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ABLA	*Abies lasiocarpa*	42.9	0.8	1.9	20.0	T	0.1
ACOC3	*Achnatherum occidentale*	57.1	1.8	3.1	60.0	1.6	2.7
AGAU2	*Agoseris aurantiaca*	14.3	T	0.1			
AGGL	*Agoseris glauca*	21.4	0.2	1.0			
AGVA	*Agrostis variabilis*	7.1	0.1	1.0	20.0	0.2	1.0
BRCA5	*Bromus carinatus*	35.7	0.6	1.8	20.0	0.2	1.0
CAAR11	*Castilleja arachnoidea*				20.0	T	0.1
CABR12	*Carex breweri*				40.0	1.4	3.6
CAHA2	*Carex halliana*	50.0	2.4	4.9			
CAHO5	*Carex hoodii*	14.3	T	0.1			
CAIN9	*Carex inops*	100.0	8.4	8.4			
CANI2	*Carex nigricans*	14.3	0.3	2.0			
CAPA14	*Carex pachystachya*				20.0	0.6	3.0
CARO5	*Carex rossii*				40.0	0.6	1.5
CASU2	*Calochortus subalpinus*	64.3	1.1	1.8			
CIRE	*Cirsium remotifolium*	7.1	0.1	1.0	20.0	0.2	1.0
CIUMU	*Cistanthe umbellata* var. *umbellata*	21.4	0.2	1.0	40.0	0.6	1.5
DACA3	*Danthonia californica*	7.1	T	0.1	20.0	3.0	15.0
DAIN	*Danthonia intermedia*	14.3	0.3	2.0			
ELEL5	*Elymus elymoides*	71.4	1.6	2.3	80.0	5.0	6.3
ELGL	*Elymus glaucus*	21.4	0.4	2.0			
ERAL3	*Erigeron aliceae*	21.4	0.6	2.7			
ERBL2	*Ericameria bloomeri*	42.9	4.8	11.2			
ERMA4	*Eriogonum marifolium*	21.4	0.4	1.7	40.0	0.8	2.0
EROV	*Eriogonum ovalifolium*	14.3	0.1	1.0	40.0	1.6	4.0
ERPY2	*Eriogonum pyrolifolium*	21.4	0.3	1.4	60.0	1.6	2.7
ERUM	*Eriogonum umbellatum*	21.4	0.4	1.7	40.0	1.2	3.0
EULEL2	*Eucephalus ledophyllus* var. *ledophyllus*	50.0	2.3	4.6			
EURA11	*Eurybia radulina*				20.0	0.6	3.0
FEVI	*Festuca viridula*	100.0	30.5	30.5	100.0	14.6	14.6
HIGR	*Hieracium gracile*	21.4	0.7	3.3	20.0	0.2	1.0
IPAG	*Ipomopsis aggregata*	28.6	0.4	1.5			
JUDR	*Juncus drummondii*	21.4	0.9	4.0	40.0	2.2	5.5
JUPA	*Juncus parryi*	7.1	0.5	7.0	20.0	T	0.1
LIGR	*Ligusticum grayi*	14.3	T	0.1			
LULA4	*Lupinus latifolius*	71.4	10.6	14.9	40.0	0.8	2.0
LULE2	*Lupinus lepidus*				40.0	1.0	2.5
NOAL2	*Nothocalais alpestris*	71.4	0.8	1.1	60.0	0.8	1.3
ORALA2	*Oreostemma alpigenum* var. *alpigenum*				20.0	T	0.1
PEEU	*Penstemon euglaucus*	21.4	0.3	1.3			
PHHA	*Phacelia hastata*	7.1	0.1	1.0	20.0	0.2	1.0
PICO	*Pinus contorta*	21.4	0.6	2.7	40.0	0.8	2.1

Subalpine mesic communities		FEVI (CAIN9 phase)			FEVI (PODA phase)		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
PODA	*Polygonum davisiae*	57.1	1.1	1.9	100.0	4.6	4.6
SYFO2	*Symphyotrichum foliaceum*	28.6	0.7	2.5			
TRSP2	*Trisetum spicatum*	14.3	0.1	1.0			
TSME	*Tsuga mertensiana*	42.9	0.9	2.2	20.0	0.2	1.0
VIBA2	*Viola bakeri*	21.4	0.2	0.7			

Only species with at least 10% constancy in one of the plant communities are listed. T is trace (<0.05).

Subalpine moist communities		CANI2 (mono. phase)			CANI2 (ORALA2 phase)			CANI2 (POFL3 phase)		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ACMI2	*Achillea millefolium*				12.5	0.1	1.0			
AGHU	*Agrostis humilis*	7.7	0.1	1.0	6.3	0.3	5.0	35.7	0.4	1.2
AGVA	*Agrostis variabilis*	23.1	0.5	2.0	6.3	0.1	1.0			
ANAL4	*Antennaria alpina*	46.2	1.0	2.2	31.3	0.4	1.4	21.4	0.3	1.3
ARCA7	*Arenaria capillaris*				12.5	0.3	2.5			
CABR12	*Carex breweri*	15.4	0.2	1.0	6.3	0.6	10.0	7.1	T	0.1
CAIL	*Carex illota*							14.3	0.1	0.6
CAME7	*Cassiope mertensiana*	7.7	0.1	1.0	12.5	0.2	1.5			
CANI2	*Carex nigricans*	100.0	60.7	60.7	100.0	30.3	30.3	100.0	32.1	32.1
CAPA26	*Castilleja parviflora*				25.0	0.9	3.5	42.9	0.7	1.7
CAPU	*Calamagrostis purpurascens*				6.3	2.5	40.0	14.3	2.9	20.0
CASC12	*Carex scopulorum*	15.4	0.2	1.0				14.3	1.2	8.6
CASP5	*Carex spectabilis*	23.1	0.2	1.0	25.0	1.0	4.0	35.7	1.4	4.0
DACA3	*Danthonia californica*				12.5	0.3	2.5	7.1	0.1	1.0
DAIN	*Danthonia intermedia*	15.4	0.4	2.5				7.1	0.1	1.0
DECE	*Deschampsia cespitosa*				18.8	2.5	13.3	14.3	0.1	0.6
EPAL	*Epilobium alpinum*	7.7	0.1	1.0	18.8	0.6	3.3	14.3	0.1	1.0
ERLO	*Erigeron lonchophyllus*	15.4	0.6	4.0						
ERMO8	*Erythronium montanum*							28.6	1.8	6.3
ERPE3	*Erigeron peregrinus*	7.7	0.1	1.0	18.8	1.5	8.0	28.6	1.6	5.5
FEOV	*Festuca ovina*				12.5	0.9	7.5	7.1	1.1	15.0
HIGR	*Hieracium gracile*	7.7	0.1	1.0	12.5	0.1	1.0	14.3	0.7	5.0
JUDR	*Juncus drummondii*	69.2	1.5	2.2	18.8	0.7	3.7	50.0	1.3	2.6
JUME3	*Juncus mertensianus*	23.1	0.2	1.0	6.3	0.3	5.0	7.1	0.1	2.0
JUPA	*Juncus parryi*	15.4	0.4	2.5	18.8	0.6	3.0	21.4	3.9	18.4
KAMI	*Kalmia microphylla*				12.5	0.2	1.5			
LIGR	*Ligusticum grayi*	7.7	0.2	2.0	56.3	1.9	3.4	78.6	4.9	6.3
LULA4	*Lupinus latifolius*	7.7	0.1	1.0	6.3	0.1	2.0	14.3	2.4	16.5
LUPE	*Luetkea pectinata*				18.8	0.6	3.3	21.4	1.1	5.3
NOAL2	*Nothocalais alpestris*	30.8	1.2	3.8						
ORALA2	*Oreostemma alpigenum* var. *alpigenum*	15.4	0.2	1.0	100.0	20.5	20.5	50.0	1.7	3.4
PEPR2	*Penstemon procerus*	7.7	0.1	1.0	18.8	0.1	0.7			
PHEM	*Phyllodoce empetriformis*	23.1	0.8	3.4	56.3	1.3	2.3	35.7	0.9	2.6
POBI6	*Polygonum bistortoides*				12.5	0.1	1.0	7.1	0.1	1.0
PODA	*Polygonum davisiae*	15.4	0.1	0.6	6.3	0.1	1.0			
POFL3	*Potentilla flabellifolia*	38.5	0.4	1.0	56.3	3.6	6.4	100.0	18.6	18.6
PUOC	*Pulsatilla occidentalis*	15.4	0.4	2.5						
RAPO	*Ranunculus populago*				6.3	0.2	3.0	14.3	0.2	1.5
SACO2	*Salix commutata*				12.5	0.7	5.5			
TRLO	*Trifolium longipes*							14.3	0.8	5.5
VADE	*Vaccinium deliciosum*	7.7	0.2	2.0	12.5	0.1	1.0	7.1	0.7	10.0
VEVI	*Veratrum viride*							14.3	1.2	8.5

