NATIVE FRESHWATER WETLAND PLANT ASSOCIATIONS OF NORTHWESTERN OREGON

John A. Christy
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Oregon State University

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Photographs (by author):

Cover: *Polytrichum commune* Association
Following page: *Sagittaria latifolia* Association

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THE AUTHOR

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The report summarizes datasets from numerous wetland studies: Three Sisters Wilderness (Fred Hall, 1966-1969); Mt. Jefferson Wilderness (Leonard Volland, 1976-1984); coastal and Cascade peatlands (John Christy 1978-2002); Willamette National Forest (Leighton Ho and Warren Pavlat, 1984; Cindy McCain, Jennifer Lippert, Warren Pavlat, Evelyn Everett, L. Rankin, Kim McMahan, Marie Palumbo, Saxton, 1991); Mt. Hood National Forest (Nancy Diaz, Mark Boyll, Gordon Whitehead, Tom High, Fred Small, Jennifer Guard, Paul Bakke, Paula Brooks, 1989-1990); lower Columbia River (John Christy and Judy Putera, 1992); Oregon Dunes National Recreation Area (John Christy, Jimmy Kagan, Tim Rettmann, 1993); Willamette Valley (Jonathan Titus, 1994-1996); Mt. Hood, Siuslaw, and Willamette National Forests, and Eugene and Salem BLM Districts (Michael Murray, Rachel Schwindt, Nick Otting, Danna Lytgen, 1999; David Alley and Peter Stocking, 2001). These earlier projects were funded by USFS, BLM, EPA, and The Nature Conservancy. Elaine Stewart of Metro kindly provided most of the data for the *Carex aperta* association, collected in 2003.

Some of the text is adapted from earlier material that I wrote for Kunze (1994), Guard (1995), and Christy et al. (1998), as well as various internal reports cited elsewhere in this guide.

The map on page 5 was obtained from the Color Landform Atlas of the United States (http://fermi.jhuapl.edu/states), compiled by Ray Sterner.

Construction of a vegetation classification for the northwestern Oregon area was challenging because of the variation among the different datasets, sampled by so many different observers in so many different localities over the last 38 years. It is often difficult to visualize and describe plant associations without seeing them firsthand in the field. In these cases, photographs and qualitative descriptions are extremely useful when available, but difficulties still remain in interpreting someone else's data and concepts. A further complication is the tendency for tidy concepts of local or regional plant associations to lose their resolution at a larger geographic scale. What fits a neat package on a district or National Forest scale may become increasingly difficult to interpret as species composition, elevation, and even hydrology change within an expanded study area and extended latitude. As interpreter of these data, I assume all responsibility for any distortions, omissions, and improbable leaps of faith.

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SUMMARY

This guide provides keys, descriptions, and stand tables for 122 native freshwater plant associations (14 forest and woodland, 28 shrub, 78 herbaceous, 2 nonvascular) in northwestern Oregon, based on analysis of data from 1,992 plots distributed throughout the study area. Descriptions are provided for eight other plant associations for which there are no plot data. Data were also not available for 114 additional associations reported from the study area (Kagan et al. 2000). The study area includes the north half of both the Coast Range and Western Cascade ecoregions, and all of the Willamette Valley. Vegetation is classified according to the National Vegetation Classification System, and plant associations are assigned to ecological systems that are currently being developed on a nationwide level.

PREVIOUS WORK

Northwestern Oregon is a large area with myriad scenic and outstanding wetlands that have been the subject of numerous vegetation studies. Although this guide is the first attempt to treat the region as a whole, various parts of have been examined at various scales of resolution and reported in many published and unpublished sources. Most numerous are site-specific studies done for theses, dissertations, or contract work. Recent work by the U.S. Forest Service has summarized plot data from larger areas, by individual forest or several forests, depending on management unit or vegetation unit. This guide includes work done in northwestern Oregon as well as sourrounding regions, and is based on a foundation of more than 100 previous studies, large and small. It is a compilation of all the work done by those who have gone before, and the best way to review who did what, where, and when, is to peruse the references cited near the end of the guide.

SCOPE, LOCATION, AND ENVIRONMENT

Scope and study area. This guide attempts to describe only wetland associations with seasonal to perennial hydration, excluding irregularly flooded riparian vegetation (see McCain 2004). Salt marsh and brackish plant associations were also excluded in this guide, as were undersampled freshwater stands of *Carex lyngbyei* and *Schoenoplectus americanus* that occur up to 50 miles upstream from salt water in the Columbia River. Northwestern Oregon as defined in this guide includes the north half of both the Coast Range and Western Cascade ecoregions, and all of the Willamette Valley ecoregion (Figure 1). The Western Cascade ecoregion also includes a significant portion of the east slope of the Cascade Range, down to an elevation of about 3,000 feet in the north to 5,000 feet in the south. Data from some wetlands in coastal Douglas County and western Klamath County were also included where wetland associations from these adjoining areas are known or suspected to occur within the study area. The guide is a precursor to a more complete web-based catalog that will contain photographs of each association and will include additional associations for which data were not available at the time of writing.

Landscape. The landscape in the study area is extremely diverse. The coastal strip, the Columbia River bottoms, and the Willamette Valley provide low relief up to about 500 feet and include most low-gradient streams, extensive and varied floodplains, and wetlands formed among sand dunes. Historically these low-elevation areas had the greatest variation in hydroperiod because of seasonal flooding on a grand scale. Flood control dams on the major rivers now mediate seasonal flooding and its effects are now much more localized. The Coast Range includes rugged topography and most wetlands are associated with streams and rivers, often enhanced by beaver activity, in relatively

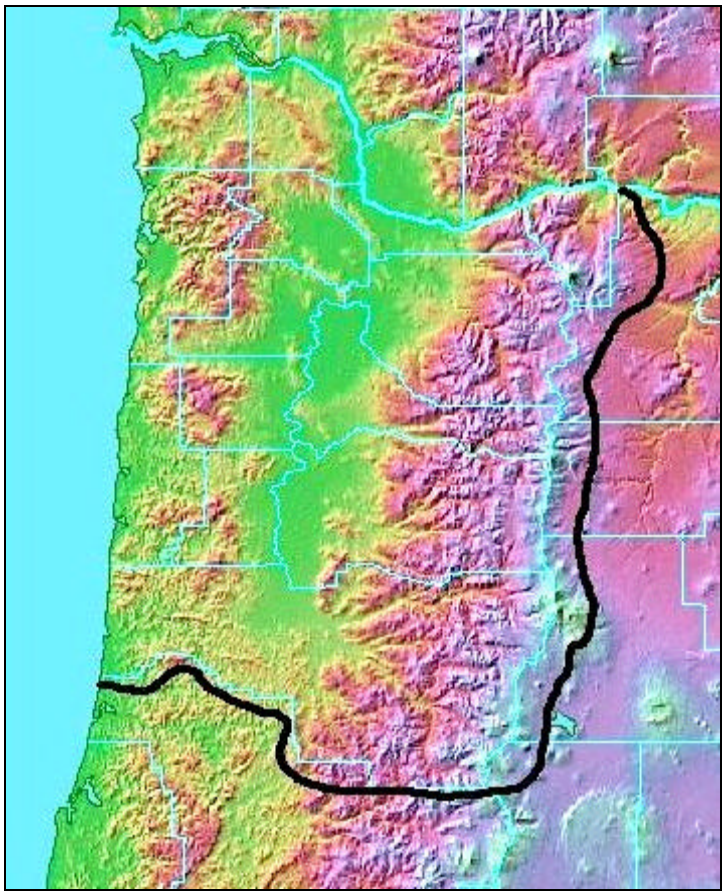

Figure 1. Northwestern Oregon as treated in this guide.

narrow valleys. Extensive wetlands are not common in the Coast Range because it lacks glacial headwall basins and flats that foster impeded drainage, the few notable exceptions being Lost Prairie and Fanno Meadows that formed in rare plateau areas. Like the Coast Range, the Cascade Range has myriad streams and rivers with much related beaver activity in narrow stream valleys, but it also has an extensive glaciated landscape at higher elevations that created the many ponds, lakes, headwall basins, and flats that give to rise to rich wetland development.

Climate. Northwestern Oregon is composed of three distinct ecoregions (Coast Range, Willamette Valley, and Western Cascades) with maritime and Mediterranean climates influenced by proximity to the Pacific Ocean (Table 1). Low-elevation temperatures are moderate year-round, and even temperatures in the Cascade Range are moderate compared to continental climates farther inland. Most precipitation occurs in winter months, followed by summer drought. Between October and April, low-pressure weather systems generated in the Gulf of Alaska bring extended and occasionally violent cyclonic storms to the region. These winter storms bring heavy rains, accounting for 80 percent of the year's total precipitation, and strong south to southwesterly winds. Precipitation along the immediate coast averages 70-85 inches per year but may reach 100+ inches 10-20 miles inland in the Coast Range, and may also exceed 100 inches in the Cascade Range. Snow is rare on the coast and in the Willamette Valley, but frequent in the Coast Range and Cascade Range above 2,500 feet elevation. By mid-June, a high pressure system with north to northwesterly winds develops off the coast, deflecting storms to the north and maintaining clear skies. Summer precipitation is negligible in

the Coast Range and Willamette Valley and may not occur for weeks at a time, but summer thunderstorms are frequent in the Cascade Range. On hot days, marine fogs occur along the immediate coast, dramatically lowering temperatures for a mile or two inland. The high pressure system breaks down in September, bringing an end to summer drought.

The coast is consistently warmer and wetter than the Willamette Valley in winter, cooler in summer, and it nearly has a year-round growing season. In contrast, the Cascade Range is consistently cooler and wetter than the Willamette Valley for most of of the year and has the shortest growing season in the study area. The cooler, wetter climate of the coast and Cascade Range favor growth of *Sphagnum* and accumulation of organic soils in wetlands, while these features are rare in the Willamette Valley.

Table 1. Average temperatures and precipitation, northwestern Oregon. Data from NRCS soil surveys.

Location	Temperature (°F)					Average annual precipitation (in)
	Ave. winter	Ave. winter minimum	Ave. summer	Ave. summer maximum	Extremes	
North coast	43	37	59	67	6 - 100	70
Central coast	45	38	60	65	15-91	84
North valley	40	34	65	75-78	0-107	38
South valley	42	35	64	76	-12 - 107	46
North Cascades	30	24	53	63-66	-14 - 100	89
Central Cascades	37	29	64	76	-12 - 107	82

Geology. In northwestern Oregon, the Coast Range is underlain mostly by marine sandstones and mudstones with pockets of igneous intrusions or submarine basalts. The Willamette Valley is a combination of deep unconsolidated sediments, marine sandstones, and flood basalts. The Cascade Range is almost entirely underlain by igneous rocks, both intrusive and extrusive. These rocks provide the parent material for soils and influence groundwater chemistry that has an important effect on wetland vegetation. A number of wetlands are directly influenced by bedrock, either through providing perched water tables or causing constrictions in valley profiles, behind which sediments have accumulated to form flats ideal for wetland development.

Soils. Wetlands in northwestern Oregon occur on both organic and mineral hydric soils. The organic soils are perennially saturated, while the mineral soils may be flooded in winter and moist or dry in summer. Organic soils include muck (hemic histosols), mucky peats (sapric histosols), fibrous peats (fibric histosols), or combinations of these but with poor to moderate profile development. Mineral soils range from sand with no profile to various types of loams. Silt loams, sandy loams, or clay loams come in a variety of profiles (alfisols, entisols, inceptisols, mollisols, spodosols, vertisols). Of particular importance for some of our rare wetland associations are sandy loams underlain by duripan

(spodosols) and heavy clay loams (alfisols, vertisols) that usually have a seasonally perched water table. Most of the larger occurrences of organic soils in northwestern Oregon have been delineated in the county soil surveys, but many smaller occurrences were never mapped and are hidden inclusions in non-hydric soils.

MAJOR WETLAND TYPES

Aquatic beds. Freshwater ponds, lakes, and sloughs are habitat for aquatic bed and emergent marsh associations and occur throughout northwestern Oregon. Along the coast, most large lakes formed when shifting sands blocked streams draining the Coast Range, creating deep lakes with steep slopes whose water levels may drop as much as 6-8 feet during the summer. Lakes and ponds also occur within the dune sheet in areas where the water table is at the surface. They are typically shallow and subject to seasonal changes in water levels, and some are unique because of their large size and extensive aquatic bed and emergent plant associations. Ponds, lakes, and sloughs are also associated with floodplains of major rivers throughout the study area, particularly on broad flats associated with the Willamette and Columbia Rivers. Water levels here typically recede in summer, so gravel banks and mud flats may appear, stranding some aquatic plants, but creating habitat for emergent species. Peatlands and headwater basins also contain pools, ponds, and tarns with aquatic bed associations. Ponds and pools may also occur on midslope benches or as midslope slump or sag ponds in landslide topography, often associated with marshes or peatlands that develop on these sites. Aquatic bed vegetation in ponds is usually entirely submerged or may have leaves floating at the surface. Most vegetation is rooted in sand, gravel, silt or mud, but some species are free-floating and drift about with wind and current. Extensive monotypic stands are typical of this kind of vegetation. If the water body is large enough, discrete clumping or zonation of single species can be seen, with mixtures occurring in the ecotones. Since 1850, much of this habitat has been lost to river channelization, has silted in naturally, or has been filled or recontoured for agriculture.

Marshes. Marsh associations occur in depressions in various landforms, particularly headwall basins and floodplains. They may also occur on midslope benches or associated with midslope slump or sag ponds in landslide topography. Water levels typically recede in summer, exposing gravel or mud flats and creating habitat for some seasonal species. Aquatic species may become stranded in these communities and persist with modified morphology, if the substrate is wet enough. If good zonation is present, it is possible to see weak-stemmed or decumbent species in the deeper water, or species specifically adapted to later exposure on mud flats, followed by taller herbs and shrubs on the landward side. Perennially wet marshes are usually too wet for the noxious grass *Phalaris arundinacea* to become established. Channelization, flood control and agriculture have caused extensive losses of these habitats. The *Saggitaria latifolia* association that was once common throughout the region in floodplain marshes inundated until midsummer largely has been displaced by *Phalaris arundinacea* except in the Columbia River bottoms. Mud flat associations along the lower Columbia River have suffered a similar fate.

Peatlands. Most peatlands in Oregon are fens rather than bogs, being hydrated by mineral-rich surface or groundwater, lacking a domed peat profile, and having a pH generally higher than 5.5. Many fens, however, contain localized *Sphagnum* hummocks or lawns with a pH as low as 4, and may be classified as "poor fen." They occur in depressions in various landforms, particularly in interdunal depressions, headwall basins, and floodplains. Peatlands may also occur around midslope slump or sag ponds in landslide topography. They are usually perennially saturated but local areas of surface drying are not uncommon. These wetlands are widespread in northwestern Oregon but usually small in area, and occurrences in the Willamette Valley are now rare. Drainage, filling, peat mining, conversion to commercial cranberry production, and plant succession have destroyed many sites, and losses continue to occur despite wetland regulations that were designed to protect them. The small area they occupy in the landscape is causing some conservation organizations to pass them over in the "bigger is better" philosophy that currently dominates the field. It is important to properly document the components of these ecosystems and to develop new conservation priorities to help protect representative examples in the state. Coastal fens in Oregon are floristically distinct from those north of the

Columbia River (e.g., Golinski 1999; Vitt et al. 1999) and those at higher elevations in the Cascade and Coast Ranges (Seyer 1979, 1981, 1983; Wilson 1986; Frenkel et al. 1986), making them unique in North America and highly-ranked elements in state Heritage Program methodology.

Wet prairies. The name prairie refers here to wet grasslands that developed on clay or silt loam soils in the Willamette Valley, on the Columbia River bottoms, and along the coast. Although best known for *Deschampsia caespitosa,* they contain many other species of grasses, sedges and herbs. Before flood control, wet prairies on the Columbia River bottoms were frequently flooded well into summer, and not much is known about their original composition because widespread invasion of *Phalaris arundinacea* has displaced many native species. Some stands were probably *Deschampsia caespitosa* prairie and others were *Carex aperta* prairie, and they intergraded with a complex of marshes and sloughs on the river bottoms. Willamette Valley prairie developed on heavy clay loam soils that created a seasonally perched water table that was often isolated hydrologically from streams and rivers. These sites are usually dry by late spring but depressions may retain water well into the summer. Few vernal pools are known to remain in the Willamette Valley and none are described in this guide. The Willamette Valley prairie is unique and one of the rarest ecosystems in the Pacific Northwest, containing a number of endemic plant species. It developed under a regime of frequent fire from both lightning and native Americans (Boyd 1999), but after settlement by Euroamericans it went into rapid decline. Considerable research is now being done on fire ecology and restoration in this habitat, but after twenty years of study most plant associations still remain unpublished. The few Willamette Valley prairie associations described in this guide are provided to help document the vegetation, but much work remains to be done.

Shrub swamps. Shrub swamps are wetlands dominated by shrubs and they occur at all elevations throughout northwestern Oregon. They occur on floodplains and basins, and most tolerate a variable water regime. Community structure ranges from scattered shrubs with intervening herbaceous component, to dense and impenetrable stands of *Salix, Cornus stolonifera,* and *Spiraea douglasii.* Riparian shrub swamp associations are highly variable and difficult to classify. Many contain various mixtures of the same species, with or without a partial tree canopy. Historically, willow swamps were the second most abundant wetland vegetation (after wet prairies) forming a wet landscape described by early explorers and land surveyors of the region. Many of these systems were maintained or enhanced by beavers and have since been lost to drainage and conversion to farming.

Forested wetlands (swamps). This guide includes only forested wetland associations occurring in seasonally to perennially flooded depressions, or with perennially wet soils throughout the stands. All other types were referred to McCain (2004). The major associations are dominated by *Alnus rubra, Fraxinus latifolia*, *Picea sitchensis,* or *Thuja plicata.* The extent of forested wetlands in northwestern Oregon is now much diminished from what it was in 1850. General Land Office survey notes from the 1850's show that riparian forest in the Willamette Valley was in some areas as much as five miles wide, but most stands are now reduced to narrow strips fringing streams and rivers (Benner and Sedell 1997). Probably at least 100,000 acres of this forest were cleared for agriculture and fuelwood. On the coast, old-growth *Picea sitchensis* swamp is very rare because most stands were readily accessible for logging and suitable sites may never have been numerous or extensive. Of an estimated 14,000 acres in Oregon in 1850, about 1,700 remain today, representing an 88 percent loss.