Subalpine moist communities		CANI2 (mono. phase)			CANI2 (ORALA2 phase)			CANI2 (POFL3 phase)		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
VEWO2	*Veronica wormskjoldii*	7.7	0.1	1.0	12.5	0.2	1.5	7.1	0.1	1.0

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Subalpine moist communities		CANI2 (CASP5 phase)			CANI2 (LUPE phase)			CANI2 (PHEM phase)		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ACMI2	*Achillea millefolium*	4.2	T	1.0	13.3	0.1	0.8			
AGHU	*Agrostis humilis*	29.2	0.3	0.9	13.3	0.9	7.0	23.1	0.6	2.7
ANAL4	*Antennaria alpina*	16.7	0.3	1.8	13.3	0.1	0.8	15.4	0.2	1.0
ARCA7	*Arenaria capillaris*				13.3	0.1	1.0			
ARLY	*Arabis lyallii*				13.3	0.1	1.0			
CALEH2	*Caltha leptosepala* ssp. *howellii*	12.5	0.8	6.3						
CABR12	*Carex breweri*				13.3	0.1	0.8			
CAME7	*Cassiope mertensiana*				13.3	0.2	1.5	38.5	2.5	6.4
CANI2	*Carex nigricans*	100.0	30.8	30.8	100.0	24.3	24.3	100.0	25.9	25.9
CAPA26	*Castilleja parviflora*	20.8	0.2	1.0	46.7	2.7	5.7	23.1	0.2	1.0
CASC12	*Carex scopulorum*	4.2	0.4	10.0	6.7	0.3	4.0	23.1	0.5	2.0
CASP5	*Carex spectabilis*	100.0	25.5	25.5	46.7	1.4	3.0	46.2	1.8	3.8
DECE	*Deschampsia cespitosa*							23.1	1.5	6.7
DOAL	*Dodecatheon alpinum*	16.7	0.2	1.3				23.1	0.2	1.0
DOJE	*Dodecatheon jeffreyi*	16.7	1.7	10.0	6.7	0.8	12.0	30.8	0.5	1.8
EPAL	*Epilobium alpinum*	29.2	0.3	0.9	6.7	0.1	1.0	7.7	0.1	1.0
EPMI	*Epilobium minutum*	4.2	0.2	5.0	6.7	0.2	3.0	15.4	0.2	1.5
ERMO8	*Erythronium montanum*	12.5	0.8	6.7	13.3	1.1	8.5	7.7	0.1	1.0
GECA	*Gentiana calycosa*	4.2	T	1.0				15.4	0.2	1.5
HIGR	*Hieracium gracile*	37.5	0.6	1.7	60.0	0.7	1.1	7.7	0.1	1.0
JUDR	*Juncus drummondii*	37.5	1.1	2.9	40.0	1.5	3.8	15.4	0.2	1.5
JUME3	*Juncus mertensianus*	25.0	0.3	1.2	13.3	0.2	1.5	15.4	0.6	4.0
JUPA	*Juncus parryi*	16.7	0.4	2.2	40.0	3.3	8.3	15.4	1.1	7.0
KAMI	*Kalmia microphylla*	4.2	T	1.0				69.2	12.3	17.8
LIGR	*Ligusticum grayi*	70.8	2.2	3.1	40.0	1.3	3.3	61.5	1.8	3.0
LUGLH	*Luzula glabrata* var. *hitchcockii*				20.0	0.6	3.0			
LULA4	*Lupinus latifolius*	33.3	2.0	6.1	6.7	2.0	30.0	7.7	0.8	10.0
LUPA4	*Luzula parviflora*	4.2	T	0.1	20.0	0.3	1.5	7.7	0.1	1.0
LUPE	*Luetkea pectinata*	20.8	0.7	3.4	100.0	17.6	17.6	38.5	1.5	4.0
NOAL2	*Nothocalais alpestris*	16.7	0.4	2.3				7.7	0.1	1.0
ORALA2	*Oreostemma alpigenum* var. *alpigenum*	50.0	3.5	7.0	40.0	1.0	2.6	84.6	4.9	5.8
PEAT	*Pedicularis attollens*							15.4	0.2	1.5
PHAL2	*Phleum alpinum*	12.5	0.1	1.0				7.7	0.1	1.0
PHEM	*Phyllodoce empetriformis*	41.7	1.1	2.8	60.0	1.2	2.0	100.0	13.0	13.0
POBI6	*Polygonum bistortoides*	12.5	0.5	4.0						
PODA	*Polygonum davisiae*	12.5	0.1	0.4	20.0	0.7	3.7	7.7	0.3	4.0
PODR	*Potentilla drummondii*	12.5	1.3	10.7						
POFL3	*Potentilla flabellifolia*	45.8	2.9	6.4	20.0	0.7	3.7	7.7	0.2	3.0
PUOC	*Pulsatilla occidentalis*	12.5	0.2	1.7						
SATO2	*Saxifraga tolmiei*	4.2	0.2	4.0	40.0	2.2	5.4	7.7	0.1	1.0
SETR	*Senecio triangularis*	16.7	0.3	1.5	6.7	0.1	1.0			
SYSP	*Symphyotrichum*	16.7	1.3	7.5						

Subalpine moist communities		CANI2 (CASP5 phase)			CANI2 (LUPE phase)			CANI2 (PHEM phase)		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
	spathulatum									
TRGL5	*Triantha glutinosa*	8.3	0.5	5.5				15.4	0.2	1.5
TSME	*Tsuga mertensiana*	4.2	T	1.0	33.3	0.7	2.2	23.1	0.2	1.0
VAAT2	*Vahlodea atropurpurea*	16.7	0.2	1.3	13.3	0.5	4.0	7.7	0.2	3.0
VADE	*Vaccinium deliciosum*	16.7	0.3	1.5	13.3	0.3	2.0	53.8	2.8	5.3
VEVI	*Veratrum viride*	12.5	0.3	2.0						

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Subalpine moist communities		PHEM			PHEM/CAME7			PHEM/POFL3		
Plant symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ACMI2	*Achillea millefolium*	12.1	0.2	1.3	6.1	0.1	1.0	18.2	0.6	3.5
AGDI	*Agrostis diegoensis*	12.1	0.4	3.5	3.0	T	1.0	9.1	0.9	10.0
AGHU	*Agrostis humilis*	3.0	T	1.0	6.1	0.1	1.5	27.3	1.5	5.3
ANAL4	*Antennaria alpina*	30.3	0.5	1.5	15.2	0.3	1.8	18.2	0.4	2.0
CAME7	*Cassiope mertensiana*				100.0	16.9	16.9	18.2	0.5	3.0
CANI2	*Carex nigricans*	48.5	3.3	6.7	66.7	5.1	7.6	36.4	1.3	3.5
CAPA26	*Castilleja parviflora*	51.5	1.4	2.8	42.4	0.8	1.9	63.6	4.0	6.3
CASC12	*Carex scopulorum*				3.0	T	0.1	18.2	0.4	2.0
CASP5	*Carex spectabilis*	39.4	2.0	13.0	42.4	0.9	2.1	54.5	13.1	24.0
EPAL	*Epilobium alpinum*	9.1	0.2	2.2	12.1	0.2	1.3	18.2	1.0	5.5
ERMO8	*Erythronium montanum*	21.2	0.6	2.9	6.1	0.2	3.0	18.2	0.8	4.5
ERPE3	*Erigeron peregrinus*	39.4	2.5	6.4				63.6	6.4	10.0
GECA	*Gentiana calycosa*				3.0	0.1	2.0	18.2	1.4	7.5
HIGR	*Hieracium gracile*	27.3	0.5	2.0	33.3	0.4	1.3	9.1	0.1	1.0
JUDR	*Juncus drummondii*	36.4	0.9	2.5	24.2	0.3	1.3	36.4	0.5	1.3
JUME3	*Juncus mertensianus*	12.1	0.1	1.1	9.1	0.1	1.0	36.4	0.5	1.5
JUPA	*Juncus parryi*	12.1	0.1	1.0	24.2	0.7	3.0			
LIGR	*Ligusticum grayi*	51.5	1.2	2.3	48.5	1.5	3.1	81.8	2.5	3.0
LUGLH	*Luzula glabrata* var. *hitchcockii*	12.1	0.4	3.0	21.2	0.2	1.0			
LULA4	*Lupinus latifolius*	33.3	2.4	7.1	36.4	3.0	8.3	54.5	11.5	21.0
LULE2	*Lupinus Lepidus*	12.1	0.2	2.0	6.1	0.4	7.0			
LUPA4	*Luzula parviflora*	9.1	0.1	1.3	21.2	0.2	1.1			
LUPE	*Luetkea pectinata*	87.9	11.5	13.1	84.8	8.8	10.3	18.2	0.4	2.0
ORALA2	*Oreostemma alpigenum* var. *alpigenum*	27.3	1.7	6.1	51.5	2.0	3.9	54.5	1.7	3.2
PHEM	*Phyllodoce empetriformis*	100.0	37.3	37.3	100.0	31.5	31.5	100.0	26.0	26.0
PIAL	*Pinus albicaulis*	18.2	0.3	1.7	18.2	0.2	1.2			
POBI6	*Polygonum bistortoides*	12.1	0.1	1.0	6.1	0.3	4.5	27.3	0.8	3.0
PODA	*Polygonum davisiae*	18.2	0.3	1.5	18.2	0.2	1.0			
POFL3	*Potentilla flabellifolia*	18.2	1.0	5.2	15.2	0.2	1.2	100.0	11.4	11.4
PUOC	*Pulsatilla occidentalis*	15.2	0.4	2.8	6.1	T	0.5			
SAPL2	*Salix planifolia*	3.0	0.3	10.0				18.2	10.9	60.0
SATO2	*Saxifraga tolmiei*				12.1	0.1	1.0			
SETR	*Senecio triangularis*	27.3	0.6	2.1	9.1	0.4	4.0	45.5	3.2	7.0
TRGL5	*Triantha glutinosa*							18.2	0.2	1.0
TRSP2	*Trisetum spicatum*	3.0	T	1.0	12.1	0.1	0.5			
TSME	*Tsuga mertensiana*	42.4	0.6	1.5	45.5	1.0	2.2	18.2	0.3	1.5
VAAT2	*Vahlodea atropurpurea*				12.1	0.1	1.0			
VADE	*Vaccinium deliciosum*	15.2	2.1	14.0	54.5	5.2	9.5	18.2	0.5	3.0
VASI	*Valeriana sitchensis*	6.1	0.1	1.3				27.3	1.6	6.0
VEWO2	*Veronica wormskjoldii*	3.0	T	1.0				18.2	0.2	1.0