DISTURBANCE PROCESSES

The major agents of wetland disturbance in northwestern Oregon have been beavers, floods, landslides, tsunamis, windthrow, fire, and people. These forces mediate the supply, movement, and chemistry of water and sediments and shape the development of different types of vegetation.

Beavers. Beavers occur throughout the Pacific Northwest, their work most evident as beaver dams, beaver

ponds, and plugged culverts. Less evident is the extensive cropping of wetland and riparian vegetation by beavers that den in streambanks without the familiar dams or lodges. Many wetlands developed on sediments trapped by long-vanished beaver dams, and in narrow drainages these wetlands persist as series of terraces extending upstream in stairstep fashion, the beaver dams no longer visible. Although beavers are seemingly ubiquitous today, some researches have estimated that historic populations in Oregon were ten times larger than what they are today. Their numbers were decimated first by commercial trapping prior to 1845, then by diminishing wetland acreage caused by their trapping, and finally by a rush of agricultural drainage projects.

Floods. Floods are the primary force influencing landforms and vegetation on river bottoms. They vary in magnitude and either destroy, create, or maintain wetlands. High-energy floods in constrained valleys may fill wetlands with sediment and create new wetlands by reworking sediments to create depressions. They frequently destroy beaver dams and expose accumulated sediments to erosion and rapid invasion by upland species. They also have less impact on some wetlands by simply rehydrating them after summer drying. Floods had their greatest effect on wetlands prior to construction of flood control dams in the Willamette River basin and on the Columbia River. Historically, two distinct seasonal flood regimes existed, one initiated by winter rain west of the Cascades, the other by spring snowmelt east of the Cascades. Winter floods ("rain floods") primarily affected the Willamette Valley and spring floods ("freshets") affected the Columbia River bottoms. Along the Columbia River, flood heights gradually diminished downstream, and below river mile 40 the broad estuary and strong tidal influence dissipated its effects. Floodwaters of 20 to 30 feet at Vancouver would rise to only 2 to 5 feet in the estuary (U.S. Army Corps of Engineers 1948, 1988). The spring floods on the Columbia River bottoms kept much of the floodplain under water until June or sometimes July, maintaining much wet prairie and seasonal willow and ash swamps that were later invaded by *Phalaris arundinacea* in the absence of prolonged flooding.

Landslides. Like floods, landslides and debris torrents both create and destroy wetlands. Those occurring midslope may form isolated slump or sag ponds that are often associated with marshes and peatlands. Larger-scale landslide topography usually contains clusters of ponds over a large area. Debris torrents are concentrated in narrow stream valleys and scour riparian marshes and beaver impoundments associated with the streambed. Wetlands sometimes form in the jumbled deposits at the base of the flow.

Tsunamis. Sediment cores indicate that tsunamis have repeatedly inundated salt marshes, swamps, and peatlands along the coast of the Pacific Northwest. Burial by marine sediments and associated tectonic uplift or subsidence destroys wetlands and creates new ones, but these processes are not well documented in Oregon.

Windthrow. Windthrow is usually a minor agent of disturbance in our wetlands but locally could be catastrophic in a major storm. *Picea sitchensis* swamps on the coast are the most vulnerable wetlands. The roots of *Picea* cannot grow in perennially wet, anoxic soil and instead form wide-spreading but very shallow systems that, combined with buttresses at the base of the trunk, serve to keep the tree rocking back and forth on the spongy substrate. Windthrow is common in these stands, creating canopy gaps for the dense shrub layer and reproducing trees. Windthrow of small trees is sometimes seen in peatlands where the weight of the tree becomes insupportable in the soft ground.

Fire. Fire probably played a major role historically in most wetlands in northwestern Oregon except for the wettest of coastal swamps. Ignition sources were both aboriginal and by lightning, the former being most common in the Willamette Valley (Boyd 1999). Fire-scarred trees or stumps may often be found in the center of wetlands, and soil pits or sediment cores frequently contain charcoal, but these are the only evidence for fire in and around wetlands. While forest fires in upland settings have been well studied locally, no studies have focused on the role of fire in Oregon wetlands except for Willamette Valley prairie.

People. Although people have lived in northwestern Oregon for at least 10,000 years, large-scale human-caused changes to wetlands did not occur until after 1850. The greatest losses of wetland habitat in northwestern Oregon are directly attributable to settlement and land conversion. Agricultural drainage, livestock grazing, logging, groundwater pumping, urban and industrial development, and road construction have all taken their toll and made some wetland associations extremely rare. Recreational off-road vehicles, horseback riding, and hiking can damage wetlands if traffic is concentrated in fragile areas. These effects are well known and will not be explored in this guide.

EXOTIC PLANTS

Despite their relative proximity to or isolation from urban or agricultural areas, certain wetland habitats appear to be especially vulnerable to invasion by exotic species. Recently drained sites with exposures of bare sediments, such as those occurring behind broken or abandoned beaver dams, are favored habitat for upland weeds as long as inundation does not recur in the second growing season. In contrast, seasonally-flooded mudflat associations on floodplains are rarely invaded by weeds as long as water persists into the growing season and suppresses weed development. Some aquatic bed associations are vulnerable to aggressive aquatic weeds and can be completely replaced by them. Well-known weedy species in our area include *Myriophyllum aquaticum, Egeria densa, Ludwigia uruguayensis,* and *Myriophyllum spicatum.* The most serious pests of emergent marsh and wet prairie are *Phalaris arundinacea, Agrostis stolonifera, Poa pratensis,* and *Alopecurus pratensis*. *Phalaris arundinacea* and *Agrostis stolonifera* are less common above 4,000 feet in the Cascade Range, but *Poa pratensis* extends well into subalpine meadows, where it presumably was introduced as a forage species in range improvement programs, or brought in inadvertently by sheep.

METHODS

Datasets. The datasets used in this analysis were collected by many individuals from 1966 to the present, and are listed in the acknowledgements at the beginning of this guide. Data were collected from a variety of plots sizes and transects scattered throughout the study area, and were usually placed subjectively in order to characterize perceived differences in vegetation as seen in the field. Plots of 10-500 m^2 ("macroplots") were usually sampled to characterize homogeneous stands of vegetation, while plots of 0.10-1 m^2 ("microplots") were sampled to characterize either homogeneous stands remote from ecotones or changing zones of vegetation within ecotones. Microplots were either free-standing or sampled along transects. Some associations require smaller plots of 10-50 m^2 because of limited size or irregular configuration around bodies of water. Whenever possible, plots were located in sites free of obvious human-caused disturbance. Unfortunately, it becomes increasingly difficult to avoid disturbed sites at lower elevations, where pervasive ditching, drainage, and eutrophication have affected virtually all larger wetlands at one time or another.

Dataset variables are shown in Table 2. All plot data included percent cover of individual species and the vegetation layer to which the species belong. Environmental variables varied widely among datasets and were absent for some. I assembled a skeletal environmental dataset by reviewing all data available, as well as qualitative site descriptions and observations from original plot cards. Plot cards and electronic data are archived at the Siuslaw National Forest in Corvallis, and the Oregon Natural Heritage Information Center in Portland.

Data analysis. This guide attempts to describe only wetland associations with seasonal to perennial hydration. Initial review of species composition and environmental variables in 4,039 plots was used to segregate upland from wetland plots, reducing the dataset to 1,992 wetland plots for analysis. Those plots considered uplands were referred to McCain (2004). Plant associations were identified using cluster analysis, TWINSPAN, and Bray-Curtis

ordination provided in PC-ORD (McCune and Mefford 1999), and were further segregated by manual analysis of association tables generated by ECOTOOLS (Smith 1997). In all cases, cover values were averaged for all plots within a plant association. Because of the differences in plot size and environmental data gathered in macroplots and microplots, data from these two plot types were analyzed separately. In many cases I simply could not classify certain plots because they did not segregate well in cluster analysis or fit any concepts known to me or reported in the literature. Some of the plots were originally placed deliberately in ecotones and thus represent improbable mixtures of associations better recognized at opposite ends of the ecotones. In some cases I had to modify data by downweighting rare species or lumping some subspecies and varieties. Although bryophytes are extremely good indicators of certain wetland plant associations, many earlier datasets did not identify individual species and I had to lump them all as "moss." Where data are available, the species are enumerated in the descriptions of each association.

Botanical nomenclature. Scientific names used in this guide follow the NRCS PLANTS database (http://plants.usda.gov), supplemented by county distributional data from Kartesz (2003) and the Oregon Plant Atlas currently under development at Oregon State University.

Table 2. Dataset variables used in this analysis.

Dataset	Variable	Description
Environment data	Elevation	Elevation in feet
	Slope	Slope in degrees
	Landform position	(1) top, (2) upper, mid, lower slope, (3) bench, (4) toe, (5) bottom, (6) basin
	Hydrology	(1) dry, (2) convex, (3) seasonal, (4) moist, (5) saturated
	Soil	(1) organic, (2) silt or clay loam, (3) sand, (4) pumice, (5) gravel, (6) rock
Species data	Plot ID	Unique plot identifier
	Layer	(1) mature trees, (2) reproducing trees, (3) shrub layer, (4) herb layer, (5) moss layer, (6) unvegetated
	Species code	Region 6 code, PLANTS code, or 6-letter code (whichever available)
	Percent cover	Absolute percent cover, 0.01-100

Classification concepts. The classification in this guide conforms with the National Vegetation Classification System (NVCS) [http://biology.usgs.gov/npsveg/nvcs.html; http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol]. It uses the plant association as the basic unit of classification, defined as having a distinct floristic composition, uniform physiognomy, and more or less uniform habitat conditions. It applies to existing vegetation regardless of successional status. Each association is named after one or more diagnostic species in each vegetation layer. Following the NVCS, I used a 25% cover cutoff to segregate tree and shrub associations from herbaceous associations. Dominant species in the herb layer were defined as having at least 20% cover, following the 1987 Wetland Delineation Manual (U.S. Army Corps of Engineers 1987), or having the highest cover available in depauperate stands.

Many wetland species tend to form monotypic stands over relatively large areas but they also often form mixed stands with other types. When species are capable of forming monotypic stands of 100 m^2 or more, I recognize them as distinct plant associations instead of patches, and I consider mixed stands of these species as ecotones and avoid

sampling them. In some cases a dearth of plot data makes this approach impossible. Some researchers sample mixed stands as single units and lump several types that others recognize as being distinct. In these cases it is not possible to segregate different vegetation types in the data. Species capable of forming large monotypic stands also often occur as small patches, but for practical purposes I generally don't recognize them as occurrences of associations if they are smaller than about 25 m^2, except for vernal pool associations that may occur in patches as small as 1-5 m^2.

Species indicative of high or low elevations, such as *Carex obnupta, Abies lasiocarpa, Picea engelmanii, Pinus monticola,* and *Tsuga mertensiana,* are often useful in separating plant associations, and their distributions are fairly consistent in northwestern Oregon. Their usefulness diminishes beyond about 5 degrees of latitude north or south as species composition shifts with elevation and the terms "low elevation" and "high elevation" take on different meanings. Indicator species are often not present in every plot from a given locality, and while their constancy within an association may be as low as 10-15 percent, they may occur intermittently in patches with cover of 30-50 percent. These species should not be overlooked, particularly when trying to identify an association in the field.

RESULTS

Keys and descriptions. Identification keys and descriptions are provided for 122 plant associations (14 forest and woodland, 28 shrub, 78 herbaceous, 2 nonvascular) identified from analysis of plot data. Eight of these had no plot data but are described because they are commonly observed in the field. Abbreviated stand tables are provided with the description for each association when plot data are available, and complete summary data for each association are given alphabetically in Appendix A at the end of the guide. Appendix A uses 6-letter acronyms to identify each association, based on the first three letters of the genus and species names (e.g., *Fraxinus latifolia / Symphoricarpos albus* = FRALAT/SYMALB). Descriptions for several associations include phases that have been identified or are expected to occur in the region. Each phase is described briefly or is simply listed if detailed analysis has not been done. In most cases phases do not have their own synthesis tables, but those for the *Deschampsia caespitosa* "wet meadow" complex are provided in Appendix A. Data were not available for 114 additional associations reported from the study area (Kagan et al. 2000). Some of these may be synonymous with other wetland associations, some are undocumented and may be found not to be real associations, while others are drier riparian types and may be included in McCain (2004).

The associations are listed alphabetically in three vegetation classes used in the NVCS: forest, shrubland, herbaceous, and nonvascular. The NVCS distinguishes "Forest" from "Woodland" based on crown density (overlapping in forests, usually not touching in woodland) or canopy cover (60-100 % in forest, 25-66% in woodland), but because these are not always evident from plot data I chose to lump both types as "Forest and Woodland." The NVCS also divides shrub associations into two physiognomic classes: "Shrubland" (shrubs > 0.5 m tall) and "Dwarf-shrubland" (shrubs < 0.5 m tall). However, the height potential of an unfamiliar shrub is not always obvious in the field, and tall shrub species may be dwarfed in certain habitats for a variety of reasons. For this reason I lumped all shrubs together under one physiognomic class in this guide. For convenience, I also placed *Salix lucida* ssp. *lasiandra* associations together with other *Salix* associations in the shrub class, despite the fact that under favorable conditions *Salix lucida* ssp. *lasiandra* can reach tree height of 30 or 40 feet in western Oregon. In the stand tables for each association it is listed as a tree.

Each association description includes the following information:

Association: Scientific and common names
Classification: (1) NVCS association name and code, (2) NatureServe ecological system name and code, (3) the association's global and state rank, and (4) the total number of plots sampled and proportion of macroplots vs. microplots.

Distribution in NW Oregon: Ecoregions in northwestern Oregon in which the association is known or thought to occur.
Environment: In most cases these data (when available) are from the specific plots used in the analysis and may not represent the full range of variables in which the association occurs. See Table 2 for definition of variables used. Descriptions of hydroperiod were based on the somewhat limited hydrological nomenclature used in Table 2 but were expanded to clarify patterns and seasonal trends.
Vegetation and ecology: Description of habitat, species composition, hydroperiod, and history of the association.
Global distribution: Describes the distribution of the association on a global scale, and is reflected in the global rank of the association. Many of these are educated guesses made by the author, pending analysis of updated NVCS data and forthcoming regional publications (e.g., MacKenzie & Moran 2004, Crowe et al. 2004).
Other studies: Publications or reports in which the association or something similar has been reported previously. They are listed in chronological order for publications based on quantitative data, and are sometimes followed by a second chronological list of publications based on qualitative descriptions. The change from one list to the next is indicated by the break in chronology.

KEY TO NATIVE FRESHWATER WETLAND PLANT ASSOCIATIONS OF NORTHWESTERN OREGON

The following keys identify each association and most follow standard couplet formatting except in cases where using couplets would add greatly to the length of the keys. In the latter case I chose to simply list dominant species instead of running each through a series of couplets.

1a. Combined tree cover generally at least 25 % ..... Key to **Forest and Woodland Associations** (p. 13)
1b. Combined tree cover generally < 25 % 2

2a. Combined shrub cover generally at least 25 % ..... Key to **Shrubland Associations** (p. 15)
2b. Combined shrub cover generally < 25 % 3

3a. Graminoid, forb, or fern cover generally at least 25 %, or highest cover available in layer; bryophyte, lichen, or algal cover various ..... Key to **Herbaceous Associations** (p. 18)
3b. Graminoid, forb, or fern cover generally < 25%; bryophyte, lichen, or algal cover generally > 25%, or highest cover available in layer .....Key to **Nonvascular Associations** (p. 20)

I. FOREST AND WOODLAND ASSOCIATIONS

Mature trees > 12 feet tall, crowns overlapping, cover generally 60-100 %.

Note: Some stands with tree cover at least 25 % may key to shrubland or herbaceous associations if trees are only occasional or peripheral in the associations.

Characterized by having one of the following tree species, either mature or reproducing, generally with at least 20% cover:
(1) *Abies amabilis* ..... A
(2) *Abies lasiocarpa* ..... B

(3) *Alnus rubra* C
(4) *Fraxinus latifolia* ..... D
(5) *Picea engelmannii* ..... E
(6) *Picea sitchensis* ..... F
(7) *Pinus contorta* var. *contorta* [shore pine] ..... ***Pinus contorta* var. *contorta* / *Carex obnupta*** (p. 31)
(8) *Pinus contorta* var. *latifolia* [lodgepole pine] ..... G
(9) *Populus balsamifera* ssp. *trichocarpa* .....
Populus balsamifera* ssp. *trichocarpa* / *Cornus sericea* / *Impatiens capensis ..... (p. 32)
(10) *Populus tremuloides* ..... ***Populus tremuloides* / *Carex obnupta*** (p. 33)
(11) *Salix lucida* ssp. *lasiandra* ..... Key to **Shrubland Associations** (p. 15)

(12) *Thuja plicata* ..... A
(13) *Tsuga heterophylla* ..... A

A. *Abies amabilis, Thuja plicata*, and/or *Tsuga heterophylla*:
1a. *Ledum glandulosum* present .....
..... ***Tsuga heterophylla* / *Ledum glandulosum* / *Carex obnupta* - *Lysichiton americanus*** (p. 35)
1b. *Ledum glandulosum* absent 2

2a. *Thuja plicata* present ..... ***Thuja plicata* / *Lysichiton americanus*** (p. 34)
2b. *Thuja plicata* absent ..... Key to **Herbaceous Associations** (p. 18)

B. *Abies lasiocarpa*:
1a. *Vaccinium uliginosum* with > 20% cover .....Key to **Shrubland Associations** (p. 15)
1b. *Vaccinium uliginosum* with < 20% cover or absent ..... Key to **Herbaceous Associations** (p. 18)

C. *Alnus rubra*:
1a. *Carex obnupta* with at least 5% cover and usually dominant or codominant with *Lysichiton americanus* .....
.....***Alnus rubra*/*Carex obnupta* - *Lysichiton americanus*** (p. 22)
1b. *Carex obnupta* with < 5% cover or absent; *Athyrium filix-femina* and/or *Lysichiton americanus* usually with = 20% cover ..... ***Alnus rubra* / *Athyrium filix-femina* - *Lysichiton americanus*** (p. 21)

D. *Fraxinus latifolia*: Characterized by having one of the following species, usually with at least 20% cover, but sometimes less in stands with depauperate understories:
(1) *Callitriche heterophylla* ..... Key to **Herbaceous Associations** (p. 18)
(2) *Carex aquatilis* var. *aquatilis* .....***Fraxinus latifolia* / *Carex aquatilis* var. *aquatilis*** (p. 23)
(3) *Carex deweyana*, sometimes with as little as 1% cover in stands with depauperate understory .....
.....***Fraxinus latifolia* / *Carex deweyana* - *Urtica dioica* ssp. *gracilis*** (p. 24)
(4) *Carex obnupta* .....***Fraxinus latifolia* / *Carex obnupta*** (p. 25)
(5) *Spiraea douglasii* ..... ***Fraxinus latifolia* / *Spiraea douglasii*** (p. 26)
(6) *Symphoricarpos albus* .....***Fraxinus latifolia* / *Symphoricarpos albus*** (p. 27)

E. *Picea engelmannii*:
1a. *Vaccinium uliginosum* with > 20% cover .....Key to **Shrubland Associations** (p. 15)
1b. *Vaccinium uliginosum* with < 20% cover or absent ..... Key to **Herbaceous Associations** (p. 18)

F. *Picea sitchensis*:
1a. *Cornus sericea* present; on tidal surge plain of large coastal rivers .....
..... ***Picea sitchensis* / *Cornus sericea* / *Lysichiton americanus*** (p. 29)

1b. *Cornus sericea* absent; not on surge plain.....
.....***Picea sitchensis / Carex obnupta - Lysichiton americanus*** (p. 28)

G. *Pinus contorta* var. *latifolia* [lodgepole pine]:
1a. *Vaccinium uliginosum* with > 20% cover .....Key to **Shrubland Associations** (p. 15)
1b. *Vaccinium uliginosum* with < 20% cover or absent ..... Key to **Herbaceous Associations** (p. 18)

II. SHRUBLAND ASSOCIATIONS

Mature shrubs < 12 feet tall, crowns overlapping or remote,
shrub cover generally > 25 %, tree cover generally < 25 %.