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Subalpine moist communities		CASP5-LULA4			SETR-VERAT-VASI		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
AGAU2	*Agoseris aurantiaca*	11.5	0.1	0.8			
AGDI	*Agrostis diegoensis*	11.5	0.3	2.2	18.2	0.6	3.1
ARLA8	*Arnica latifolia*	3.8	T	1.0	31.8	0.5	1.6
ARMO4	*Arnica mollis*	19.2	2.0	10.2			
CANI2	*Carex nigricans*	30.8	1.3	4.3	13.6	0.1	1.0
CAPA26	*Castilleja parviflora*	38.5	2.3	5.9	22.7	0.5	2.0
CAPH2	*Carex phaeocephala*	11.5	0.3	2.7	4.5	T	1.0
CASP5	*Carex spectabilis*	100.0	25.1	25.1	27.3	3.0	11.2
CASU11	*Castilleja suksdorfii*	7.7	0.2	2.5	13.6	0.2	1.3
CASU2	*Calochortus subalpinus*				13.6	0.1	1.0
EPAL	*Epilobium alpinum*	23.1	0.2	1.0	13.6	0.1	1.0
ERMO8	*Erythronium montanum*	11.5	0.7	6.0	13.6	0.8	5.5
ERPE3	*Erigeron peregrinus*	38.5	3.1	8.0	18.2	0.2	1.1
EULEL2	*Eucephalus ledophyllus* var. *ledophyllus*	26.9	1.5	5.6	27.3	1.4	5.1
FEVI	*Festuca viridula*	7.7	0.1	1.5	13.6	2.1	15.3
HIGR	*Hieracium gracile*	23.1	0.3	1.5	4.5	T	1.0
JUDR	*Juncus drummondii*	34.6	1.4	4.1	27.3	0.5	2.0
JUME3	*Juncus mertensianus*	15.4	0.2	1.3	4.5	T	1.0
JUPA	*Juncus parryi*	11.5	1.7	14.8	4.5	0.1	2.0
LIGR	*Ligusticum grayi*	42.3	1.5	3.5	45.5	1.1	2.4
LOMA5	*Lomatium martindalei*	11.5	0.1	1.2	4.5	T	1.0
LUGLH	*Luzula glabrata* var. *hitchcockii*	15.4	2.1	13.4	31.8	3.0	9.4
LULA4	*Lupinus latifolius*	96.2	21.6	22.4	68.2	11.1	16.3
LUPE	*Luetkea pectinata*	23.1	2.9	12.4	22.7	2.5	11.0
MILE2	*Mimulus lewisii*	15.4	1.2	8.0			
PHAL2	*Phleum alpinum*	11.5	0.1	1.0			
PHEM	*Phyllodoce empetriformis*	23.1	0.6	2.8			
POBI6	*Polygonum bistortoides*	7.7	0.2	3.0	18.2	0.7	3.8
PODA	*Polygonum davisiae*	11.5	0.2	2.0	9.1	0.2	2.5
POFL3	*Potentilla flabellifolia*	50.0	6.3	12.6	36.4	0.7	2.0
POPU3	*Polemonium pulcherrimum*	3.8	0.2	4.0	27.3	1.7	18.6
PUOC	*Pulsatilla occidentalis*	15.4	2.1	13.4	13.6	1.0	7.3
RIAC	*Ribes acerifolium*				18.2	2.6	14.5
SAFE	*Saxifraga ferruginea*	11.5	0.5	4.0	9.1	0.1	1.0
SETR	*Senecio triangularis*	69.2	2.2	3.2	100.0	6.3	6.3
SOSI2	*Sorbus sitchensis*				50.0	15.0	30.0
TSME	*Tsuga mertensiana*	19.2	0.3	1.8	22.7	0.2	1.0
VAAT2	*Vahlodea atropurpurea*	7.7	1.1	14.0	18.2	1.2	6.5
VAME	*Vaccinium membranaceum*				18.2	2.3	12.8
VASI	*Valeriana sitchensis*	23.1	3.0	13.2	86.4	9.9	11.5
VEVI	*Veratrum viride*	15.4	1.1	7.3	95.5	18.1	18.9
VEWO2	*Veronica wormskjoldii*	23.1	0.5	2.2	4.5	T	1.0

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Subalpine wet communities		CASC12			CASC12-ELQU2		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
AGHU	*Agrostis humilis*	23.1	1.1	4.7	28.6	1.9	6.5
CABR15	*Carex brunnescens*	15.4	0.6	4.0	7.1	2.4	34.0
CALE4	*Caltha leptosepala*	7.7	0.1	1.0	14.3	0.4	3.0
CALU7	*Carex luzulina*	15.4	0.2	1.5	28.6	0.5	1.8
CAMI7	*Carex microptera*	15.4	0.8	4.9	14.3	0.2	1.5
CANI2	*Carex nigricans*	53.8	7.8	14.4	42.9	9.0	21.0
CASC12	*Carex scopulorum*	100.0	30.9	30.9	100.0	27.4	27.4
DACA3	*Danthonia californica*	15.4	1.9	12.5	7.1	0.1	1.0
DAIN	*Danthonia intermedia*	15.4	0.2	1.0			
DECE	*Deschampsia cespitosa*	61.5	11.7	18.9	42.9	10.6	24.8
DOAL	*Dodecatheon alpinum*	15.4	0.2	1.0	21.4	0.4	1.7
DOJE	*Dodecatheon jeffreyi*	30.8	0.4	1.3	7.1	0.1	2.0
ELQU2	*Eleocharis quinqueflora*	7.7	1.2	15.0	100.0	26.3	26.3
ERANA3	*Eriophorum angustifolium* ssp. *angustifolium*				14.3	0.6	4.0
HYAN2	*Hypericum anagalloides*				14.3	0.1	1.0
KAMI	*Kalmia microphylla*	7.7	0.1	1.0	28.6	1.0	3.5
LIGR	*Ligusticum grayi*	30.8	1.2	4.0	14.3	T	0.1
MIPR	*Mimulus primuloides*	7.7	0.1	1.0	14.3	0.8	5.5
MUFI2	*Muhlenbergia filiformis*	23.1	0.9	4.0	28.6	4.8	30.5
ORALA2	*Oreostemma alpigenum* var. *alpigenum*	53.8	4.7	8.8	42.9	9.9	23.0
PAST10	*Packera streptanthifolia*	7.7	0.2	2.0	21.4	2.2	10.3
PEAT	*Pedicularis attollens*				14.3	0.1	0.6
PEGR2	*Pedicularis groenlandica*	7.7	0.1	1.0	42.9	1.1	2.5
PHEM	*Phyllodoce empetriformis*	7.7	0.1	1.0	14.3	0.1	0.6
POBI6	*Polygonum bistortoides*	7.7	0.1	1.0	14.3	0.4	2.6
POFL3	*Potentilla flabellifolia*	69.2	5.1	7.3			
RAAL	*Ranunculus alismifolius*	46.2	9.8	21.3	28.6	2.4	8.5
RAPO	*Ranunculus populago*	23.1	0.8	3.7	14.3	0.1	1.0
SACO2	*Salix commutata*	15.4	0.5	3.5	35.7	5.1	14.2
SASI2	*Salix sitchensis*				14.3	0.8	5.5
SPHAG2	*Sphagnum* spp.	15.4	1.9	12.5	42.9	22.1	51.7
SPRO	*Spiranthes romanzoffiana*				21.4	0.2	1.0
TRGL5	*Triantha glutinosa*	15.4	0.2	1.0	28.6	0.7	2.5
TRLO	*Trifolium longipes*	38.5	6.9	18.0	28.6	1.6	5.5
TRSP2	*Trisetum spicatum*	15.4	0.1	0.8			
VIMA2	*Viola macloskeyi*				14.3	0.4	3.0

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Alpine dry communities		CABR12			JUPA		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ACMI2	*Achillea millefolium*	9.5	0.1	1.3	20.0	0.2	1.0
AGVA	*Agrostis variabilis*	16.7	0.2	1.0			
ANAL4	*Antennaria alpina*	23.8	1.1	4.7	40.0	0.6	1.5
ANTEN	*Antennaria* spp.				20.0	T	0.1
ARCA7	*Arenaria capillaris*	9.5	0.3	3.5	40.0	1.2	3.0
CAAR11	*Castilleja arachnoidea*	19.1	0.3	1.5	20.0	T	0.1
CABE	*Cardamine bellidifolia*	4.8	0.1	1.0	20.0	T	0.1
CABR12	*Carex breweri*	100.0	13.5	13.5	20.0	0.2	1.0
CANI2	*Carex nigricans*	19.1	0.3	1.4	20.0	0.2	1.0
CASP5	*Carex spectabilis*	9.5	0.4	4.5	40.0	0.4	1.0
CASTI2	*Castilleja* spp.	2.4	T	1.0	20.0	T	0.1
CIUMU	*Cistanthe umbellata* var. *umbellata*	42.9	0.5	1.2	20.0	0.2	1.0
ELEL5	*Elymus elymoides*	16.7	0.2	1.3	20.0	0.2	1.0
ERMA4	*Eriogonum marifolium*	14.3	0.2	1.5			
EROV	*Eriogonum ovalifolium*	14.3	0.2	1.3			
ERPE3	*Erigeron peregrinus*				40.0	5.0	12.5
ERPY2	*Eriogonum pyrolifolium*	21.4	0.3	1.2	40.0	1.4	3.6
ERUM	*Eriogonum umbellatum*	9.5	0.2	2.3	60.0	0.6	1.0
HIGR	*Hieracium gracile*	21.4	0.3	1.2			
JUDR	*Juncus drummondii*	26.2	1.1	4.4			
JUPA	*Juncus parryi*	14.3	0.5	3.3	100.0	19.4	19.4
LOMA5	*Lomatium martindalei*	26.19	0.31	1.18	40.00	1.22	3.05
LUCO6	*Luzula comosa*				20.0	T	0.1
LULE2	*Lupinus lepidus*	33.3	0.4	1.1	60.0	1.2	2.0
LUPE	*Luetkea pectinata*	50.0	5.1	10.1	60.0	6.2	10.3
NOAL2	*Nothocalais alpestris*	7.1	0.1	1.0	40.0	T	0.1
ORALA2	*Oreostemma alpigenum* var. *alpigenum*	42.9	0.8	1.9	60.0	2.4	4.0
PEDA2	*Penstemon davidsonii*	38.1	0.8	2.1			
PEPR2	*Penstemon procerus*	11.9	0.1	1.2	40.0	2.4	6.0
PHDI3	*Phlox diffusa*	9.5	0.1	1.0	40.0	4.2	10.5
PHEM	*Phyllodoce empetriformis*	9.5	0.4	4.0	20.0	T	0.1
PIAL	*Pinus albicaulis*	11.9	0.3	2.6			
PODA	*Polygonum davisiae*	61.9	1.3	2.1	80.0	0.6	0.8
RAAR	*Raillardella argentea*	11.9	0.1	1.0			
SATO2	*Saxifraga tolmiei*	16.7	0.4	2.6			
TRSP2	*Trisetum spicatum*	14.3	0.3	2.2	20.0	T	0.1
VEWO2	*Veronica wormskjoldii*				20.0	0.4	2.0

Only species with at least 10% constancy in one of the plant communities are listed. T is trace (<0.05).

Alpine dry communities		CIUMU			ERGR16			PHDI3		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ACMI2	*Achillea millefolium*				36.4	0.3	0.9	90.9	1.5	1.7
ACOC3	*Achnatherum occidentale*	5.6	0.1	1.0				18.2	0.4	2.0
AGDI	*Agrostis diegoensis*				9.1	0.3	3.0	45.5	1.6	3.6
AGVA	*Agrostis variabilis*	22.2	0.2	1.0						
ANAL4	*Antennaria alpina*	11.1	0.1	1.0						
ARCA7	*Arenaria capillaris*	5.6	0.1	1.0	45.5	1.4	3.1	27.3	0.7	2.7
CAAR11	*Castilleja arachnoidea*	27.8	0.3	1.0						
CABR12	*Carex breweri*	16.7	0.1	0.7	36.4	3.9	10.8	27.3	0.7	2.7
CANI2	*Carex nigricans*	5.6	T	0.1	9.1	1.8	20.0	18.2	0.4	2.0
CASP5	*Carex spectabilis*							27.3	4.2	15.3
CIUMU	*Cistanthe umbellata* var. *umbellata*	100.0	4.3	4.3	54.5	0.5	0.9	27.3	1.7	6.3
ELEL5	*Elymus elymoides*	38.9	0.7	1.7	27.3	0.3	1.0	63.6	2.2	3.4
ERGR16	*Ericameria greenei*				100.0	8.7	8.7			
ERMA4	*Eriogonum marifolium*	22.2	0.3	1.5						
EROV	*Eriogonum ovalifolium*	22.2	0.2	1.0				9.1	0.1	1.0
ERPY2	*Eriogonum pyrolifolium*	33.3	0.4	1.3						
ERUM	*Eriogonum umbellatum*				63.6	2.7	4.2	63.6	6.1	9.6
EULEL2	*Eucephalus ledophyllus* var. *ledophyllus*	5.6	0.1	1.0	9.1	0.2	2.0	36.4	1.0	2.8
HIGR	*Hieracium gracile*	11.1	0.2	1.5						
JUCO6	*Juniperus communis*							27.3	7.3	26.7
LOMA5	*Lomatium martindalei*	33.3	0.7	2.0	63.6	0.6	0.9	36.4	0.4	1.0
LUGLH	*Luzula glabrata* var. *hitchcockii*							18.2	0.5	2.5
LULA4	*Lupinus latifolius*	5.6	0.1	1.0	27.3	2.1	7.7	18.2	1.3	7.0
LULE2	*Lupinus lepidus*	27.8	0.3	1.2	9.1	T	0.5	18.2	0.4	2.0
LUPE	*Luetkea pectinata*				18.2	2.7	15.0	9.1	0.5	5.0
LUSE4	*Lupinus sericeus*				72.7	5.2	7.1	63.6	7.2	11.3
NOAL2	*Nothocalais alpestris*	22.2	0.3	1.5						
ORALA2	*Oreostemma alpigenum* var. *alpigenum*	16.7	0.2	1.3	9.1	0.1	1.0	18.2	0.2	1.0
PAMY	*Paxistima myrsinites*							18.2	1.4	7.5
PEDA2	*Penstemon davidsonii*	5.6	0.1	1.0	18.2	0.2	1.0	18.2	0.2	1.0
PHDI3	*Phlox diffusa*				72.7	4.3	5.9	100.0	9.4	9.4
PIAL	*Pinus albicaulis*	11.1	0.1	1.0	27.3	0.4	1.5	27.3	0.4	1.3
PODA	*Polygonum davisiae*	72.2	2.9	4.1	81.8	2.7	3.3	54.5	1.5	2.7
POPU3	*Polemonium pulcherrimum*							36.4	1.8	5.0
RAAR	*Raillardella argentea*	11.1	0.1	1.0						
TRSP2	*Trisetum spicatum*	11.1	0.1	1.0	36.4	0.3	0.9	27.3	0.5	2.0

Only species with at least 10% constancy in one of the plant communities are listed. T is trace (<0.05).