Note: Some stands with shrub cover at least 25 % may key to herbaceous associations if shrubs are only occasional or peripheral in the associations.

Characterized by having one of the following shrub species with highest cover, usually at least 20%, or highest cover available in layer:

(1) *Alnus incana*.....***Alnus incana / Lysichiton americanus*** (p. 36)
(2) *Alnus viridis* ssp. *sinuata* ..... A
(3) *Betula nana* ..... B
(4) *Cornus sericea* .....***Cornus sericea / Lysichiton americanus*** (p. 40)
(5) *Corylus cornuta* ..... Key to **Herbaceous Associations** (p. 18)
(6) *Kalmia microphylla* C
(7) *Gaultheria shallon* ..... D
(8) *Ledum glandulosum* ..... E
(9) *Lonicera caerulea* ..... Key to **Herbaceous Associations** (p. 18)
(10) *Lonicera involucrata* ..... Key to **Herbaceous Associations** (p. 18)
(11) *Malus fusca* ..... F
(12) *Myrica gale* ..... G
(13) *Rosa pisocarpa* ..... Key to **Herbaceous Associations** (p. 18)
(14) *Rosa gymnocarpa* ..... Key to **Herbaceous Associations** (p. 18)
(15) *Salix commutata* .....***Salix commutata*** (p. 51)
(16) *Salix geyeriana* ..... ***Salix geyeriana*** (p. 52)
(17) *Salix hookeriana* ..... H
(18) *Salix lucida* ssp. *lasiandra* I
(19) *Salix sitchensis* .....***Salix sitchensis*** (p. 57)
(20) *Spiraea douglasii* ..... J
(21) *Vaccinium caespitosum* ..... K
(22) *Vaccinium macrocarpon* .....***Vaccinium uliginosum / Carex obnpta*** (p. 63)
(23) *Vaccinium oxycoccos* .....
.....***Vaccinium uliginosum / Dodecatheon jeffreyi - Caltha leptosepala ssp. howellii*** (p. 65)
(24) *Vaccinium uliginosum* L

A. *Alnus viridis* ssp. *sinuata*:
1a. *Lysichiton americanus* with at least 20% cover .....***Alnus viridis* ssp. *sinuata* / *Lysichiton americanus*** (p. 37)
1b. *Lysichiton americanus* with < 20% cover or absent 2

2a. *Scirpus microcarpus* with at least 20% cover .....***Alnus viridis* ssp. *sinuata* / *Scirpus microcarpus*** (p. 38)

2b. *Scirpus microcarpus* with < 20% cover or absent ..... Key to **Herbaceous Associations** (p. 18)

B. *Betula nana*:
1a. *Vaccinium uliginosum* with at least 20% cover .....
.....***Vaccinium uliginosum / Dodecatheon jeffreyi - Caltha leptosepala* ssp. *howellii*** (p. 65)
1b. *Vaccinium uliginosum* with < 20% cover or absent .....***Betula nana / Carex aquatilis* var. *dives*** (p. 39)

C. *Kalmia microphylla*:
1a. *Vaccinium uliginosum* with at least 20% cover .....
..... ***Vaccinium uliginosum / Dodecatheon jeffreyi - Caltha leptosepala* ssp. *howellii*** (p. 65)
1b. *Vaccinium uliginosum* with < 20% cover or absent .....
.....***Kalmia microphylla / Carex aquatilis* var. *dives*** (p. 41)

D. *Gaultheria shallon*:
1a. *Vaccinium uliginosum* and *Deschampsia caespitosa* present .....
.....***Vaccinium uliginosum / Deschampsia cespitosa - Carex obnupta*** (p. 64)
1b. *Vaccinium uliginosum* and *Deschampsia caespitosa* absent .....
..... ***Ledum glandulosum - Gaultheria shallon / Carex obnupta*** (p. 42)

E. *Ledum glandulosum*:
1a. *Gaultheria shallon* with at least 20% cover .....
..... ***Ledum glandulosum - Gaultheria shallon / Carex obnupta*** (p. 42)
1b. *Gaultheria shallon* with < 20% cover or absent 2

2a. *Myrica gale* with at least 20% cover .....***Ledum glandulosum - Myrica gale*** (p. 47)
2b. *Myrica gale* with < 20% cover or absent 3

3a. *Carex obnupta* most conspicuous species in herb layer or evident adjacent to plot .....
.....***Ledum glandulosum / Carex obnupta / Sphagnum*** (p. 43)
3b. *Carex obnupta* not most conspicuous species in herb layer 4

4a. *Darlingtonia californica* present or evident adjacent to plot; *Sanguisorba officinalis* absent .....
.....***Ledum glandulosum / Darlingtonia californica/ Sphagnum*** (p. 45)
4b. *Darlingtonia californica* absent; *Sanguisorba officinalis* present .....
.....***Ledum glandulosum / Sanguisorba officinalis*** (p. 48)

F. *Malus fusca*:
1a. *Salix hookeriana* conspicuous in plot or evident adjacent to plot; coastal.....
..... ***Salix hookeriana - Malus fusca / Carex obnupta - Lysichiton americanus*** (p. 54)
1b. *Salix hookeriana* absent; not coastal..... ***Malus fusca / Carex obnupta*** (p. 49)

G. *Myrica gale*:
1a. *Ledum glandulosum* generally with at least 20% cover .....***Ledum glandulosum - Myrica gale*** (p. 47)
1b. *Ledum glandulosum* with < 20% cover or absent ..... ***Myrica gale / Carex aquatilis* var. *dives*** (p. 50)

H. *Salix hookeriana*:
1a. *Malus fusca* conspicuous in plot or evident adjacent to plot .....
..... ***Salix hookeriana - Malus fusca / Carex obnupta - Lysichiton americanus*** (p. 54)
1b. *Malus fusca* absent 2

2a. *Carex obnupta* and *Lysichiton americanus* usually both present in plot or evident adjacent to plot; coastal ... . ***Salix hookeriana - Malus fusca / Carex obnupta - Lysichiton americanus*** (p. 54)
2b. *Lysichiton americanus* absent; not coastal ..... ***Salix hookeriana - (Salix sitchensis)*** (p. 53)

I. *Salix lucida* ssp*. lasiandra*:
1a. *Salix sitchensis* present in plot or evident adjacent to plot, usually with > 20% cover .... ***Salix lucida* ssp. *lasiandra* / *Salix sitchensis* / *Lysichiton americanus*** (p. 56)
1b. *Salix sitchensis* with < 20% cover or absent..... ..... ***Salix lucida* ssp*. lasiandra* / *Urtica dioica* ssp. *gracilis*** (p. 55)

J. *Spiraea douglasii*:
1a. *Vaccinium uliginosum, Deschampsia caespitosa*, and *Sphagnum* usually present or evident adjacent to plot .... ***Spiraea douglasii - Vaccinium uliginosum / Carex obnupta - Deschampsia caespitosa*** (p. 59)
1b. *Vaccinium uliginosum* and *Deschampsia caespitosa* absent 2

2a. *Salix hookeriana* conspicuous in plot or evident adjacent to plot .... ***Salix hookeriana - Malus fusca / Carex obnupta - Lysichiton americanus*** (p. 54)
2b. *Salix hookeriana* absent 3

3a. *Carex cusickii* present or evident adjacent to plot ..... ***Spiraea douglasii / Sphagnum*** (p. 60)
3b. *Carex cusickii* absent, other herbs <10 % cover or absent ..... ***Spiraea douglasii*** (p. 58)

K. *Vaccinium caespitosum*:
1a. *Xerophyllum tenax* present or evident adjacent to plot, flooded openings absent..... ..... ***Vaccinium caespitosum / Xerophyllum tenax - Sanguisorba officinalis*** (p. 62)
1b. *Xerophyllum tenax* absent, flooded openings present .... ***Vaccinium caespitosum / Sanguisorba officinalis - Carex obnupta*** (p. 61)

L. *Vaccinium uliginosum*:
1a. *Spiraea douglasii* codominant or evident adjacent to plot..... ..... ***Spiraea douglasii - Vaccinium uliginosum / Carex obnupta - Deschampsia caespitosa*** (p. 59)
1b. *Spiraea douglasii* not codominant 2

2a. Herb layer with < 10 % cover or absent .... ***Vaccinium uliginosum / Dodecatheon jeffreyi - Caltha leptosepala* ssp. *howellii*** (p. 65)
2b. Herb layer with at least 10% cover, usually > 20%.....3

3a. *Dodecatheon jeffreyi* and *Caltha leptosepala* ssp. *howellii* with highest cover available in herb layer ..... ***Vaccinium uliginosum / Dodecatheon jeffreyi - Caltha leptosepala* ssp. *howellii*** ..... (p. 65)
3b. *Dodecatheon jeffreyi* and *Caltha leptosepala* ssp. *howellii* not with highest cover available in herb layer 4

4a. *Salix hookeriana* present or conspicuous adjacent to plot .... ***Vaccinium uliginosum / Carex obnupta*** (p. 63)
4b. *Salix hookeriana* absent ..... ***Vaccinium uliginosum / Deschampsia cespitosa - Carex obnupta*** (p. 64)

III. HERBACEOUS ASSOCIATIONS

Graminoid, forb, or fern cover generally > 25 %;
tree and shrub cover generally < 25%.

One the following herb species with highest cover in herb layer, usually at least 20% or highest cover available in depauperate stands, or one of 2-3 most abundant species in herb layer:

(43) *Euthamia occidentalis* ..... ***Euthamia occidentalis*** (p. 119)
(44) *Glyceria striata* ..... ***Glyceria striata*** (p. 120)
(45) *Gnaphalium palustre* ..... ***Eragrostis hypnoides - Gnaphalium palustre*** (p. 125)
(46) *Hippuris vulgaris* ..... ***Hippuris vulgaris*** (p. 121)
(47) *Hydrocotyle ranunculoides* ..... ***Hydrocotyle ranunculoides*** (p. 122)
(48) *Isoetes nuttallii* ..... ***Isoetes nuttallii*** (p. 123)
(49) *Juncus balticus* ..... ***Juncus balticus*** (p. 124)
(50) *Juncus effusus* ..... ***Juncus effusus*** (p. 125)
(51) *Juncus nevadensis* ..... ***Juncus nevadensis*** (p. 126)
(52) *Lemna minor* ..... ***Lemna minor*** (p. 127)
(53) *Lilaeopsis occidentalis* ..... ***Lilaeopsis occidentalis*** (p. 128)
(54) *Ludwigia palustris* ..... ***Ludwigia palustris - Polygonum hydropiperoides*** (p. 129)
(55) *Menyanthes trifoliata* ..... ***Menyanthes trifoliata*** (p. 130)
(56) *Nephrophyllidium crista-galli* ..... ***Nephrophyllidium crista-galli*** (p. 131)
(57) *Nuphar lutea* ssp. *polysepala* ..... ***Nuphar lutea* ssp. *polysepala*** (p. 132)
(58) *Oenanthe sarmentosa* ..... ***Oenanthe sarmentosa*** (p. 133)
(59) *Paspalum distichum* ..... ***Paspalum distichum*** (p. 134)
(60) *Polygonum amphibium* ..... ***Polygonum amphibium*** (p. 135)
(61) *Polygonum hydropiperoides* ..... ***Ludwigia palustris - Polygonum hydropiperoides*** (p. 129)
(62) *Potamogeton natans* ..... ***Potamogeton natans*** (p. 136)
(63) *Ranunculus aquatilis* ..... ***Ranunculus aquatilis*** (p. 137)
(64) *Ranunculus flammula* ..... ***Ranunculus flammula*** (p. 138)
(65) *Sagittaria latifolia* ..... ***Sagittaria latifolia*** (p. 139)
(66) *Sanguisorba officinalis* ..... D
(67) *Schoenoplectus acutus* ..... ***Schoenoplectus acutus*** (p. 141)
(68) *Scirpus microcarpus* ..... ***Scirpus microcarpus*** (p. 142)
(69) *Senecio triangularis* ..... ***Senecio triangularis*** (p. 143)
(70) *Sparganium angustifolium* ..... ***Sparganium angustifolium*** (p. 144)
(71) *Sparganium eurycarpum* ..... ***Sparganium eurycarpum*** (p. 145)
(72) *Torreyochloa pallida* var. *pauciflora* ..... ***Torreyochloa pallida* var. *pauciflora*** (p. 146)
(73) *Trichophorum caespitosum* ..... ***Trichophorum caespitosum*** (p. 147)
(74) *Triteleia hyacinthina* ..... ***Triteleia hyacinthina*** (p. 148)
(75) *Typha latifolia* ..... ***Typha latifolia*** (p. 149)
(76) *Utricularia macrorhiza* ..... ***Utricularia macrorhiza*** (p. 150)

A1. *Sanguisorba officinalis* usually codominant, *Carex obnupta* and/or *Carex cusickii* conspicuous in plot or evident adjacent to plot; Coast Range ..... ***Caltha leptosepala* ssp. *howellii - Carex obnupta*** (p. 77)
A2. *Sanguisorba officinalis, Carex obnupta, Carex cusickii* absent or with < 5% cover; Cascade Range ..... ***Caltha leptosepala* ssp. *howellii*** (p. 76)

B1. *Nuphar lutea* ssp. *polysepala* present; coastal ..... ***Carex aquatilis* var. *dives - Comarum palustre*** (p. 84)
B2. *Nuphar lutea* ssp. *polysepala* absent; montane ..... ***Carex aquatilis* var. *dives*** (p. 83)

C1. *Carex unilateralis* and *Danthonia californica* usually present ..... ***Deschampsia caespitosa - Danthonia californica*** (p. 108)
C2. *Carex unilateralis* and *Danthonia californica* absent 2

2a. A*rtemisia lindleyana* present, *Juncus balticus* absent; low elevation .....
..... ***Deschampsia caespitosa - Artemisia lindleyana*** (p. 107)
2b. A*rtemisia lindleyana* absent; Cascade Range 3

3a. *Juncus balticus* codominant ..... ***Deschampsia caespitosa - Juncus balticus*** (p. 109)
3b. *Juncus balticus* not codominant; any other combinations of species .....
..... ***Deschampsia caespitosa* montane "wet meadow" complex** (p. 102)

D1. *Carex aquatilis* var*. dives* conspicuous in plot or evident adjacent to plot; *Carex obnupta* and *Carex cusickii* absent; Cascade Range ..... ***Sanguisorba officinalis - Carex aquatilis* var*. dives*** (p. 140)
D2. *Carex aquatilis* var*. dives* absent, *Carex obnupta* and/or *Carex cusickii* conspicuous in plot or evident adjacent to plot; Coast Range .....
..... ***Caltha leptosepala* ssp*. howellii - Carex obnupta*** (p. 77)

IV. NONVASCULAR ASSOCIATIONS

Bryophyte, lichen, or algal cover generally > 25%;
graminoid, forb, fern, tree, or shrub cover generally < 25%

Most abundant species in moss layer:

1a. *Fontinalis antipyretica* ..... ***Fontinalis antipyretica*** (p. 152)
1b. *Polytrichum commune* ..... ***Polytrichum commune*** (p. 153)

I. FOREST AND WOODLAND ASSOCIATIONS

Alnus rubra / Athyrium filix-femina - Lysichiton americanus Association

Red alder / lady fern - skunk cabbage

Classification:

NVCS: *Alnus rubra / Athyrium filix-femina - Lysichiton americanus* Forest (CEGL003388)
Ecological System: North Pacific Deciduous Swamp (CES204.865)
Rank: G3G4S3
Plots sampled: 21 (macro)

Distribution in NW Oregon: Coast Range, Willamette Valley, western Cascade Range

Environment:

Elevation (ft): ave. 1549, range 500-4130
Slope (deg): ave. 1, range 0-5
Landform position: floodplains, terraces
Hydrology: seasonally moist to perennially moist
Soils: mostly loam, some organic muck or rocky

Vegetation and ecology: Habitat is woodland or forest, sometimes with seasonal pools. Stands are dominated by *Alnus rubra* in both mature and reproducing layers, with a small representation of *Thuja plicata* in both layers. *Rubus spectabilis* is abundant in the shrub layer in about half of the plots. *Lysichiton americanus* and *Athyrium filix-femina* dominate the herb layer, which contains over 65 other species, most with low constancy and cover. Moss cover is usually on elevated microsites such as logs and tip-up mounds.

Global distribution: Northern California to Alaska.

Other studies: Henderson 1970: 42; Henderson 1979: 200; Kunze 1994: 32; Titus et al. 1996.