Alpine dry communities		LULE2-ACMI			LULE2-SEDI			PEDA2		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ABLA	*Abies lasiocarpa*				11.1	0.1	1.0			
ACMI2	*Achillea millefolium*	100.0	5.5	5.5	88.9	2.0	2.3	44.4	0.7	1.5
AGDI	*Agrostis diegoensis*	5.6	0.3	5.0	11.1	0.6	5.0	11.1	0.2	1.5
AGHU	*Agrostis humilis*				11.1	0.1	1.0			
ANAL4	*Antennaria alpina*				66.7	1.6	2.3			
ANDR	*Anemone drummondii*							16.7	0.2	1.3
ARCA7	*Arenaria capillaris*	50.0	1.4	2.8	33.3	0.8	2.3	16.7	0.2	1.3
CABR12	*Carex breweri*	33.3	1.8	5.3				5.6	0.1	1.0
CANI2	*Carex nigricans*	16.7	0.6	3.3				11.1	0.1	1.0
CAPA26	*Castilleja parviflora*				44.4	0.4	1.0			
CAPH2	*Carex phaeocephala*	16.7	0.9	5.7	44.4	1.0	2.3	33.3	0.9	2.7
CAREX	*Carex* spp.	11.1	0.4	3.5	11.1	0.3	3.0			
CASP5	*Carex spectabilis*	11.1	1.2	10.5	22.2	3.4	15.5	5.6	0.1	2.0
CASU11	*Castilleja suksdorfii*	11.1	0.1	1.0						
CIUMU	*Cistanthe umbellata* var. *umbellata*	27.8	0.3	1.0	11.1	0.1	1.0	16.7	0.2	1.0
ELEL5	*Elymus elymoides*	77.8	2.2	2.9	11.1	0.1	1.0	50.0	0.7	1.4
EPAL	*Epilobium alpinum*							11.1	0.1	1.0
EROV	*Eriogonum ovalifolium*	5.6	0.1	1.0	66.7	1.2	1.8	50.0	0.7	1.4
ERUM	*Eriogonum umbellatum*	77.8	3.6	4.7				33.3	1.2	3.5
FEOV	*Festuca ovina*	16.7	0.8	5.0	55.6	0.7	1.2			
FEVI	*Festuca viridula*							16.7	0.2	1.0
JUCO6	*Juniperus communis*	11.1	6.9	62.5	44.4	10.0	22.5	11.1	3.9	35.5
JUME3	*Juncus mertensianus*							11.1	0.1	1.0
JUNCU	*Juncus* spp.				11.1	0.1	1.0			
JUPA	*Juncus parryi*							22.2	0.2	1.0
LOMA5	*Lomatium martindalei*	11.1	0.1	1.0				5.6	0.1	1.0
LULE2	*Lupinus lepidus*	100.0	8.2	8.2	100.0	6.0	6.0	50.0	1.2	2.3
LUPE	*Luetkea pectinata*				44.4	0.8	1.8	33.3	1.1	3.3
MIOB2	*Minuartia obtusiloba*				33.3	1.7	5.0	5.6	0.4	7.0
ORALA2	*Oreostemma alpigenum* var. *alpigenum*	22.2	0.6	2.8				16.7	0.2	1.3
PEDA2	*Penstemon davidsonii*	55.6	1.8	3.3	22.2	0.2	1.0	100.0	3.3	3.3
PEPR2	*Penstemon procerus*	11.1	0.3	3.0	22.2	0.8	3.5	5.6	0.1	1.0
PHDI3	*Phlox diffusa*	16.7	0.3	1.7	44.4	2.4	5.5			
PHEM	*Phyllodoce empetriformis*	5.6	0.3	5.0	11.1	0.6	5.0	11.1	0.1	1.0
PHHA	*Phacelia hastata*	16.7	0.2	1.3				33.3	0.6	1.7
PIAL	*Pinus albicaulis*	11.1	0.1	1.0	22.2	0.4	2.0	11.1	0.3	3.0
PODA	*Polygonum davisiae*	11.1	0.2	2.0				5.6	0.1	1.0
POPU3	*Polemonium pulcherrimum*				11.1	0.4	4.0			
PUOC	*Pulsatilla occidentalis*				11.1	0.1	1.0	5.6	0.1	1.0
SATO2	*Saxifraga tolmiei*							11.1	0.2	1.5
SEDI	*Sedum divergens*	5.6	0.1	1.0	100.0	1.1	1.1	5.6	0.1	1.0
SIPR	*Sibbaldia procumbens*				11.1	0.1	1.0			
SISU	*Silene suksdorfii*	5.6	0.1	1.0	11.1	0.1	1.0	11.1	0.1	1.0

Alpine dry communities		LULE2-ACMI			LULE2-SEDI			PEDA2		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
SOSI3	*Solidago simplex*	50.0	1.8	3.6	55.6	5.0	9.0	38.9	0.6	1.6
TRSP2	*Trisetum spicatum*	55.6	0.8	1.4	22.2	0.2	1.0	22.2	0.3	1.3
TSME	*Tsuga mertensiana*				11.1	0.2	2.0	5.6	0.1	2.0
VASC	*Vaccinium scoparium*				11.1	2.2	20.0			

Only species with at least 10% constancy in one of the plant communities are listed. T is trace (<0.05).

Alpine mesic and wet communities		JUDR-SATO2			MITI-MILE2		
Plants symbol	Scientific name	Const (%)	Mean cover (%)	Charac cover (%)	Const (%)	Mean cover (%)	Charac cover (%)
ACMI2	*Achillea millefolium*				14.3	0.3	2.0
ANAL4	*Antennaria alpina*				21.4	0.2	1.0
CANI2	*Carex nigricans*				28.6	1.9	6.8
CAPA26	*Castilleja parviflora*				14.3	0.3	2.0
CASP5	*Carex spectabilis*	33.3	0.3	1.0	57.1	4.9	8.5
EPAL	*Epilobium alpinum*				92.9	3.4	3.7
ERPE3	*Erigeron peregrinus*				28.6	0.7	2.5
HIGR	*Hieracium gracile*				14.3	0.1	1.0
JUDR	*Juncus drummondii*	100.0	11.3	11.3	64.3	2.0	3.1
JUME3	*Juncus mertensianus*				57.1	1.3	2.3
JUPA	*Juncus parryi*				21.4	0.8	3.7
LIGR	*Ligusticum grayi*				28.6	0.4	1.5
LULA4	*Lupinus latifolius*				35.7	4.0	11.2
LUPE	*Luetkea pectinata*	66.7	0.7	1.0	28.6	0.5	1.8
LUZUL	*Luzula* spp.	33.3	0.3	1.0			
MILE2	*Mimulus lewisii*				85.7	6.5	7.6
MITI	*Mimulus tilingii*				85.7	8.8	10.3
PEPR2	*Penstemon procerus*				14.3	0.1	1.0
PHAL2	*Phleum alpinum*				21.4	0.3	1.3
PHEM	*Phyllodoce empetriformis*	33.3	0.3	1.0	28.6	1.7	6.0
POBI6	*Polygonum bistortoides*				14.3	0.1	1.0
POFL3	*Potentilla flabellifolia*				21.4	0.9	4.0
SACO2	*Salix commutata*				50.0	10.9	21.9
SAFE	*Saxifraga ferruginea*				28.6	1.0	3.5
SASI2	*Salix sitchensis*				21.4	1.8	8.3
SATO2	*Saxifraga tolmiei*	100.0	4.3	4.3			
SETR	*Senecio triangularis*				57.1	0.9	1.5
STUM	*Stellaria umbellata*				21.4	0.2	1.0
VASI	*Valeriana sitchensis* ssp. *sitchensis*				28.6	1.1	3.8
VEVI	*Veratrum viride*				14.3	0.8	5.5
VEWO2	*Veronica wormskjoldii*				35.7	1.1	3.0

Only species with at least 10% constancy in one of the plant communities are listed. T is trace (<0.05).