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Alnus rubra	95	72	0	95
Thuja plicata	10	Tr	0	7
Acer macrophyllum	5	Tr	0	4
REPRODUCING TREES				
Alnus rubra	19	3	0	30
Thuja plicata	10	Tr	0	3
Tsuga heterophylla	5	Tr	0	3
Picea engelmannii	5	Tr	0	2
Malus fusca	5	Tr	0	2
SHRUB LAYER				
Rubus spectabilis	43	3	0	50
Acer circinatum	24	4	0	50
HERB LAYER				
Lysichiton americanus	100	50	3	95
Athyrium filix-femina	95	17	0	85
Oenanthe sarmentosa	57	4	0	30
Stachys ciliata	52	2	0	10
Claytonia sibirica	48	3	0	35
Tolmiea menziesii	33	3	0	25
Urtica dioica ssp. *gracilis*	33	1	0	10
MOSS LAYER				
Moss	43	7	0	80

Alnus rubra / Carex obnupta - Lysichiton americanus Association

Red alder / slough sedge - skunk cabbage

Classification:

NVCS: *Alnus rubra / Rubus spectabilis / Carex obnupta - Lysichiton americanus* Woodland (CEGL003389)
Ecological System: North Pacific Deciduous Swamp (CES204.865)
Rank: G3G4S4
Plots sampled: 26 (6 macro, 20 micro)

Distribution in NW Oregon:

Coast Range, Willamette Valley, western Cascade Range

Environment:

Elevation (ft): ave. 300, range 30-2800
Slope (deg): ave. 1, range 0-10
Landform position: floodplains, basins, lower slopes, benches
Hydrology: perennially saturated or perennially moist
Soils: mostly organic, some silt loam or sand

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Alnus rubra	100	89	40	95
Thuja plicata	8	1	0	20
Picea sitchensis	8	1	0	15
Frangula purshiana	8	Tr	0	10
Tsuga heterophylla	8	Tr	0	3
REPRODUCING TREES				
Thuja plicata	4	Tr	0	10
Picea sitchensis	4	Tr	0	1
Pseudotsuga menziesii	4	Tr	0	Tr
SHRUB LAYER				
Rubus ursinus	15	Tr	0	4
Salix hookeriana	12	3	0	50
Gaultheria shallon	12	Tr	0	5
HERB LAYER				
Carex obnupta	100	29	5	85
Lysichiton americanus	92	57	0	90
Athyrium filix-femina	23	1	0	10
Polystichum munitum	15	2	0	45
MOSS LAYER				
Moss	8	Tr	0	3
UNVEGETATED				
Bare ground	50	7	0	35

Vegetation and ecology: Habitat is forested wetland (swamp). Some sites are silted-in beaver ponds, and others are in peatlands where the association occurs in nutrient-rich laggs adjacent to uplands. Stands are dominated by *Alnus rubra* between 20-50 years old and have relatively few species in the shrub and herb layers. *Thuja plicata, Picea sitchensis,* and *Tsuga heterophylla* are sparsely represented in both mature and reproducing layers, where they are peripheral or limited to elevated microsites. The scanty shrub layer may include *Rubus ursinus, Salix hookeriana, Spiraea douglasii*, *Lonicera involucrata,* or *Rubus spectabilis* in wet areas and may have *Gaultheria shallon* and *Acer circinatum* on stumps and logs. The herb layer is dominated by *Carex obnupta* and *Lysichiton americanus*. *Athyrium filix-femina* has a constancy of 23 percent but cover never exceeds 10 percent. *Polystichum munitum* may be abundant on logs and stumps. Expanses of treacherously deep muck frequently occur between clumps of *Carex* and *Lysichiton*. *Sphagnum* does not occur in this association but *Eurhynchium praelongum* is common. Stands along streams may be flooded for brief periods after winter storms.

Global distribution: Common between northern California and British Columbia.

Other studies: Henderson 1970: 42; Henderson 1979: 200; Kunze 1994: 98 (WA); Klinka et al. 1996: 153 (in part; BC); Christy et al. 1998: 64; Christy 2001a: 10.

Fraxinus latifolia / Carex aquatilis var*. aquatilis* Association

Oregon ash / aquatic sedge

Classification:

NVCS: new
Ecological System: North Pacific Lowland Riparian Forest and Shrubland (CES204.869)
Rank: GUSU
Plots sampled: 2 (macro)

Distribution in NW Oregon: Willamette Valley

Environment:

Elevation (ft): 500
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: seasonally wet to flooded
Soils: clay loam with seasonal perched water table

Vegetation and ecology: Habitat is riparian forest. This association is known from only two plots and but is described here because it may be a relic of a more widespread historic vegetation type. It represents a mix of lowland and cold-soil vegetation of higher elevations. *Fraxinus latifolia* is the only tree species present in the plots. The diverse shrub layer includes *Spiraea douglasii, Rubus ursinus, Lonicera involucrate,* and *Symphoricarpos albus*, but none of these have particularly high cover. *Carex aquatilis* and *Veratrum californicum* are the most abundant species in the herb layer, species typical of wetlands at higher elevations. In contrast, *Fraxinus latifolia, Rosa nutkana, Crataegus douglasii, Carex deweyana* ssp. *leptopoda*, *Carex obnupta,* and *Camassia quamash* are all typical of lower elevations. Proximity to settlement and agriculture is indicated by presence of exotic species such as *Crataegus monogyna, Phalaris arundinacea, Poa trivialis,* and *Lolium arundinaceum*.

Global distribution: western Oregon, possibly western Washingon.

Other studies: Not known

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Fraxinus latifolia	100	75	70	80
SHRUB LAYER				
Spiraea douglasii	100	7	3	10
Rubus ursinus	100	4	2	5
Lonicera involucrata	100	3	3	3
Symphoricarpos albus	50	2	0	3
Amelanchier alnifolia	50	1	0	1
Rosa nutkana	50	Tr	0	1
Crataegus douglasii	50	Tr	0	Tr
Crataegus monogyna	50	Tr	0	Tr
HERB LAYER				
Carex aquatilis	100	50	20	80
Veratrum californicum	100	14	3	25
Carex deweyana ssp. *leptopoda*	100	4	2	5
Carex obnupta	100	3	2	3
Geum macrophyllum	100	2	2	2
Phalaris arundinacea	100	2	1	2
Epilobium ciliatum	100	2	1	2
Galium triflorum	100	Tr	Tr	Tr
Mimulus guttatus	50	13	0	25
Oenanthe sarmentosa	50	4	0	8
Carex	50	2	0	3
Poa palustris	50	1	0	1
Polypodium glycyrrhiza	50	1	0	1
Poa trivialis	50	1	0	1
Camassia quamash	50	Tr	0	1
Stellaria calycantha	50	Tr	0	Tr
Ranunculus uncinatus	50	Tr	0	Tr
Galium aparine	50	Tr	0	Tr
Rumex crispus	50	Tr	0	Tr
Lolium arundinaceum	50	Tr	0	Tr

Fraxinus latifolia / Carex deweyana - Urtica dioica ssp. *gracilis* Association

Oregon ash / Dewey sedge - California nettle

Classification:

NVCS: *Fraxinus latifolia / Carex deweyana - Urtica dioica* Forest (CEGL003365)
Ecological System: North Pacific Lowland Riparian Forest and Shrubland (CES204.869)
Rank: G2S2
Plots sampled: 2 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Fraxinus latifolia	100	78	75	80
SHRUB LAYER				
Rubus ursinus	50	9	0	18
Spiraea douglasii	50	5	0	10
HERB LAYER				
Carex deweyana ssp. *leptopoda*	100	31	1	60
Juncus patens	50	13	0	25
Phalaris arundinacea	50	3	0	5
Veronica scutellata	50	1	0	2
Geum macrophyllum	50	1	0	1
Juncus tenuis	50	1	0	1
Juncus effusus	50	Tr	0	Tr
Agrostis exarata	50	Tr	0	Tr
Perideridia gairdneri	50	Tr	0	Tr
Stellaria calycantha	50	Tr	0	Tr
Elymus glaucus	50	Tr	0	Tr
MOSS LAYER				
Moss	100	6	1	11

Distribution in NW Oregon: Willamette Valley, Columbia River bottoms in Vancouver Basin

Environment:

Elevation (ft): ave. 255, range 10- 500
Slope (deg): 0
Landform position: bottoms
Hydrology: seasonally flooded to moist
Soils: silt loams

Vegetation and ecology: Habitat is riparian forest. These stands occur in depressions on river and creek bottoms and were subject to sometimes prolonged seasonal inundation prior to flood control in western Oregon. Floodwaters may pool and persist into the growing season, suppressing herbaceous vegetation. *Fraxinus latifolia* is the only tree present in these plots, forming a dense canopy. *Rubus ursinus* and *Spiraea douglasii* are present in the shrub layer but with low cover. *Carex deweyana* ssp. *leptopoda* and *Juncus patens* are the primary species in the herb layer, and *Urtica dioica* ssp. *gracilis* may be abundant in some stands although it is not represented in these plots. The herb layer sometimes may be nearly devoid of any vegetation, and litterfall or recent deposits of silt are the only features to be seen. Beds of silt may become densely colonized by *Fraxinus* seedlings during the year following deposition. Tree trunks usually have thick sleeves of mosses that trap sediment and mark high water lines with silt stains. The bare understory in these stands is now preserved only in concave depressions on floodplains. Many stands that now only flood occasionally probably contain more herbaceous vegetation than what existed before flood control. Invasion by *Phalaris arundinacea* and *Solanum dulcamara* can be particularly severe around openings in the canopy, displacing smaller native species. Stands along the Columbia River bottoms historically remained flooded into July, with only the crowns of ash trees protruding above the waters.

Global distribution: western Oregon and western Washington

Other studies: Christy & Putera 1993: 41; Kunze 1994: 52 (WA); Titus et al. 1996.

Fraxinus latifolia / Carex obnupta Association

Oregon ash / slough sedge

Classification:

NVCS*: Fraxinus latifolia / Carex obnupta* Forest (CEGL000640)
Ecological System: North Pacific Lowland Riparian Forest and Shrubland (CES204.869)
Rank: G4S4
Plots sampled: 18 (macro)

Distribution in NW Oregon: Willamette Valley

Environment:

Elevation (ft): ave. 669, range 500-1700
Slope (deg): ave. 0, range 0-2
Landform position: floodplains and benches
Hydrology: seasonally flooded to saturated
Soils: silt and clay loams, some organic

Vegetation and ecology: Habitat is riparian forest. *Fraxinus latifolia* is the primary tree, with lesser amounts of *Populus balsamifera* ssp*. trichocarpa, Frangula purshiana, Abies grandis,* and *Alnus rubra.* The shrub layer is diverse but averages less than 10 percent cover, with occasionally high cover of *Rubus ursinus, Symphoricarpos albus, Cornus sericea,* or *Acer circinatum. Carex obnupta* dominates the herb layer with cover averaging 76 percent. Forty other herbaceous species are reported from plots but most have less than 15 percent cover. The presence of *Veratrum viride* and *Rudbeckia occidentalis* in a stand of *Fraxinus* is unusual because these species are more typical of elevations above 2000-3000 feet.

Global distribution: Western Oregon and southwestern Washington.

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Fraxinus latifolia	100	64	25	90
Populus balsamifera ssp. *trichocarpa*	11	1	0	15
Frangula purshiana	11	Tr	0	5
Abies grandis	6	Tr	0	Tr
REPRODUCING TREES				
Fraxinus latifolia	11	Tr	0	1
Alnus rubra	6	Tr	0	Tr
SHRUB LAYER				
Rubus ursinus	67	6	0	36
Rosa nutkana	33	Tr	0	1
Symphoricarpos albus	28	3	0	20
Spiraea douglasii	22	1	0	8
Physocarpus capitatus	22	Tr	0	3
Corylus cornuta	22	Tr	0	2
HERB LAYER				
Carex obnupta	100	76	25	100
Polypodium glycyrrhiza	50	Tr	0	Tr
Carex deweyana ssp. *leptopoda*	33	2	0	15
Polystichum munitum	33	1	0	10
MOSS LAYER				
Moss	83	12	0	50

Other studies: Heinitz 1982: 20; Marshall 1985: 142; Frenkel & Heinitz 1987: 208; Kunze 1994: 33 (WA); Titus et al. 1996.

Fraxinus latifolia / Spiraea douglasii Association

Oregon ash / Douglas spiraea

Classification:

NVCS: *Fraxinus latifolia* / *Spiraea douglasii* Forest (CEGL003392)
Ecological System: North Pacific Lowland Riparian Forest and Shrubland (CES204.869)
Rank: G3S3
Plots sampled: 3 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Fraxinus latifolia	100	74	50	90
SHRUB LAYER				
Spiraea douglasii	100	85	60	100
Cornus sericea	25	Tr	0	1
HERB LAYER				
Carex obnupta	25	10	0	40
Ranunculus uncinatus	25	Tr	0	1
Apiaceae	25	Tr	0	Tr
Rumex crispus	25	Tr	0	Tr
Poa trivialis	25	Tr	0	Tr
Epilobium ciliatum	25	Tr	0	Tr
MOSS LAYER				
Moss	50	1	0	4

Distribution in NW Oregon: Willamette Valley

Environment:

Elevation (ft): 500
Slope (deg): 0
Landform position: floodplains
Hydrology: seasonally flooded to saturated
Soils: silt and clay loams

Vegetation and ecology: Habitat is riparian woodland or forest with open to closed canopy. *Fraxinus latifolia* is the only tree species present, and stands are characterized by a very dense shrub layer of *Spiraea douglasii* with little else present but *Carex obnupta.* Stands may be extensive along floodplains and some have no doubt developed on abandoned pasture land and old prairie.

Global distribution: Western Oregon and southwestern Washington.

Other studies: Titus et al. 1996.

Fraxinus latifolia / Symphoricarpos albus Association

Oregon ash / snowberry

Classification:

Fraxinus latifolia / *Symphoricarpos albus* Forest (CEGL003393)
Ecological System: North Pacific Lowland Riparian Forest and Shrubland (CES204.869)
Rank: G4S4
Plots sampled: 2 (macro)

Distribution in NW Oregon: Willamette Valley

Environment:

Elevation (ft): ave. 790, range 500-1080
Slope (deg): ave. 1, range 0-1
Landform position: floodplain depressions
Hydrology: seasonally flooded
Soils: silt and clay loams

Vegetation and ecology: Habitat is riparian forest. *Fraxinus latifolia* is typically the only tree present in these stands. *Symphoricarpos albus* and *Rubus ursinus* may cover up to half the shrub layer, and *Corylus cornuta* may sometimes have cover up to 40 percent. The herb layer is dominated by monotypic stands of *Carex obnupta* with few other species present. Depressions with *Carex obnupta* may remain flooded into the growing season.

Global distribution: Western Oregon and southwestern Washington.

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Fraxinus latifolia	100	80	75	85
SHRUB LAYER				
Symphoricarpos albus	100	55	50	60
Rubus ursinus	100	33	Tr	65
Corylus cornuta	50	20	0	40
Cornus sericea	50	6	0	12
Amelanchier alnifolia	50	5	0	10
Acer circinatum	50	Tr	0	Tr
HERB LAYER				
Carex obnupta	100	60	45	75
Carex deweyana ssp. *leptopoda*	100	1	Tr	2
Athyrium filix-femina	50	1	0	2
Galium triflorum	50	1	0	1
Botrychium virginianum	50	Tr	0	Tr
Galium aparine	50	Tr	0	Tr
MOSS LAYER				
Moss	100	3	1	5

Other studies: Heinitz 1982: 20; Frenkel & Heinitz 1987: 208; Kunze 1994: 33 (WA); Titus et al. 1996.

Picea sitchensis / Carex obnupta - Lysichiton americanus Association

Sitka spruce / slough sedge - skunk cabbage

Classification:

NVCS: *Picea sitchensis / Carex obnupta - Lysichiton americanus* Forest (CEGL000400)
Ecological System: North Pacific Coniferous Swamp (CES204.867)
Rank: G2G3S1
Plots sampled: 27 (7 macro, 20 micro)

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Picea sitchensis	100	66	30	85
Alnus rubra	19	2	0	25
Thuja plicata	7	1	0	30
Tsuga heterophylla	4	1	0	20
REPRODUCING TREES				
Tsuga heterophylla	4	Tr	0	1
SHRUB LAYER				
Gaultheria shallon	37	4	0	30
Rubus spectabilis	30	3	0	20
Vaccinium parvifolium	30	3	0	20
HERB LAYER				
Carex obnupta	96	66	0	95
Lysichiton americanus	74	20	0	70
Oenanthe sarmentosa	22	1	0	20
Maianthemum dilatatum	22	1	0	8
MOSS LAYER				
Moss	11	3	0	70

Distribution in NW Oregon: coastal

Environment:

Elevation (ft): ave. 24, range 20-40
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: perennially saturated
Soils: organic or muck

Vegetation and ecology: Habitat is forested wetland (swamp) in coastal fens. The association occurs peripheral to open mire or shrub-swamp and often develops in nutrient-rich laggs adjacent to uplands. Stands are dominated by *Picea sitchensis* with lesser amounts of *Alnus rubra*, *Thuja plicata* and *Tsuga heterophylla* confined to elevated logs, rootballs, or stumps. Cover of *Picea sitchensis* ranges from 30-85 percent, and stands with more open canopies have moderate shrub cover of *Gaultheria shallon*, *Rubus spectabilis*, and *Vaccinium parvifolium* on mounds, and *Malus fusca* and *Lonicera involucrata* in wetter hollows. *Carex obnupta, Lysichiton americanus,* and *Oenanthe sarmentosa* dominate wet hollows in the herb layer with exposures of typically deep muck soil between them. *Eurhynchium praelongum* is the most common moss, but several species of *Sphagnum* become more frequent near the Columbia River and northward with increasing precipitation. *Picea sitchensis* grows slowly in perennially saturated soils and trees with diameters of 25-40 inches have been found to be 200-500 years old, generally much older than upland spruce with comparable diameters. These "swamp spruce" have a characteristic growth form with shallow and spreading root systems, buttressed trunks, and reduced crown spread. Large wads of *Polypodium scouleri*, and thick mats of epiphytic mosses, particularly *Antitrichia curtipendula*, are typical on upper trunks and limbs. Windthrow is frequent, creating gaps for regeneration of *Picea*, often as resprouts from fallen boles. Old-growth stands are very rare because most swamps were readily accessible for logging and suitable sites may never have been numerous or extensive.

Global distribution: southwestern Oregon to British Columbia.