Appendix F. Effects of soil erosion on distribution of plant communities

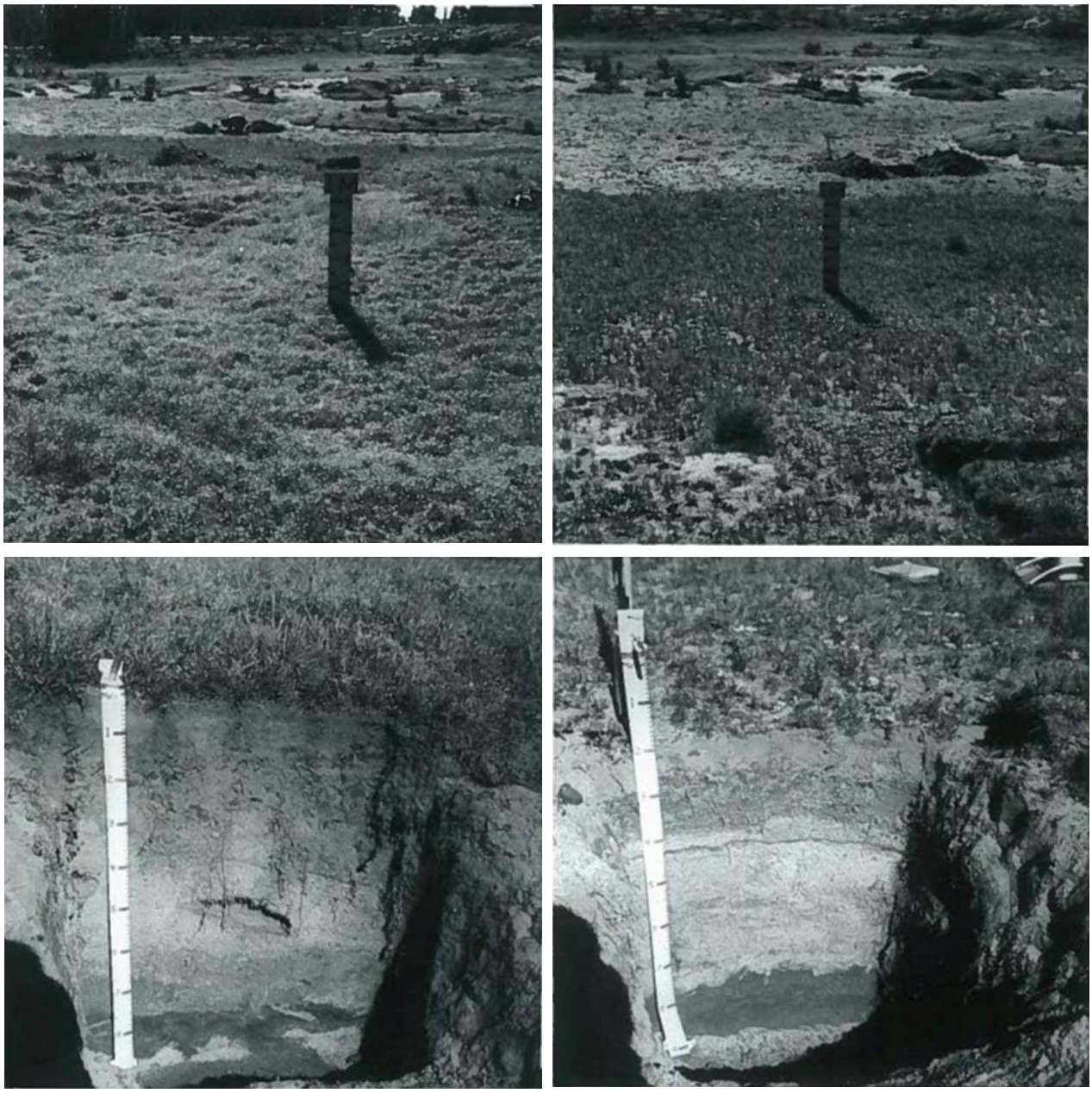
Effect of soil erosion on distribution of plant communities in the Three Sisters Wilderness Area. Pictures and text from Fred Hall, retired Region 6 Ecologist of the USDA Forest Service.

Fred Hall worked in the Three Sisters Wilderness, on the Willamette and Deschutes National Forests, beginning in the 1960s. His data, observations, and photographs included in this guide give a landscape context for the communities and their development. The following pages capture some of his insights into disturbance and succession. The quotes from his notes have been altered slightly to update the old Latin names and to correct spelling.

Fred Hall hypothesized that some of the differences in soils among the CANI2 group (p. 178), CABR12 community (p. 232), and CIUMU community (p. 236) could relate to erosion associated with earlier livestock grazing.

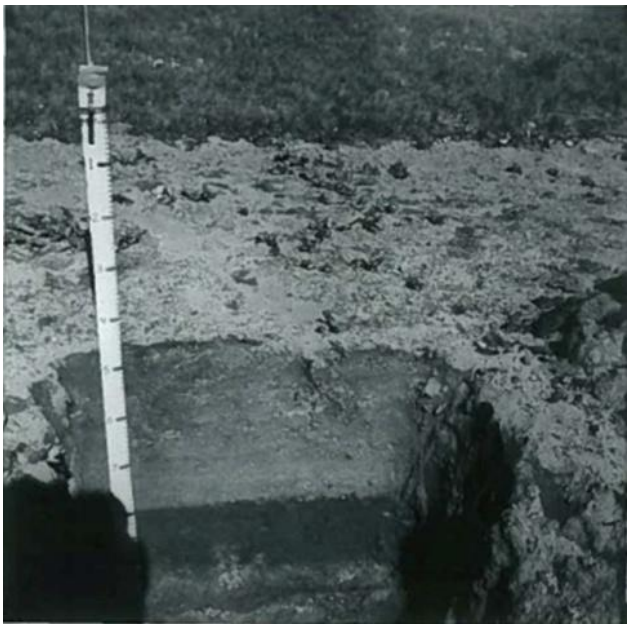
From Fred Hall's notes: "General view showing: non-eroded site where the man is located, the darker colored area which is partially eroded, and the light area to the right which has been severely eroded. Pictures below show the three site and plant community conditions."

The following photographs show these sites at a closer proximity, with photographs of corresponding soil pits.



From Fred Hall's notes: "Non-eroded area of *Carex nigricans*: 2 dm (8 in.) of A1 horizon, 2 dm of A3, and 3.5 dm of C horizon (raw pumice) over a buried soil. A good condition dry meadow."

"Partially eroded area where the entire top 2 dm (8 in.) of the A horizon has been removed. Community: *Carex breweri* at one-half the density of *C. nigricans*, with *Antennaria alpina*, *Erigeron lonchophyllus*, and some *Cistanthe umbellata* var. *umbellata*. Good condition for the site."



"Severly eroded area where all the A horizon (top 4 dm or 16-18 in.) has been removed leaving only the raw pumice. Community: very scant *Cistanthe umbellata* var. *umbellata* and *Polygonum davisiae*. Apparently good condition for the site."