Other studies: Smith & Smith 1976: 112, 129; Frenkel et al. 1978: 59; Boss 1983: 83; Kunze 1994: 91, 98 (WA); Bigley & Hull 1995: 20 (in part; WA); Klinka et al. 1996: 153 (BC); Christy et al. 1998: 62; Christy 2001a: 10; Cordes 1972: 176, 416 (in part; BC). Kunze's *Picea sitchensis - Alnus rubra / Lysichiton americanus* association occupies a higher topographic position on natural levees along major rivers but is otherwise similar.

Picea sitchensis / Cornus sericea / Lysichiton americanus Association

Sitka spruce / creek dogwood / skunk cabbage

Classification:

NVCS: *Picea sitchensis / Cornus sericea / Lysichiton americanus* Forest (CEGL000055)
Ecological System: North Pacific Coniferous Swamp (CES204.867)
Rank: G1G2S1
Plots sampled: 15 (macro)

Distribution in NW Oregon: coastal

Environment:

Elevation (ft): ave. 5, range 5-6
Slope (deg): 0
Landform position: floodplains
Hydrology: seasonally flooded to perennially saturated
Soils: muck or organic

Vegetation and ecology: Habitat is forested wetland (swamp) on floodplains of large coastal rivers, within the zone of daily freshwater tidal inundation. Stands occur on natural levees along river channels and larger tidal creeks that provide slight elevation above the reach of daily freshwater tidal inundation. They form perimeters around typically lower and wetter interiors composed of either willow swamp or emergent marsh. The entire wetland complex is connected by sinuous tidal creeks to the adjacent river channels at high tide. *Picea sitchensis* is the primary tree species, with lesser amounts of *Alnus rubra*, *Thuja plicata*, *Frangula purshiana, Populus balsamifera* ssp. *trichocarpa,* and *Salix lucida* ssp. *lasiandra*. *Fraxinus latifolia* and *Tsuga heterophylla* are occasional, the latter most common on logs and stumps. "Tideland spruce" have the same characteristic growth form and diameter age classes as "swamp spruce" in the *Picea sitchensis / Carex obnupta - Lysichiton americanus* association, but here the ground is wetter, many trees are leaning, and stands are full of windthrow as well as driftwood brought in by tidal surges. Although many of the tree species have a relatively high frequency, average cover does not exceed 25 percent and a tall, diverse, and nearly impenetrable shrub layer is characteristic of these stands. *Cornus sericea* dominates the shrub layer and *Rubus spectabilis, Rosa nutkana, Salix lucida* ssp. *lasiandra, Malus fusca,* and *Salix sitchensis* are conspicuous. *Rubus parviflorus, Gaultheria shallon,* and *Acer circinatum* form dense thickets on elevated logs and stumps. The herb layer is patchy but diverse, with 25 species reported. *Lysichiton americanus*, *Impatiens capensis,* and *Carex obnupta* may be abundant in

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Picea sitchensis	100	24	5	65
Alnus rubra	73	7	0	20
Thuja plicata	67	8	0	25
Frangula purshiana	67	4	0	20
Populus balsamifera ssp. *trichocarpa*	60	19	0	80
REPRODUCING TREES				
Thuja plicata	13	Tr	0	2
Picea sitchensis	13	Tr	0	1
SHRUB LAYER				
Cornus sericea	100	22	3	50
Rubus spectabilis	87	6	0	25
Rosa nutkana	80	3	0	10
Rubus ursinus	80	1	0	4
Rubus parviflorus	73	3	0	10
Vaccinium parvifolium	73	1	0	2
Gaultheria shallon	67	4	0	15
Oemleria cerasiformis	67	1	0	5
Symphoricarpos albus	67	1	0	5
Acer circinatum	60	5	0	20
Malus fusca	60	3	0	10
Salix sitchensis	40	5	0	40
HERB LAYER				
Lysichiton americanus	100	10	2	35
Athyrium filix-femina	93	2	0	10
Adiantum pedatum	93	1	0	2
Impatiens capensis	80	10	0	50
Carex obnupta	73	6	0	35
Oenanthe sarmentosa	60	2	0	5
Polystichum munitum	60	1	0	4
Galium	53	1	0	3
Angelica genuflexa	47	1	0	2
Polypodium glycyrrhiza	47	Tr	0	1
Heracleum lanatum	40	Tr	0	1

openings, while other areas are too brushy and have relatively little herb cover. *Polypodium scouleri*, *Antitrichia curtipendula*, and *Usnea longissima* are conspicuous epiphytes on spruce limbs overhanging channels and tidal creeks. Old-growth stands are very rare because most swamps were readily accessible for logging and suitable sites may never have been numerous or extensive. Of an estimated 14,000 acres in Oregon in 1850, about 1,700 remain today, representing an 88 percent loss.

Global distribution: Oregon to British Columbia.

Other studies: Eilers 1975: 261, Hinschberger 1978: 5, Frenkel et al. 1978: 99; Thomas 1980: 8; Wiedemann 1984; Thomas 1984: 95, 97.

Pinus contorta var. *contorta / Carex obnupta* Association

Shore pine / slough sedge

Classification:

NVCS: *Pinus contorta* var. *contorta* / *Carex obnupta* Forest (CEGL000142)
Ecological System: North Pacific Maritime Coastal Sand Dune (CES200.881)
Rank: G2S1
Plots sampled: 93 (11 macro, 82 micro)

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Pinus contorta var. *contorta*	99	30	0	85
SHRUB LAYER				
Vaccinium ovatum	16	1	0	15
Vaccinium uliginosum	12	2	0	75
Gaultheria shallon	10	1	0	40
HERB LAYER				
Carex obnupta	100	27	1	75
Dichanthelium acuminatum var. *fasciculare*	9	1	0	15
Deschampsia caespitosa	6	1	0	50
Agrostis	5	Tr	0	10
Argentina egedii	3	Tr	0	20
Juncus lesueurii	3	Tr	0	10
MOSS LAYER				
Moss	76	30	0	95
UNVEGETATED				
Bare ground	14	7	0	95
Litter	1	Tr	0	15

Distribution in NW Oregon: coastal

Environment:

Elevation (ft): ave. 76, range 20-100
Slope (deg): 0
Landform position: former deflation plains, ancient marine terraces
Hydrology: seasonally flooded, dry in summer
Soils: sand, sometimes with duripan

Vegetation and ecology: Habitat is depressions in stabilized sand dunes along the coast. Sand in dried-up depressions is often stained with iron. Peat does not develop at these sites because summer drying oxidizes any organic material. *Pinus contorta* var. *contorta* 30-130 years old is the primary tree species, but most stands are 30-75 years old. Canopy cover ranges between 0-85 percent, and *Pinus contorta* is usually the only reproducing conifer present. The sparse shrub layer, ranging from 1-25 percent cover, may contain *Vaccinium uliginosum, Vaccinium ovatum, Spiraea douglasii, Myrica californica,* and *Gaultheria shallon* growing on mounds in and around the depressions. *Carex obnupta* dominates the ground layer, with density varying inversely with depth and duration of winter flooding. Drought-tolerant *Warnstorfia exannulata, Sphagnum mendocinum, Polytrichum commune,* and *Fontinalis howellii* are the most conspicuous mosses. Inclusions of the *Salix hookeriana - Malus fusca / Carex obnupta - Lysichiton americanus* association may occur in deeper depressions where water persists later in the season. The seasonally high water table inhibits invasion of upland species, and this association persists long after surrounding vegetation has developed into upland forest. Old-growth stands are rare. Considerable acreage of this association is developing on deflation plains, presumably an artifact of the expansion of these landforms after the advent of fordunes formed by sand-trapping *Ammophila arenaria*. Pumping of groundwater for municipal use may be causing the water table to drop in some areas and hasten invasion of upland species.

Global distribution: Sporadic along the coast between northern California and Vancouver Island.

Other studies: Christy et al. 1998: 60; Christy 2001a: 11; Egler 1934: 29; Christy 1979: 55; Wiedemann 1984: 56.

Populus balsamifera ssp*. trichocarpa / Cornus sericea / Impatiens capensis* Association

Black cottonwood / creek dogwood / jewelweed

Classification:

NVCS: *Populus balsamifera* ssp*. trichocarpa / Cornus sericea / Impatiens capensis* Forest (CEGL003408)
Ecological System: North Pacific Lowland Riparian Forest and Shrubland (CES204.869)
Rank: G1S1
Plots sampled: 3 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Populus balsamifera ssp. *trichocarpa*	100	48	30	75
Salix lucida ssp. *lasiandra*	67	8	0	15
SHRUB LAYER				
Cornus sericea	100	47	20	60
Rubus ursinus	67	2	0	3
Rubus spectabilis	67	2	0	4
HERB LAYER				
Impatiens capensis	100	33	25	50
Carex deweyana ssp. *leptopoda*	100	1	1	2
Athyrium filix-femina	67	1	0	2
Lysichiton americanus	67	1	0	2
Scutellaria lateriflora	67	1	0	1
Solanum dulcamara	33	Tr	0	1
Callitriche	33	Tr	0	1
Prunella vulgaris	33	Tr	0	1

Distribution in NW Oregon: coastal

Environment:

Elevation (ft): ave. 8, range 5-10
Slope (deg): 0
Landform position: floodplains
Hydrology: perennially saturated
Soils: silt loam or muck

Vegetation and ecology: Habitat is forested wetland (swamp) in floodplains of large coastal rivers, within the zone of daily freshwater tidal inundation. Portions are flooded at high tide, but trees are restricted to areas elevated above the water. *Populus balsamifera* ssp*. trichocarpa* is the most conspicuous tree in this swamp association, but *Salix lucida* ssp. *lasiandra* and *Fraxinus latifolia* are frequent. *Cornus sericea* is the primary shrub with an average cover of 47 percent, with lesser amounts of *Salix sitchensis* and very low cover of other species such as *Rubus ursinus, Rubus spectabilis, Malus fusca,* and *Physocarpus capitatus.* Because much of the understory is flooded at high tide, there are few herbaceous species present with any appreciable cover. *Impatiens capensis* is the only conspicuous herb, although *Carex deweyana* ssp*. leptopoda* was present in very small amounts in each plot and *Athyrium filix-femina* and *Lysichiton americanus* were a close second. Seeds of weedy *Phalaris arundinacea, Iris pseudacorus,* and *Ranunculus repens* are capable of rafting into the interior of stands at high tide and can occur almost anywhere.

Global distribution: Oregon to British Columbia.

Other studies: Christy & Putera 1993: 41; Kunze 1994: 60 (WA)

Populus tremuloides / Carex obnupta Association

Quaking aspen / slough sedge

Classification:

NVCS: *Populus tremuloides* / *Carex obnupta* Forest (CEGL003371)
Ecological System: North Pacific Deciduous Swamp (CES204.865)
Rank: G2S1
Plots sampled: 1 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Populus tremuloides	100	50	50	50
SHRUB LAYER				
Spiraea douglasii	100	80	80	80
Salix hookeriana	100	10	10	10
HERB LAYER				
Carex obnupta	100	Tr	Tr	Tr
MOSS LAYER				
Moss	100	98	98	98

Distribution in NW Oregon:

Northern Willamette Valley

Environment:

Elevation (ft): 500
Slope (deg): 0
Landform position: floodplains, depressions
Hydrology: seasonally flooded to saturated
Soils: silt loam or organic

Vegetation and ecology: The single known occurrence of this association in Oregon is in a seasonally-flooded depression on shallow-soiled basalt scabland. It is described here because it may be a relic of type that was more widespread historically. Seasonal flooding is from precipitation but summer drying precludes formation of peat. The tree layer is dominated by *Populus tremuloides* with up to 50 percent cover. The shrub layer includes *Spiraea douglasii* and Salix *hookeriana* with covers of 80 and 10 percent, respectively. The sparse herb layer is dominated by only *Carex obnupta* with a very low cover. The moss layer is covered up to 98 percent by *Sphagnum mendocinum.* Large expanses of swamp vegetation once occurred in the northern Willamette and Tualatin valleys and this association may have been part of it. *Populus tremuloides* still occurs in a number of low-elevation sites in Clackamas, Multnomah and Washington Counties, but most are on uplands that do not support wetland vegetation, and it becomes very rare at low elevations south of Clackamas County. These wetlands are thought to be more frequent in western Washington and perhaps extend to southwestern British Columbia but have not been sampled adequately. *Spiraea douglasii* and other species of *Sphagnum* have been observed in some stands in Washington. Despite the abundance of *Spiraea douglasii* in this association, *Carex obnupta* is used here to distinguish these low-elevation occurrences west of the Cascade Range from some *Populus tremuloides* / *Spiraea douglasii* stands reported from east of the Cascades.

Global distribution: Willamette Valley, Puget Trough, and possibly lower Fraser River valley and southeastern Vancouver Island.

Other studies: Christy 2001a: 14

Thuja plicata / *Lysichiton americanus* Association

Western red cedar / skunk cabbage

Classification:

NVCS: *Thuja plicata* / *Lysichiton americanus* Forest (CEGL0004780)
Ecological System: North Pacific Coniferous Swamp (CES204.867)
Rank: G4S1
Plots sampled: 8 (macro)

Distribution in NW Oregon: western Cascade Range

Environment:

Elevation (ft): ave. 2925, range 1300-3800
Slope (deg): ave. 6, range 0-14
Landform position: floodplains, benches, and various slope positions with impeded drainage
Hydrology: perennially moist
Soils: loams

Vegetation and ecology: Habitat is forested wetland (swamp) with shallow depressions among the trees. Stands are dominated by *Thuja plicata* in both the mature and reproducing layers, and about half the plots contain lesser amounts of *Abies amabilis* and *Tsuga heterophylla*, depending on elevation. *Pseudotsuga menziesii* is present but usually peripheral in the stands because of wet soils. *Rubus spectabilis* and *Vaccinium ovalifolium* occur in about half the plots, while the herb layer is dominated by *Lysichiton americanus*. *Athyrium filix-femina* has fairly high constancy but consistently low cover. Both shrub and herb layers are extremely diverse, with over 70 species present in the latter, sometimes making classification difficult. Trees and shrubs occupy elevated microsites, while *Lysichiton americanus* occupies wetter bottoms. *Sphagnum* occurs only at higher elevations.

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Thuja plicata	100	36	15	80
Abies amabilis	50	10	0	25
Tsuga heterophylla	50	8	0	30
Pseudotsuga menziesii	50	3	0	15
REPRODUCING TREES				
Thuja plicata	63	2	0	5
Tsuga heterophylla	50	1	0	3
Abies amabilis	38	1	0	2
SHRUB LAYER				
Rubus spectabilis	63	1	0	2
Vaccinium ovalifolium	50	3	0	8
Acer circinatum	38	Tr	0	2
HERB LAYER				
Lysichiton americanus	100	28	8	60
Athyrium filix-femina	63	2	0	6
Galium triflorum	63	Tr	0	1
Blechnum spicant	50	6	0	30
Maianthemum dilatatum	38	1	0	7
Viola glabella	38	1	0	5
Listera	38	Tr	0	Tr
Asarum caudatum	38	Tr	0	Tr
MOSS LAYER				
Moss	38	3	0	10

Global distribution: Oregon to British Columbia

Other studies: Franklin 1966 (WA); Glad et al. 1987: 261; Klinka et al. 1996: 153 (BC); Jankovsky-Jones et al. 1999: 37 (ID)

Tsuga heterophylla / Ledum glandulosum / Carex obnupta - Lysichiton americanus Association

Western hemlock / Labrador tea / slough sedge - skunk cabbage

Classification:

NVCS: *Tsuga heterophylla / Ledum glandulosum / Carex obnupta - Lysichiton americanus* Forest (CEGL000477)
Ecological System: North Pacific Bog and Fen (CES204.063)
Rank: G1S1
Plots sampled: 8 (macro)

Distribution in NW Oregon: western Coast Range

Environment:

Elevation (ft): 25
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: perennially saturated to flooded
Soils: organic muck and peat

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Tsuga heterophylla	100	19	4	60
Pinus contorta var. contorta	75	11	0	60
Thuja plicata	38	7	0	32
Picea sitchensis	25	2	0	8
SHRUB LAYER				
Gaultheria shallon	100	21	12	40
Ledum glandulosum	100	14	4	32
Vaccinium ovatum	75	4	0	8
Vaccinium parvifolium	38	2	0	4
HERB LAYER				
Carex obnupta	100	42	16	60
Lysichiton americanus	100	4	4	4
Juncus	88	11	0	20
Oenanthe sarmentosa	50	2	0	4
Blechnum spicant	38	2	0	4
MOSS LAYER				
Moss	100	20	4	36

Vegetation and ecology: Habitat is forested wetland (swamp) in coastal fens. Stands occur adjacent to open peatlands and shrub-swamps. The tree layer is dominated by *Tsuga heterophylla*. *Thuja plicata* may be abundant in drier sites but is suppressed or killed in waterlogged soils. Other species present in lesser amounts are *Picea sitchensis* and *Pinus contorta* var. *contorta,* the latter also being killed by extended flooding. The dense shrub layer is dominated by *Gaultheria shallon* and *Ledum glandulosum,* with *Vaccinium ovatum, Vaccinium parvifolium,* and *Myrica californica* present in lesser amounts. Most trees and shrubs occur on elevated microsites such as decaying logs, stumps, and old root wads. The herb layer is dominated by *Carex obnupta* and *Lysichiton americanus,* with *Carex* being much more abundant. *Juncus*, *Oenanthe sarmentosa, Blechnum spicant*, and *Athyrium filix-femina* are typically present but with low cover. *Sphagnum palustre* or *S. henryense* are conspicuous in the moss layer. Stands are subject to windthrow in severe winter storms but appear to be self-perpetuating in the absence of major disturbance.

Global distribution: *Ledum glandulosum* becomes dominant in coastal peatlands only south of the Columbia River, so this association appears to be restricted to the coast of Oregon. Stands resemble a number of hemlock-cedar swamp associations typical of hyperoceanic sites in British Columbia and southeastern Alaska, and this appears to be the southernmost occurrence of this group in North America.

Other studies: Howarth 1995: 10; Christy 2001a: 19. Kunze (1994) described a *Thuja plicata - Tsuga heterophylla / Lysichiton americanus* association containing up to 15 percent *Sphagnum*, but *Carex obnupta* is only a minor component there and *Ledum groenlandicum* does not occur in Oregon. Her *Tsuga heterophylla / Ledum groenlandicum / Sphagnum* spp. type does not contain *Carex obnupta* and contains several other taxa not occurring in low-elevation peatlands in Oregon.

II. SHRUBLAND ASSOCIATIONS

Alnus incana / Lysichiton americanus Association

White alder / skunk cabbage

Classification:

NVCS: *Alnus incana / Lysichiton americanus* Shrubland (CEGL002629)
Ecological System: North Pacific Montane Riparian Woodland and Shrubland (CES204.866)
Rank: G3SU
Plots sampled: 7 (macro)

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 3789, range 3120-4580
Slope (deg): ave. 5, range 0-15
Landform position: floodplains, basins, benches, slopes
Hydrology: seasonally moist to perennially saturated
Soils: mostly organic, some loam

Vegetation and ecology: Habitat is montane fens and shrub-swamp. *Alnus incana* is the primary shrub and may form dense stands with a variety of other species, particularly *Ribes bracteosum* and *Vaccinium ovalifolium*. *Picea engelmannii, Tsuga heterophylla*, and *Thuja plicata* occur in about half the plots as mature trees or seedlings. *Lysichiton americanus, Athyrium filix*-femina*, Glyceria striata*, *Carex laeviculmis,* and *Senecio triangularis* are the most common species in the herb layer, but over 60 species with lesser cover were recorded, making the understory extremely diverse and stands difficult to classify. This is why a number of publications have used "mesic forb" to characterize these stands.

Global distribution: Oregon, Washington

Other studies: Not known. Kovalchik 1987: 67, Crowe & Clausnitzer 1997: 136, and Jankovsky-Jones *et al.* 1999: 8 (ID) described *Alnus incana* types with *Ribes* that sound somewhat similar but drier.

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Picea engelmannii	57	4	0	15
Tsuga heterophylla	29	1	0	7
Thuja plicata	14	2	0	15
Abies amabilis	14	1	0	5
REPRODUCING TREES				
Tsuga heterophylla	57	1	0	3
Picea engelmannii	29	1	0	5
Abies amabilis	14	1	0	5
Thuja plicata	14	1	0	4
Abies grandis	14	Tr	0	Tr
SHRUB LAYER				
Alnus incana	100	50	20	81
Ribes bracteosum	43	2	0	10
HERB LAYER				
Lysichiton americanus	100	34	8	75
Athyrium filix-femina	86	14	0	55
Glyceria striata	86	5	0	15
Carex laeviculmis	71	6	0	20
Senecio triangularis	71	4	0	10
Stachys ciliata	71	1	0	4
Veronica americana	71	Tr	0	1
Maianthemum stellatum	57	2	0	6
Trautvetteria caroliniensis	57	1	0	7
Viola glabella	57	1	0	5
Epilobium ciliatum ssp. *glandulosum*	57	Tr	0	1
Geum macrophyllum	57	Tr	0	1
MOSS LAYER				
Moss	14	6	0	40

Alnus viridis ssp*. sinuata* / *Lysichiton americanus* Association

Sitka alder / skunk cabbage

Classification:

NVCS: new
Ecological System: North Pacific Deciduous Swamp (CES204.865)
Rank: G3SU
Plots sampled: 3 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Pinus monticola	33	2	0	5
REPRODUCING TREES				
Thuja plicata	33	3	0	10
Tsuga heterophylla	33	Tr	0	Tr
Picea engelmannii	33	Tr	0	Tr
SHRUB LAYER				
Alnus viridis ssp. *sinuata*	100	72	60	90
Ribes bracteosum	67	4	0	10
HERB LAYER				
Lysichiton americanus	100	53	25	80
Athyrium filix-femina	67	9	0	20
Glyceria striata	67	8	0	20
Mimulus guttatus	67	Tr	0	1
Epilobium ciliatum ssp. *watsonii*	67	Tr	0	Tr
MOSS LAYER				
Moss	33	5	0	16

Ecoregions in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 3287, range 2100-4400
Slope (deg): ave. 2, range 0-4
Landform position: depressions, seepage slopes
Hydrology: moist to perennially saturated
Soils: mostly organic, some silt loam

Vegetation and ecology: This association is a wetter variant of the *Alnus viridis* ssp. *sinuata - Athyrium filix-femina* and contains considerably more *Lysichiton americanus* in the herb layer. Trees are scarce and are peripheral or limited to seedlings, and include *Pinus monticola, Thuja plicata, Tsuga heterophylla,* or *Picea engelmannii*. *Alnus viridis* ssp. *sinuate* is the primary shrub with lesser amounts of *Ribes bracteosum*, *Ribes lacustre*, and up to eight other species of shrubs that may form very dense thickets. The herb layer is diverse with over 30 species reported, but *Lysichiton americanus, Athyrium filix-femina, Glyceria striata, Senecio triangularis, Stachys ciliata, Scirpus microcarpus,* and *Oenanthe sarmentosa* are the most abundant. The diverse understory makes stands difficult to classify, and this is why a number of publications have used "mesic forb" to characterize these stands.

Global distribution: Oregon, Washington

Other studies: This type would be included in the "*Alnus viridis* ssp. *sinuata* shrubland" or "*Alnus viridis* ssp. *sinuata* / mesic forb" associations of others.

Alnus viridis ssp. *sinuata* / *Scirpus microcarpus* Association

Sitka alder / small-fruited bulrush

Classification:

NVCS: new
Ecological System: North Pacific Deciduous Swamp (CES204.865)
Rank: G3SU
Plots sampled: 2 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Pinus contorta var. *latifolia*	50	30	0	60
Picea engelmannii	50	2	0	3
REPRODUCING TREES				
Picea engelmannii	50	1	0	2
Abies amabilis	50	1	0	1
Thuja plicata	50	Tr	0	Tr
Tsuga heterophylla	50	Tr	0	Tr
SHRUB LAYER				
Alnus viridis ssp. *sinuata*	100	58	50	65
Amelanchier alnifolia	50	5	0	10
HERB LAYER				
Scirpus microcarpus	100	65	60	70
Orthilia secunda	100	1	1	1
Viola palustris	50	10	0	20
Cornus canadensis	50	8	0	15

Ecoregions in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 3315, range 3280-3350
Slope (deg): 2
Landform position: depressions, seepage slopes
Hydrology: seasonally moist to moist
Soils: silt loam

Vegetation and ecology: This association is a variant of the *Alnus viridis* ssp. *sinuata* / *Athyrium filix-femina* that contains primarily *Scirpus microcarpus* in the herb layer. Trees are scarce and peripheral or limited to seedlings, and include *Pinus contorta* var. *latifolia, Picea engelmannii, Abies amabilis, Thuja plicata,* and *Tsuga heterophylla*. *Alnus viridis* ssp. *sinuata* is the primary shrub with a lesser amount of *Amelanchier alnifolia* recorded, and may form very dense thickets. The herb layer is diverse with 20 species recorded, but *Scirpus microcarpus*, *Viola palustris* and *Comus Canadensis* are the most abundant. The diverse understory makes stands difficult to classify, and this is why a number of publications have used "mesic forb" to characterize these stands.

Global distribution: Oregon to British Columbia

Other studies: This type would be included in the "*Alnus viridis* ssp. *sinuata* shrubland" or "*Alnus viridis* ssp. *sinuata* / mesic forb" associations of others.

Betula nana / *Carex aquatilis* var. *dives* Association

Bog birch / aquatic sedge

Classification:

NVCS: new
Ecological System:North Pacific Deciduous Swamp (CES204.865)
Rank: G3S2
Plots sampled: 2 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Betula nana	100	43	35	50
Salix myrtillifolia	50	28	0	55
Salix geyeriana	50	20	0	40
Spiraea douglasii	50	15	0	30
Alnus incana	50	5	0	10
Lonicera involucrata	50	5	0	10
HERB LAYER				
Carex aquatilis var. *dives*	100	65	60	70
Lysichiton americanus	100	2	Tr	3
Eleocharis quinqueflora	50	3	0	5
Polygonum bistortoides	50	2	0	3
Equisetum arvense	50	2	0	3
Hypericum anagalloides	50	1	0	2
MOSS LAYER				
Moss	50	10	0	20

Ecoregions in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 3959, range 3300-4618
Slope (deg): 0
Landform position: depressions
Hydrology: perennially saturated to flooded
Soils: organic

Vegetation and ecology: Habitat is montane fens. Although no trees were recorded from the plots, *Pinus contorta* var. *latifolia* and *Picea engelmanii* may be peripheral or occur on elevated microsites. *Betula nana* is the primary shrub, and with a variety of other shrubs such as *Salix myrtillifolia*, *Salix geyeriana, Spiraea douglasii,* or *Alnus incana,* it may form very dense thickets 8-10 feet tall. The herb layer is mostly a monotypic stand of *Carex aquatilis* var. *dives* with trace amounts of *Lysichiton americanus, Eleocharis quinqueflora, Polygonum bistortoides, Equisetum arvense*, and about 10 other species. Some stands may remain flooded with shallow water well into the growing season.

Global distribution: Oregon to British Columbia

Other studies: This association is very similar to the *Betula nana* / *Carex utriculata* association of Seyer 1979: 117 (NVCS: CEGL001079) except that *Carex utriculata* was present in these plots only in trace amounts. It differs from the *Picea engelmannii* / *Betula nana* / *Carex aquatilis* / *Sphagnum angustifolium* association of Carsey et al. 2003: 298 because it lacks significant cover of *Sphagnum* and iron fens are not known to occur in Oregon.

Cornus sericea / Lysichiton americanus Association

Creek dogwood / skunk cabbage

Classification:

NVCS: new
Ecological System: North Pacific Deciduous Swamp (CES204.865)
Rank: G3S3
Plots sampled: 2 (macro)

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 2500, range 1640-3360
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: perennially saturated or seasonally flooded
Soils: organic or muck

Vegetation and ecology: Habitat is montane shrub swamp. This association is typically a tall, dense stand of *Cornus sericea* with lesser amounts of *Acer circinatum*. and *Rubus ursinus.* The herb layer is primarily a stand of *Lysichiton americanus* with small amounts of *Lemna minor* and *Carex obnupta*, depending on elevation and amount of seasonal flooding. Very few other herbs are present and expanses of mud or muck are typical. Mosses are conspicuous and bare ground is an artifact of seasonal flooding.

Global distribution: Oregon to British Columbia

Other studies: Not known

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Frangula purshiana	50	2	0	3
REPRODUCING TREES				
Fraxinus latifolia	50	3	0	6
SHRUB LAYER				
Cornus sericea	100	80	65	95
Acer circinatum	100	4	1	6
Rubus ursinus	100	1	Tr	2
HERB LAYER				
Lysichiton americanus	100	20	15	25
Lemna minor	50	3	0	5
Carex obnupta	50	2	0	3
MOSS LAYER				
Moss	50	30	0	60
UNVEGETATED				
Litter	50	10	0	20
Bare ground	50	3	0	5

Kalmia microphylla / Carex aquatilis var. dives Association

Swamp laurel / Sitka sedge

Classification:

NVCS: new
Ecological System: North Pacific Bog and Fen (CES204.063)
Rank: G3S2
Plots sampled: 6 (3 macro, 3 micro)

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 4338, range 2300-5410
Slope (deg): ave. 1, range 0-2
Landform position: depressions, flats
Hydrology: moist to perennially saturated
Soils: mostly organic, some silt loam

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Pinus contorta var. *latifolia*	17	3	0	20
REPRODUCING TREES				
Pinus contorta var. *latifolia*	17	Tr	0	1
Pinus monticola	17	Tr	0	1
Picea engelmannii	17	Tr	0	1
Tsuga mertensiana	17	Tr	0	Tr
Tsuga heterophylla	17	Tr	0	Tr
SHRUB LAYER				
Kalmia microphylla	100	24	15	35
Vaccinium uliginosum	33	2	0	10
Vaccinium	17	6	0	35
Gaultheria	17	Tr	0	2
HERB LAYER				
Carex echinata ssp. *echinata*	33	3	0	15
Drosera rotundifolia	33	3	0	10
Carex aquatilis var. *dives*	33	1	0	3
Lysichiton americanus	33	Tr	0	1
MOSS LAYER				
Moss	100	81	36	100
UNVEGETATED				
Litter	50	5	0	10

Vegetation and ecology: Habitat is montane fens. Stands dominated by *Kalmia microphylla* are infrequent, as the species is usually only a minor component of more widespread *Vaccinium uliginosum* associations. This type occurs at small scale on isolated hummocks within a wet lawn matrix, and at larger scale around hummocky edges of mires. *Pinus contorta* var. *latifolia* is the most common tree in this association, occurring on elevated hummocks or "tree islands" with lesser amounts of *Pinus monticola, Picea engelmannii, Tsuga mertensiana,* and *Tsuga heterophylla*. *Kalmia microphylla* and *Vaccinium uliginosum* are the primary shrubs, the latter occurring in relatively small amounts. Though diverse and heterogeneous, with more than 20 species recorded, the herb layer has low cover and the moss layer is most conspicuous. The most common herbs are *Carex echinata* ssp. *echinata, Drosera rotundifolia,* and *Carex aquatilis* var. *dives*. *Carex aquatilis* var. *dives* is usually more abundant than indicated in these plots, these being more of a *Sphagnum* phase with fewer herbs present. The moss layer is composed almost entirely of tightly-packed mats of *Sphagnum capillifolium* and *Aulacomniun palustre* with average cover or 81 percent and ranging from 36-100 percent.

Global distribution: Oregon to British Columbia

Other studies: Frenkel et al. 1986: 33 and Hansen 1942: 525 described similar *Kalmia microphylla* vegetation of which this is a variant.

Ledum glandulosum - Gaultheria shallon / Carex obnupta Association

Labrador tea - salal / slough sedge

Classification:

NVCS: *Ledum glandulosum - Gaultheria shallon / Carex obnupta* Shrubland (CEGL003437)
Ecological System: North Pacific Bog and Fen (CES204.063)
Rank: G2S2
Plots sampled: 33 (2 macro, 31 micro)

Distribution in NW Oregon: coast and Coast Range

Environment:

Elevation (ft): ave. 86, range 20-1030
Slope (deg): ave. 0, range 0-4
Landform position: floodplains, benches, and flats
Hydrology: seasonally moist to perennially saturated
Soils: organic

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Pinus contorta var. *contorta*	21	4	0	40
REPRODUCING TREES				
Tsuga heterophylla	15	Tr	0	5
Frangula purshiana	15	Tr	0	5
Picea sitchensis	12	Tr	0	3
Thuja plicata	12	Tr	0	2
Alnus rubra	3	Tr	0	1
SHRUB LAYER				
Ledum glandulosum	100	37	25	80
Gaultheria shallon	100	18	4	50
Spiraea douglasii	52	4	0	20
HERB LAYER				
Carex aquatilis var. *dives*	64	19	0	60
Carex obnupta	52	11	0	60
Agrostis exarata	45	3	0	15
Cornus canadensis	39	2	0	15
Blechnum spicant	30	1	0	10
MOSS LAYER				
Moss	48	10	0	80
UNVEGETATED				
Litter	15	2	0	20

Vegetation and ecology: Habitat is coastal fens. It occurs around the edges of open mires subject to successional infilling by trees and shrubs, and in regenerating swamp that has been logged, burned, or killed by prolonged flooding. *Pinus contorta* var. *contorta* is the only mature tree recorded in plots, where it is usually confined to hummocks. Seedlings of *Tsuga heterophylla, Picea sitchensis*, and *Thuja plicata* are also confined to tops of hummocks, but many are stunted, chlorotic, and die before maturity. The diverse shrub layer includes elements from open peatlands, shrub swamp, and swamp forest. It is dominated by *Ledum glandulosum* and *Gaultheria shallon,* with lesser amounts of *Spiraea douglasii* and *Malus fusca. Kalmia microphylla* and *Vaccinium oxycoccos* are remnants of former open mire, *Spiraea* and *Salix hookeriana* and are indicators of early to mid-seral shrub swamp, and *Gaultheria, Rubus spectabilis,* and *Vaccinium parvifolium* are indicators of developing forest conditions. The herb layer is heterogeneous, including more than 20 species from both open mire and developing forest, but there are no obvious dominant species. *Carex aquatilis* var. *dives* and *Carex obnupta* have the highest constancy and cover, while *Agrostis exarata, Cornus canadensis,* and *Blechnum spicant* occur in lesser amounts. *Sphagnum palustre* and *Sphagnum henryense* are conspicuous in the moss layer, with up to 80 percent cover, with trace amounts of *Sphagnum mendocinum* and *Sphagnum capillifolium*. This ecotonal association is valuable as edge habitat for a variety of animals and is always present in mires with a range of seral stages.

Global distribution: along the coast of Oregon and northern California

Other studies: Christy 2001a: 23; Christy & Brophy 2002. Kunze (1994) described a *Ledum groenlandicum - Gaultheria shallon / Sphagnum* spp. association that does not occur south of the Columbia River.

Ledum glandulosum / Carex obnupta / Sphagnum Association

Labrador tea / slough sedge / sphagnum

Classification:

NVCS: *Ledum glandulosum / Carex obnupta / Sphagnum* spp. Shrubland (CEGL003434)
Ecological System: North Pacific Bog and Fen (CES204.063)
Rank: G2S2
Plots sampled: 92 (micro)

Distribution in NW Oregon: coast and Coast Range

Environment:

Elevation (ft): ave. 57, range 20-2800
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: perennially saturated
Soils: organic

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Pinus contorta var. *contorta*	23	2	0	30
REPRODUCING TREES				
Thuja plicata	27	3	0	40
Tsuga heterophylla	1	Tr	0	10
Frangula purshiana	1	Tr	0	1
SHRUB LAYER				
Ledum glandulosum	100	25	2	60
Vaccinium oxycoccos	48	4	0	35
Spiraea douglasii	33	4	0	35
Vaccinium uliginosum	21	2	0	30
HERB LAYER				
Carex obnupta	74	12	0	60
Drosera rotundifolia	51	2	0	20
Carex echinata ssp. *phyllomanica*	41	4	0	35
Lysichiton americanus	28	4	0	40
Blechnum spicant	24	3	0	35
Eriophorum chamissonis	24	1	0	15
MOSS LAYER				
Moss	92	55	0	100
UNVEGETATED				
Litter	3	Tr	0	30

Vegetation and ecology: Habitat is coastal fens in poorly-drained basins, and on floating lake-fill mats. Well-developed *Sphagnum* hummocks 1-3 feet taller than surrounding wet hollows are hallmarks of this association, and much of the woody vegetation is confined to the tops and sides of hummocks. *Pinus contorta* var. *contorta*, the only mature tree recorded from plots, develops characteristic bushy, rounded tops in this habitat. Seelings of *Thuja plicata* and small amounts of *Tsuga heterophylla* are also present but many are stunted, chlorotic, and die before maturity. The shrub layer is dominated by *Ledum glandulosum,* with lesser amounts of *Spiraea douglasii, Vaccinium* uliginosum, and *Kalmia microphylla*. The herb layer is extremely diverse with more than 25 species. *Vaccinium oxycoccos, Drosera rotundifolia, Lysichiton americanus, Eriophorum chamissonis, Trientalis europaea* ssp. *arctica*, *Carex echinata* ssp. *phyllomanica,* and *Carex leptalea* are diagnostic species even though they may not always be abundant. The circular to elliptical *Sphagnum* hummocks are sufficiently elevated above the influence of groundwater to be somewhat drier and they have lower pH and nutrient status than what is found in hollows. Hummocks composed of (1) *Sphagnum palustre* and/or *Sphagnum henryense* or (2) *Sphagnum fuscum* constitute two phases of this association described below. Hollows consist almost entirely of lawns of *Sphagnum angustifolium* and *Sphagnum pacificum*, but bare mud bottoms or standing water are occasional. Ants frequently nest inside the *Sphagnum* hummocks. The open mire habitat is favored for feeding and bedding by elk, deer and bears. A network of elk trails may have long-term effect on vegetation by influencing the location and configuration of hummock-hollow topography and may serve to channel mineral-rich water through the mires.