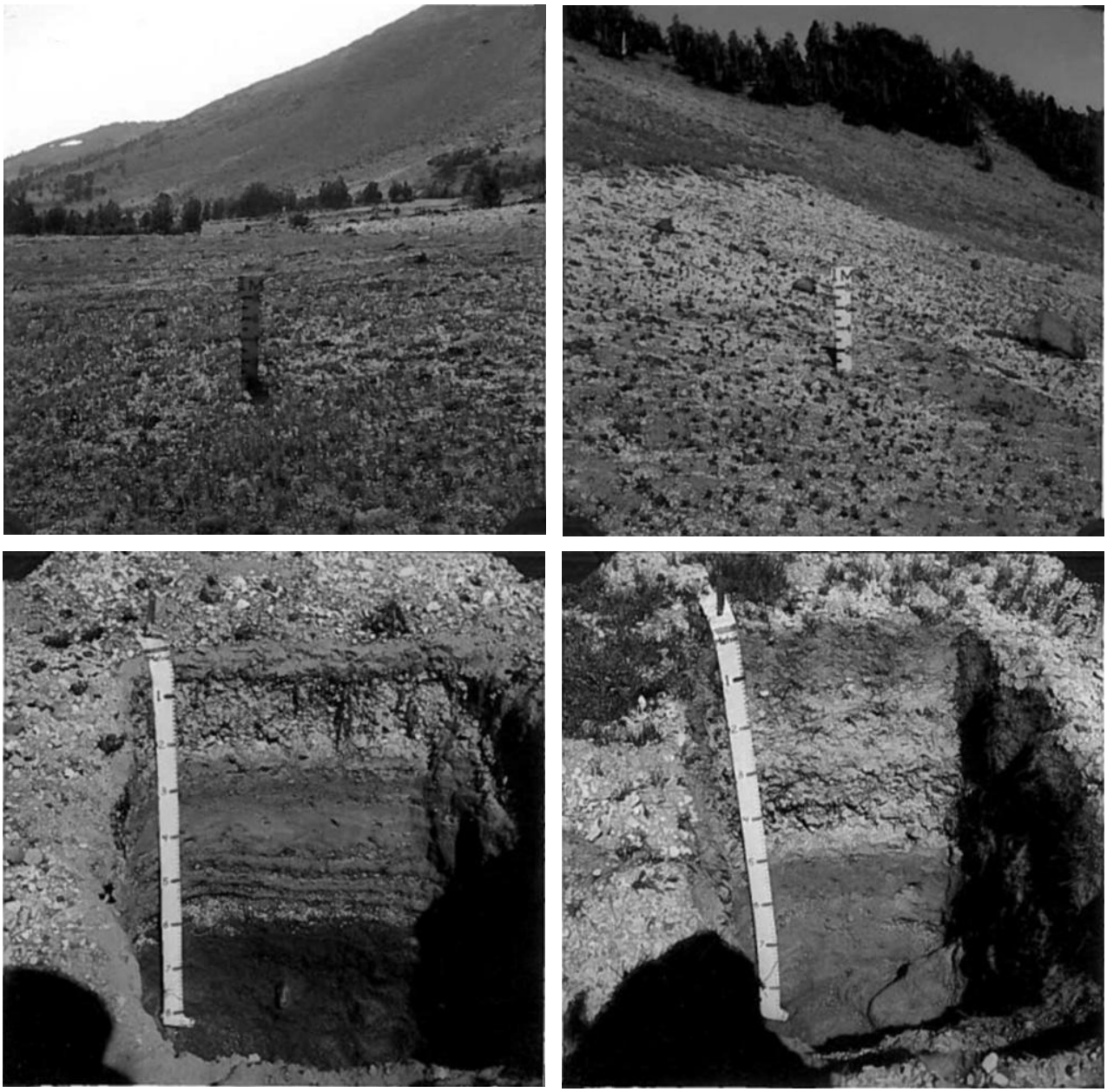
Fred Hall documented a second erosion sequence in the Broken Top area (Three Sisters Wilderness Area) where a CIUMU community developed from a CABR12 meadow with loss of about 6" of A horizon.

Broken Top Area

Eroded A horizon in the *Carex breweri* type.

From Fred Hall's notes: "Contrast between uneroded (left) and eroded (right) conditions in the *Carex breweri* type on pumice southeast of Broken Top Crater."

The following photographs show these sites at a closer proximity, with photographs of corresponding soil pits.



From Fred Hall's notes: "Non-eroded *Carex breweri* type. Note that the "soil" depth is only about 2 dm (8 in.). Few roots extend into the underlying material which is several layers of raw pumice over a residual type material (bottom of hole)."

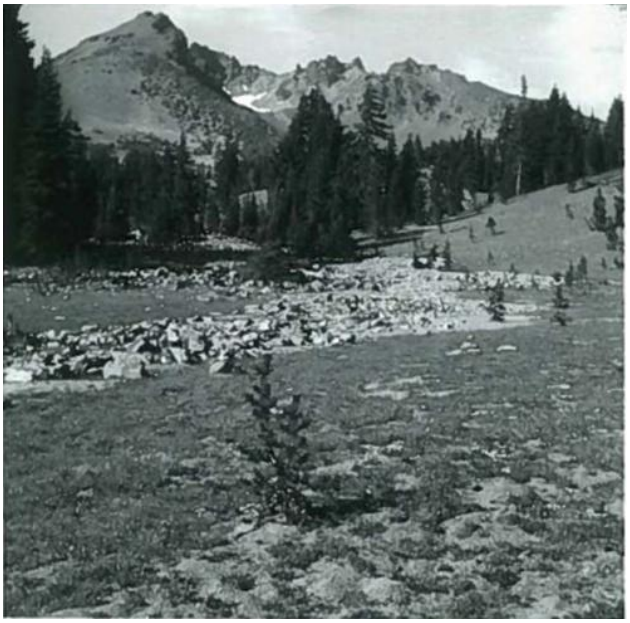
"Eroded area now dominated by very scant *Cistanthe umbellata* var. *umbellata* and some *Polygonum davisiae*. Note that only about ½ dm of "soil" remains (2 in.) over the layers of raw pumice. Nearly all roots are contained with the 2 inch soil layer."

Fred Hall captured and illustrated an alluvial deposition in the South Broken Top Plains (Three Sisters Wilderness Area) where a CASC12 community developed on a sandy alluvial fan. Signatures of this process are found in soil profile descriptions that typically show multiple layers of deposition and erosion.

South Broken Top Plains; active geologic erosion by spring runoff:

From Fred Hall's notes: "*Carex scopulorum* below 10 – 30% slopes. Shallow water channel and current year's alluvial fan of sandy material. Much of this meadow was apparently "suddenly" flood irrigated. See picture at right. Plot DE 18H is located at the X."

"Current year's sandy alluvium is 1 to 3 inches deep. Current year's status is demonstrated by the grass and sedge plants which were covered by the material. By August, some of these plants were growing through the sandy material where it was less than 2 inches deep."



From Fred Hall's notes: "North edge of the meadow immediately below a 20% slope. Gravel and rock material up to 1 ½ feet diameter as an alluvial fan. This material was in the center of the water flow. As one moves up the stream gradient, rocks become much larger in diameter – see picture at right and below."

"High water line of the current season's flood, which is marked by a dotted red line. The picture below was taken in the location and direction of the red arrow. Water depth in the stream channel was apparently 8 to 10 feet deep during this high water flow."

From Fred Hall's notes: "Stream channel cutting and deposition. Note that boulders here are often 3 feet diameter."