***Sphagnum palustre - Sphagnum henryense* phase:** Whitish-green to brown hummocks of *Sphagnum palustre* and *Sphagnum henryense* are the most common phase of this association. The surface of the hummock is relatively firm and

closely packed, and may include *Sphagnum capillifolium*, *Sphagnum rubellum,* or S*phagnum mendocinum*, indicating somewhat mineral-poor conditions. pH ranges from 4.4-4.9 (5.1)

***Sphagnum fuscum* phase:** Densely-packed, dark brown hummocks of acid-forming *Sphagnum fuscum* typify this phase and are rare in Oregon mires. They do not form until the underlying peat mat is dense, firm, and sufficiently raised above the groundwater so that wet hollows between the hummocks are uncommon or absent. The liverwort *Mylia anomala* and the moss *Pohlia sphagnicola,* both uncommon species in Oregon, are characteristic of this phase. In contrast to the previous phase, there are fewer species of vascular plants on the hummocks, and hydrophytic species such as *Comarum palustre* and *Carex aquatilis* var. *dives* are mostly absent. The vegetation is conspicuously dwarfed, indicating slightly drier conditions, higher acidity, and lower nutrient status. pH ranges from 4.1-4.5 (5.1)

Global distribution and history: Distinguished from similar associations farther north by the dominance of *Ledum glandulosum,* this vegetation occurs only between the Columbia River and northern California. Historically, it was reported as far south as San Francisco Bay and Fort Bragg, but has disappeared from many historic localities. *Vaccinium macrocarpon*, escaped from commercial cranberry bogs, is sometimes present in this association. This association was mined for peat in several locations in Oregon as early as the 1920's. *Sphagnum* was harvested from a number of sites for surgical dressing in 1918, and is occasionally harvested today for horticultural use. Peat mining destroys peatlands, while *Sphagnum* harvest tends to retard succession but not destroy hummock-hollow formations.

Other studies: Christy 2001a: 16, 17; Christy & Brophy 2002; Burtt-Davy 1902: 53 (CA); Rigg 1933: 535; Hansen 1941a: 12; Hansen 1941b: 207; Hansen 1943: 335; Hansen 1944: 628; Howarth 1995: 1, 12. Wade 1965: 28 (in part; BC) and Kunze (1994) described similar vegetation but *Kalmia microphylla* is not common in Oregon and *Ledum groenlandicum* is absent.

Ledum glandulosum / Darlingtonia californica/ Sphagnum Association

Labrador tea / darlingtonia / sphagnum

Classification:

NVCS: *Ledum glandulosum / Darlingtonia californica / Sphagnum* spp. Shrubland (CEGL003435)
Ecological System: North Pacific Bog and Fen (CES204.063)
Rank: G2S2
Plots sampled: 60 (1 macro, 59 micro)

Distribution in NW Oregon: coastal

Environment:

Elevation (ft): ave. 40, range 20-40
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: perennially saturated
Soils: organic

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Pinus contorta var. *contorta*	25	Tr	0	5
REPRODUCING TREES				
Tsuga heterophylla	17	Tr	0	2
Picea sitchensis	10	Tr	0	5
Frangula purshiana	2	Tr	0	1
SHRUB LAYER				
Ledum glandulosum	100	31	10	60
Vaccinium oxycoccos	67	9	0	40
Vaccinium uliginosum	63	18	0	70
Spiraea douglasii	25	2	0	25
HERB LAYER				
Darlingtonia californica	100	18	1	50
Drosera rotundifolia	87	1	0	10
Eriophorum chamissonis	65	10	0	35
Carex aquatilis var. *dives*	53	2	0	15
Comarum palustre	37	5	0	35
Carex cusickii	30	3	0	30
Carex leptalea	28	2	0	25
MOSS LAYER				
Moss	100	59	1	99

Vegetation and ecology: Habitat is coastal fens in poorly-drained basins, on floating lake-fill mats, or on duripan soils with perched water tables. The association is similar to the *Ledum glandulosum / Carex obnupta / Sphagnum association* except that *Darlingtonia californica* dominates the herb layer with up to 50 percent cover, *Carex obnupta* is absent, and more hydrophytic species are present. It forms the same hummock-hollow microtopography with most of the woody vegetation growing on the hummocks. *Pinus contorta* var. *contorta* is the only larger tree and with seedlings of *Tsuga heterophylla* and *Picea sitchensis* mostly stunted and chlorotic. *Ledum glandulosum* is the most abundant species in the shrub layer, with lesser amounts of *Vaccinium oxycoccos, Vaccinium uliginosum,* and *Spiraea douglasii*. The herb layer is dominated by *Darlingtonia californica, Drosera rotundifolia, Eriophorum chamissonis, Carex aquatilis* var. *dives,* and *Comarum palustre*. *Empetrum nigrum,* a common component of peatlands and forest in boreal North America and Europe, is otherwise known in Oregon only from windswept sandstone headlands along the southern coast, at the southern end of its range. Its occurrence in a peatland in Oregon is 200 miles from the closest occurrence in similar wetlands along the coast of Washington and in the northern Puget Trough. Two phases occur with the same diagnostic species of *Sphagnum* as in the previous association.

***Sphagnum palustre - Sphagnum henryense* phase:** Whitish-green to brown hummocks of *Sphagnum palustre* and *Sphagnum henryense* are the most common phase of this association. The surface of the hummock is relatively firm and closely packed, and may include *Sphagnum capillifolium*, *Sphagnum rubellum,* or S*phagnum mendocinum*, indicating somewhat mineral-poor conditions. pH ranges from 4.4-4.9 (5.1)

***Sphagnum fuscum* phase:** Densely-packed, dark brown hummocks of acid-forming *Sphagnum fuscum* typify this phase and are rare in Oregon mires. They do not form until the underlying peat mat is dense, firm, and sufficiently raised

above the groundwater so that wet hollows between the hummocks are uncommon or absent. The liverwort *Mylia anomala* and the moss *Pohlia sphagnicola,* both uncommon species in Oregon, are characteristic of this phase. In contrast to the previous phase, there are fewer species of vascular plants, and hydrophytic species are mostly absent. The vegetation is conspicuously dwarfed, a symptom indicative of high acidity and low nutrient status. One site contains conspicuous stands of the lichen *Cladina portentosa* ssp. *pacifica* over the tops of hummocks, unusual because most other populations of the lichen occur in stabilized sand dunes. pH ranges from 4.1-4.5 (5.1)

Global distribution and history: This association is restricted to the central and southern coast of Oregon, where it occurs from central Tillamook to northern Curry counties. Here, *Darlingtonia californica* is at the northern limit of its range and is confined to the immediate coast. *Darlingtonia* leaves the coast in central Curry County and extends inland and southeasterly to the Sierra Nevada in California. In Oregon's Klamath Mountains, *Darlingtonia* is a dominant species of fens occurring on ultramafic soils that lack any *Sphagnum* vegetation. *Darlingtonia* has periodically been harvested for the worldwide carnivorous plant trade, which has led to local extirpation of this species along the coast of Oregon. Because of this trade, it was once listed as a threatened species by the Oregon Natural Heritage Information Center, but its current abundance in ultramafic fens farther inland and a reduced demand for wild-dug material has reduced the threat to its survival.

Other studies: Christy 2001a: 19, 21. *Darlingtonia* fens described by Copeland (1978) and Becking et al. (1982) occur on ultramafic soils in southwestern Oregon and have no *Sphagnum* vegetation.

Ledum glandulosum - Myrica gale Association

Labrador tea - sweet gale

Classification:

NVCS: new
Ecological System: North Pacific Bog and Fen (CES204.063)
G1S1
Plots sampled: 0

Distribution in NW Oregon: northern coast

Environment:

Elevation (ft): ave., range
Slope (deg): ave., range
Landform position: depressions and flats
Hydrology: perennially saturated
Soils: organic or muck

Vegetation and ecology: Habitat is coastal fens. The association has been observed in the field but not sampled, so a quantitative description of the vegetation is not available. It forms dense shrub stands 3-6 feet tall on perennially-saturated peat in minerotrophic peatlands, and occurs in low-gradient drainages where water is ponded. Standing water may occur in hollows. Trees are absent, and the shrub layer is composed exclusively of *Ledum glandulosum* and *Myrica gale* in approximately equal amounts with total shrub cover about 95 percent. The herb layer has not been documented, but is no doubt depauperate because of dense shading. The moss layer contains scattered mats of *Sphagnum angustifolium* with lesser amounts of *Sphagnum palustre* or *Sphagnum henryense*. *Myrica gale* fixes atmospheric nitrogen and is an important source of this element in mires. The tall growth of shrubs in this association may indicate past or ongoing disturbance to groundwater flows or water quality.

Global distribution: This association is only known from the northern coast of Oregon, where it occurs in Gearhart Bog in Clatsop County. A logging road crosses the peatland upstream from these stands and is perpendicular to the flow of groundwater, which may account for the large height of the shrubs. Early collections indicate that *Myrica gale* once extended as far south as Lincoln County, with a questionable record from Curry County, but Clatsop County is currently the southernmost known locality.

Other studies: Christy 2001a: 25; Howarth 1995: 2, 13. Kunze (1994) described a very similar *Ledum groenlandicum - Myrica gale / Sphagnum* spp. association from the coast of Washington, but *Ledum groenlandicum* does not occur in Oregon.

Ledum glandulosum / Sanguisorba officinalis Association

Labrador tea / burnet

Classification:

NVCS: *Ledum glandulosum / Sanguisorba officinalis / Sphagnum* spp. Shrubland (CEGL003436)
Ecological System: North Pacific Bog and Fen (CES204.063)
Rank: G2S2
Plots sampled: 45 (micro)

Distribution in NW Oregon: coast, Coast Range

Environment:

Elevation (ft): ave. 283, range 100-2800
Slope (deg): 0
Landform position: floodplains, depressions, ancient marine terraces
Hydrology: mostly perennially saturated, some seasonally flooded
Soils: mostly organic, some sandy

Species	Const	Percent cover		
		Ave	Min	Max
REPRODUCING TREES				
Frangula purshiana	2	Tr	0	8
SHRUB LAYER				
Ledum glandulosum	100	27	3	80
Gaultheria shallon	27	1	0	10
Rubus ursinus	9	Tr	0	4
Vaccinium uliginosum	4	1	0	35
HERB LAYER				
Sanguisorba officinalis	100	21	3	60
Carex echinata ssp. *phyllomanica*	67	3	0	15
Blechnum spicant	64	15	0	60
Agrostis exarata	53	2	0	12
Drosera rotundifolia	38	1	0	3
Sisyrinchium californicum	33	4	0	30
MOSS LAYER				
Moss	73	28	0	99

Vegetation and ecology: Habitat is coastal and Coast Range fens. The association typically forms well-developed hummocks 1-2 feet taller than surrounding mire vegetation. Mature trees are absent. The shrub layer is dominated by *Ledum glandulosum* with up to 80 percent cover, with a lesser amount of *Gaultheria shallon*. The herb layer is extremely diverse and is dominated by *Sanguisorba officinalis* with up to 60 percent cover, with lesser amounts of *Carex echinata* ssp. *phyllomanica*, *Blechnum spicant* and *Agrostis exarata*. Several unusual species occur in this association along the southern coast of Oregon but do not extend to the northernmost sites. *Veratrum californicum* and *Carex buxbaumii* are more typical of middle to upper elevations in the Cascade Range, while *Sisyrinchium californicum, Helenium bolanderi, Rhynchospora capitellata, Senecio triangularis* var. *angustifolius,* and *Lilium occidentale* are more typical of mires in northern California. Hummocks are dominated by *Sphagnum palustre* and *Sphagnum henryense*, and may include *Cladina portentosa* ssp. *pacifica*. Hollows consist almost entirely of lawns of *Sphagnum angustifolium* and *Sphagnum pacificum*, but bare mud bottoms or standing water are occasional. Many of the hollows are in elk and deer trails, and may serve to channel mineral-rich water through the mires.

Global distribution: Oregon and possibly northern California

Other studies: Christy 2001a: 22.

Malus fusca / *Carex obnupta* Association

Crabapple / slough sedge

Classification:

NVCS: *Malus fusca* Shrubland (CEGL003385)
Ecological System: North Pacific Deciduous Swamp (CES204.865)
Rank: GUSU
Plots sampled: 1 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Malus fusca	100	60	60	60
Salix geyeriana	100	10	10	10
Spiraea douglasii	100	3	3	3
HERB LAYER				
Carex obnupta	100	97	97	97
Veronica scutellata	100	Tr	Tr	Tr

Distribution in NW Oregon:

Coast Range (?), Willamette Valley, western Cascade Range

Environment:

Elevation (ft): 200-2560
Slope (deg): 0
Landform position: floodplains, depressions, benches
Hydrology: seasonally flooded to perennially moist
Soils: muck or loam

Vegetation and ecology: Habitat is depressions in both deciduous and coniferous forest. Several examples of this association have been observed in the field but only one plot has been sampled. All trees are peripheral to the wetlands. The most typical expression known to the author is a dense, monotypic stand of *Malus fusca* with a monotypic understory of *Carex obnupta*. Depending on hydroperiod, the understory ranges from nearly 100 percent cover of *Carex obnupta* to very low cover of any other vegetation because of prolonged seasonal ponding. The plot reported here also contains *Salix geyeriana* and *Spiraea douglasii*. The association may have been more widespread historically, as large expanses of swamp vegetation once occurred in the northern Willamette and Tualatin valleys. These wetlands have not been sampled adequately.

Global distribution: western Oregon, western Washington, southwestern British Columbia

Other studies: Kunze 1994: 93 reported an association of the same name from coastal Washington that intergrades with *Picea sitchensis* swamp and the *Salix hookeriana - Malus fusca / Carex obnupta - Lysichiton americanus* association. Both of these are wetter types on organic soil. The NVCS *Malus fusca* Shrubland of is a provisional type that would include this association.

Myrica gale / *Carex aquatilis* var. *dives* Association

Sweet gale / Sitka sedge

Classification:

NVCS: *Myrica gale* / *Carex* (*aquatilis* var. *dives, utriculata*) Shrubland (CEGL003376)
Ecological System: North Pacific Bog and Fen (CES204.063), Boreal Fen (CES103.872)
Rank: G4S1
Plots sampled: 1 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Myrica gale	100	60	60	60
Spiraea douglasii	100	2	2	2
Betula nana	100	1	1	1
HERB LAYER				
Carex aquatilis var. *dives*	100	25	25	25
Sanguisorba officinalis	100	25	25	25
Agrostis thurberiana	100	Tr	Tr	Tr

Distribution in NW Oregon: coast, Cascade Range

Environment:

Elevation (ft): 3100
Slope (deg): 1
Landform position: floodplains, montane basins
Hydrology: perennially saturated
Soils: organic

Vegetation and ecology: Habitat is fens. This association has not been sampled extensively and more plots are needed. Trees are absent, and the shrub layer is composed primarily of *Myrica gale* from 2-4 feet tall with cover up to 95 percent. The single montane plot reported here also contains *Spiraea douglasii* and *Betula nana,* but coastal expressions would not contain *Betula*. The herb layer here contains *Carex aquatilis* var. *dives* in both coastal and montane sites, and the moss layer may contain *Sphagnum*. *Myrica gale* fixes atmospheric nitrogen and is an important source of this element in mires. It appears to favor edges of pools and former ditches that have infilled with poorly-consolidated peat, where water movement and nutrient status may be greater than in other peatland situations. In Oregon, it occurs at Gearhart Bog in Clatsop County, and may never have been very extensive. Early collections indicate that *Myrica gale* once extended as far south as Lincoln County, with a questionable record from Curry County, but Clatsop County is currently the southernmost known locality. Kunze (1994) noted that most occurrences of this association in the northern Puget Trough are in poor condition, presumably because of human disturbance, and that *Myrica gale* was once more widespread.

Global distribution: Oregon to southeastern Alaska

Other studies: Kunze 1994: 87; Christy 2001a: 26. Viereck et al. (1992) recorded a similar type from Alaska with a number of secondary associates, one of which may match the occurrence in Oregon, but more data are needed.

Salix commutata Association

Undergreen willow

Classification:

NVCS: *Salix commutata* / *Carex scopulorum* Shrubland (CEGL001189)
Ecological System: Boreal Fen (CES103.872)
Rank: G4S3
Plots sampled: 4 (1 macro, 3 micro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Salix commutata	100	26	20	35
Spiraea densiflora	25	2	0	8
Cassiope mertensiana	25	2	0	7
Kalmia microphylla	25	2	0	7
HERB LAYER				
Carex nigricans	75	31	0	75
Carex scopulorum	75	13	0	25
Pedicularis attollens	75	1	0	2
Aster alpigenus	50	1	0	5
Ligusticum grayi	50	1	0	4
Tofieldia glutinosa ssp. *occidentalis*	50	Tr	0	1
Juncus balticus	25	4	0	15

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): 5250
Slope (deg): 6
Landform position: slope
Hydrology: perennially saturated
Soils: organic

Vegetation and ecology: Habitat is subalpine fens. The association occurs at the wet end of subalpine heath and intergrades with the *Carex nigricans* and *Carex scopulorum* associations. Woody plants are confined to hummocks and the remaining vegetation is wet lawn. The plots reported here do not record any trees but *Tsuga mertensiana* and *Abies lasiocarpa* may be present on hummocks. *Salix commutata* is the primary species in the shrub layer, with an average cover of 26 percent and ranging from 20-35 percent. The other four shrub species recorded occur at low constancy and very low cover. The primary species in the herb layer are *Carex nigricans* and *Carex scopulorum*, one or the other of which is usually present in the plot. *Juncus balticus* may form significant patches, but the other species recorded all occur with very low cover.

Global distribution: northern California to British Columbia

Other studies: Kovalchik 1987: 137; Crowe & Clausnitzer 1997: 104; Seyer 1981: 8; Seyer 1983: 11; Jankovsky-Jones et al. 1999: 30 (ID). This association differs from the NVCS *Salix commutata* / *Carex scopulorum* association because it contains more *Carex nigricans* than *Carex scopulorum*, but in other ways the two associations are probably similar.

Salix geyeriana complex

Geyer willow

Classification:

NVCS: not classified
Ecological System: North Pacific Montane Riparian Woodland and Shrubland (CES204.866)
Rank: G4S4
Plots sampled: 7 (macro)

Distribution in NW Oregon:

Environment:

Elevation (ft): ave. 4552, range 2560-6575
Slope (deg): ave. 0, range 0-1
Landform position: floodplains, basins
Hydrology: seasonally to perennially flooded
Soils: mostly organic, some loam

Vegetation and ecology: Habitat is montane fens. Plots are highly variable and probably composed of several phases that need more attention. Trees are peripheral to the wetlands and *Salix geyeriana* is the primary species in the shrub layer. It occurs in many different combinations that are difficult to segregate without more plot data. *Spiraea douglasii* is the second most abundant shrub. There is no cohesion in the herb layer in the present grouping, but species with significant patch size suggest five phases that need more study:

***Carex aquatilis* var. *aquatilis* phase**
***Carex aquatilis* var. *dives* phase**
***Carex nigricans - Carex scopulorum* phase**
***Carex obnupta* phase**
***Scirpus microcarpus* phase**

Global distribution: Oregon to British Columbia

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Salix geyeriana	100	56	20	98
Spiraea douglasii	43	8	0	40
Salix myrtillifolia	29	3	0	10
Salix commutata	29	1	0	10
HERB LAYER				
Veronica americana	57	Tr	0	1
Carex aquatilis var. *dives*	43	21	0	60
Dodecatheon jeffreyi	43	1	0	4
Carex aquatilis var. *aquatilis*	29	6	0	40
Carex utriculata	29	5	0	30
Hypericum anagalloides	29	3	0	15
Calamagrostis stricta ssp. *inexpansa*	29	1	0	7
Equisetum arvense	29	1	0	5
Muhlenbergia filiformis	29	1	0	5
Lysichiton americanus	29	1	0	2
Antennaria argentea	29	Tr	0	2
Epilobium ciliatum ssp. *watsonii*	29	Tr	0	1
Platanthera dilatata	29	Tr	0	1
Veronica serpyllifolia	29	Tr	0	1
Geum macrophyllum	29	Tr	0	1
Carex scopulorum	14	6	0	40
Carex nigricans	14	6	0	40
Scirpus microcarpus	14	3	0	20
Carex obnupta	14	1	0	10
MOSS LAYER				
Moss	29	9	0	60

Other studies: Kovalchik 1987: 82; Padgett et al. 1989: 65 (ID, UT); Carsey et al. 2003: 214 (CO).

Salix hookeriana - (*Salix sitchensis*) Association

Hooker willow - (Sitka willow)

Classification:

NVCS: *Salix hookeriana* - (*Salix sitchensis*) Shrubland (CEGL003387)
Ecological System: North Pacific Lowland Riparian Forest and Shrubland (CES204.869)
Rank: G3S3
Plots sampled: 2 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Salix hookeriana	100	78	65	90
Salix sitchensis	50	8	0	15
Spiraea douglasii	50	3	0	6
HERB LAYER				
Carex obnupta	50	40	0	80
MOSS LAYER				
Moss	100	41	Tr	81

Distribution in NW Oregon:

Willamette Valley, Columbia River floodplain, Cascade Range

Environment:

Elevation (ft): ave. 1044, range 500-1587
Slope (deg): ave. 1, range 0-1
Landform position: floodplains, basins
Hydrology: seasonally flooded to perennially moist
Soils: silt loam

Vegetation and ecology: Habitat is depressions in floodplains and potholes in basalt scabland. The association is undersampled but reported here because it is common and widespread in the Willamette Valley, along the Columbia River, and at lower elevations in the Cascade Range. It represents clonal shrub swamps of the inland morphotype of *Salix hookeriana* that was previously called *Salix piperi*. Shrub swamps of this species occur in two phases determined by composition of the herb layer. Stands are typically dense thickets and are either monotypes of *Salix hookeriana* or have admixtures of *Salix sitchensis* and/or *Spiraea douglasii*. In the two plots reported here, *Salix hookeriana* has an average cover of 78 percent and ranging from 65-90 percent. Densely branched adventitious roots on the lower stems of *Salix hookeriana* and large whitish mats of dried algae may remain draped like tents over roots and trunks after water levels recede. *Fontinalis antipyretica* and *Dichelyma uncinata* are conspicuous in the moss layer.

Monotypic phase: Many stands have a species-poor herb layer because of seasonal pooling.

***Carex obnupta* phase:** Some stands have a modest array of herbaceous species, *Carex obnupta* being the most abundant with cover ranging up to 80 percent and the others occurring at very low cover.

Global distribution: western Oregon and Washington

Other studies: Not known

Salix hookeriana - Malus fusca / Carex obnupta - Lysichiton americanus Association

Hooker willow - Oregon crabapple / slough sedge - skunk cabbage

Classification:

NVCS: *Salix hookeriana* - (*Malus fusca*) / *Carex obnupta - Lysichiton americanus* Shrubland (CEGL003432)
Ecological System: North Pacific Deciduous Swamp (CES204.865)
Rank: G3S2
Plots sampled: 16 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Alnus rubra	31	2	0	15
Picea sitchensis	19	3	0	25
SHRUB LAYER				
Salix hookeriana	88	30	0	95
Spiraea douglasii	88	13	0	50
Malus fusca	81	45	0	95
Lonicera involucrata	38	1	0	5
Ledum glandulosum	31	1	0	3
HERB LAYER				
Carex obnupta	100	40	2	75
Lysichiton americanus	63	18	0	50
Oenanthe sarmentosa	31	Tr	0	3
Athyrium filix-femina	31	Tr	0	2
Blechnum spicant	25	Tr	0	1
MOSS LAYER				
Moss	25	2	0	14

Distribution in NW Oregon: coast, Coast Range

Environment:

Elevation (ft): ave. 34, range 10-100
Slope (deg): ave. 0, range 0-1
Landform position: floodplains, basins
Hydrology: perennially saturated
Soils: organic

Vegetation and ecology: Habitat is shrub swamp in peat-filled basins, adjacent to lakes and ponds, on old deflation plains, and interspersed with open mire in fens. Perennially wet soils usually preclude establishment of conifers, but occasional *Alnus rubra*, *Pinus contorta* var. *contorta,* or *Picea sitchensis* may occur on hummocks or peripheral to the wetland. A dense, tangled shrub layer dominated by *Malus fusca* and/or *Salix hookeriana* forms a canopy ranging from 30-95 percent cover. Both species are frequently present but sometimes one or the other only. *Spiraea douglasii* and *Ledum glandulosum* typically form a lower shrub layer in canopy gaps. *Gaultheria shallon* and *Lonicera involucrata* occur in small amounts on elevated stumps and logs. The herb layer is dominated by *Carex obnupta* and *Lysichiton americanus*, with expanses of deep muck soil exposed in the most shaded places. Epiphytic mosses and *Polypodium glycyrrhiza* are abundant in the canopy of tall shrubs. The moss layer contains mostly *Eurhynchium praelongum*, but one site is habitat for the rare *Limbella fryei*. *Sphagnum palustre* occurs in this association in Clatsop County, and occurs in similar sites farther north. Stands appear to be long-lived, maintained by wet soils and gap succession. The willows sustain frequent crown damage from winter storms and heavy browsing by beavers, followed by vigorous resprouting. The association is prime feeding and denning habitat for beaver.

Global distribution: along the coast between northern California and British Columbia.

Other studies: Christy 1980: 521; Christy 1985: 24; Boss 1983: 51; Sanville et al. 1986: 127; Christy & Putera 1993: 40; Kunze 1994: 93 (WA); Christy et al. 1998: 80; Christy 2001a: 27.

Salix lucida ssp. *lasiandra* / *Urtica dioica* ssp. *gracilis* Association

Pacific willow / California nettle

Classification:

NVCS: *Salix lucida* ssp. *lasiandra* / *Urtica dioica* ssp. *gracilis* Forest (CEGL003409)
Ecological System: North Pacific Lowland Riparian Forest and Shrubland (CES204.869)
Rank: G2S2
Plots sampled: 6 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Salix lucida ssp. *lasiandra*	100	67	50	90
Fraxinus latifolia	17	1	0	3
SHRUB LAYER				
Cornus sericea	33	1	0	5
Sambucus racemosa	17	7	0	40
Salix sitchensis	17	5	0	30
Salix fluviatilis	17	1	0	4
HERB LAYER				
Phalaris arundinacea	83	19	0	40
Impatiens capensis	50	12	0	35
Urtica dioica ssp. *gracilis*	33	13	0	40
Bidens frondosa	33	9	0	50
Leersia oryzoides	33	7	0	20
MOSS LAYER				
Moss	17	Tr	0	1

Distribution in NW Oregon: Willamette Valley and Columbia River bottoms

Environment:

Elevation (ft): ave. 98, range 10-500
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: seasonally flooded to perennially saturated
Soils: mostly silt loam, some sandy loam

Vegetation and ecology: Habitat is shrub swamp around shallow lakes and ponds, and along low-gradient streams and river channels. Stands are usually surrounded by *Fraxinus latifolia* forest but occur at a lower elevation that are too wet for *Fraxinus*. Salix *lucida* ssp. *lasiandra* is the primary tree in this association, with cover averaging 67 percent. In some stands it may not exceed shrub height. Other shrub species are patchy and include *Cornus sericea, Sambucus racemosa,* and *Salix sitchensis.* Because of a history of grazing and proximity to agricultural and urban areas, the herb layer is usually dominated by exotic cultivars of *Phalaris arundinacea.* Sites with seasonal inundation may have a higher component of native species in the herb layer such as *Impatiens capensis, Urtica dioica* ssp*. gracilis, Bidens frondosa,* and *Leersia oryzoides.* Many sites are associated with shallow ponds and associated mudflat vegetation. Stands are used extensively by beaver and *Salix lucida* ssp. *lasiandra* resprouts vigorously following cropping. Trees appear to senesce after about 40 years and may not readily reproduce if stands are heavily infested with *Phalaris arundinacea*. Stands are often flooded in winter and historically were sometimes flooded into the growing season, but they need late-season draw-down to survive. Use of water control structures to keep shallow lakes flooded in summer have killed several large stands of *Salix lucida* ssp. *lasiandra* in the Portland area, destroying valuable shrub swamp and mudflat habitat.

Global distribution: western Oregon and Washington

Other studies: Christy & Putera 1993: 40, 41; Kunze 1994: 43, 50 (WA)

Salix lucida ssp. lasiandra / Salix sitchensis / Lysichiton americanus Association

Pacific willow / Sitka willow / skunk cabbage

Classification:

NVCS: new
Ecological System: North Pacific Lowland Riparian Forest and Shrubland (CES204.869)
Rank: G3S3
Plots sampled: 9 (macro)

Distribution in NW Oregon:

Coast Range, Columbia River floodplain

Environment:

Elevation (ft): ave. 239, range 5-2100
Slope (deg): ave. 0, range 0-1
Landform position: floodplains, basins
Hydrology: perennially saturated
Soils: mostly loam, some organic

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Salix lucida ssp. *lasiandra*	89	20	0	60
Picea sitchensis	22	1	0	5
REPRODUCING TREES				
Populus balsamifera ssp. *trichocarpa*	11	1	0	5
SHRUB LAYER				
Salix sitchensis	89	28	0	75
Spiraea douglasii	78	11	0	30
Cornus sericea	67	13	0	70
Rubus ursinus	67	1	0	3
Lonicera involucrata	56	1	0	5
Rosa nutkana	44	2	0	10
Rubus spectabilis	44	2	0	5
HERB LAYER				
Lysichiton americanus	100	19	1	60
Athyrium filix-femina	78	10	0	60
Impatiens capensis	78	8	0	30
Oenanthe sarmentosa	67	4	0	20
Scirpus microcarpus	67	3	0	7
Vicia gigantea	44	Tr	0	1
Carex obnupta	33	7	0	55
Equisetum fluviatile	33	1	0	2
Veratrum californicum	33	Tr	0	2
Phragmites australis	33	Tr	0	2

Vegetation and ecology:

Habitat is floodplain depressions and sites with freshwater tidal irrigation. The association forms dense shrub swamps with considerable amounts of standing water. It is consistently wetter than the *Salix lucida* ssp. *lasiandra* association and has a much higher species diversity. *Salix lucida* ssp. *lasiandra* is the primary tree species present, but is often only shrub or tall shrub height. *Picea sitchensis, Alnus rubra,* and *Populus balsamifera* ssp. *trichocarpa* are only occasional and confined to hummocks. The shrub layer contains almost 20 different species, the most abundant being *Salix sitchensis, Spiraea douglasii,* and *Cornus sericea.* More than 30 species are reported from the herb layer, but because the shrub layer is so dense, the herbs usually have low cover. *Lysichiton americanus* is the primary species in the herb layer but has an average cover of only 19 percent, although it may range up to 60 percent. Other species with high constancy and relatively high cover include *Athyrium filix-femina, Impatiens capensis,* and *Oenanthe sarmentosa.* Other species with significant patches include *Carex obnupta* and *Carex aquatilis* var. *dives.* All these species are hallmarks of freshwater tidal surge plain along the lower Columbia River.

Global distribution:

western Oregon and Washington

Other studies:

Christy & Putera 1993: 41; Kunze 1994: 51,97 (WA)

Salix sitchensis complex

Sitka willow

Classification:

NVCS: not classified
Ecological System: North Pacific Lowland Riparian Forest and Shrubland (CES204.869), North Pacific Montane Riparian Woodland and Shrubland (CES204.866)
Rank: G4S4
Plots sampled: 7 (macro)

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): ave. 2789, range 500-4474
Slope (deg): ave. 1, range 0-3
Landform position: floodplains, basins
Hydrology: perennially moist to saturated
Soils: mostly organic, some loam

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Alnus rubra	14	Tr	0	2
REPRODUCING TREES				
Picea engelmannii	14	1	0	8
Abies amabilis	14	Tr	0	Tr
SHRUB LAYER				
Salix sitchensis	100	70	25	99
Spiraea douglasii	29	4	0	20
Alnus viridis ssp. *sinuata*	29	1	0	5
Salix geyeriana	14	4	0	30
Vaccinium uliginosum	14	4	0	25
HERB LAYER				
Lysichiton americanus	71	16	0	70
Carex aquatilis var. *dives*	43	18	0	90
Senecio triangularis	29	1	0	5
Carex echinata ssp. *echinata*	29	1	0	2
Viola palustris	29	Tr	0	2
Muhlenbergia filiformis	29	Tr	0	1
Juncus xiphoides var. *triandrus*	29	Tr	0	Tr
MOSS LAYER				
Moss	14	Tr	0	1

Vegetation and ecology:

Habitat is depressions on floodplains and in fens. Plots are highly variable and probably composed of numerous phases that need further study. Eleven other plots were left unclassified. *Alnus rubra, Picea engelmannii,* and *Abies amabilis* are reported in small amounts but are probably peripheral to the wetlands. *Salix sitchensis* occurs in many different combinations that are difficult to segregate satisfactorily. It is the primary species in the shrub layer, and *Spiraea douglasii*, *Salix geyeriana,* and *Vaccinium uliginosum* are important associates, depending on elevation. *Spiraea douglasii* is the second most abundant shrub. There is no cohesion in the herb layer in the present grouping, but species with significant patch size suggest at least five phases that need more study:

***Salix sitchensis* monotypic phase** (with depauperate herb layer)
***Lysichiton americanus* phase**
***Carex aquatilis* var. *dives* phase**
***Carex obnupta* phase**
***Scirpus microcarpus* phase**

Global distribution: western Oregon and Washington

Other studies: Titus 1996.

Spiraea douglasii Association

Douglas spiraea

Classification:

NVCS: *Spiraea douglasii* Shrubland (CEGL001129)
Ecological System: North Pacific Lowland Riparian Forest and Shrubland (CES204.869), North Pacific Montane Riparian Woodland and Shrubland (CES204.866)
Rank: G5S4
Plots sampled: 4 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Spiraea douglasii	100	95	90	100
Salix hookeriana	25	3	0	10
Crataegus douglasii	25	1	0	4
HERB LAYER				
Polygonum punctatum	25	1	0	3
Myosotis laxa	25	Tr	0	Tr
Poa trivialis	25	Tr	0	Tr
Rumex crispus	25	Tr	0	Tr
Epilobium ciliatum	25	Tr	0	Tr
Stellaria media	25	Tr	0	Tr
MOSS LAYER				
Moss	50	1	0	2

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): ave. 2235, range 500-4100
Slope (deg): 1, range 0-5
Landform position: toe slopes, floodplains, basins
Hydrology: seasonally to perennially moist
Soils: mostly loam, some organic

Vegetation and ecology: 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. Twenty-seven other plots were left unclassified. 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. Changes in hydrology may enhance dense stands. More northerly examples may contain *Myrica gale* and *Ledum glandulosum.* Stands may be extensive along floodplains and some have no doubt developed on abandoned pasture land and old prairie.

Global distribution: northern California and southeastern Alaska

Other studies: Hemstrom et al. 1987: 250, 259; Kovalchik 1987: 137; Kovalchik 1992: 145 (WA); Kunze 1994: 31, 90 (WA); Titus 1996e; Christy et al. 1998: 78; Thomas 1980: 7; Seyer 1983: 11; Wiedemann 1984: 54; Glad et al. 1987: 261; Streatfield & Frenkel 1997: 346; Jankovsky-Jones et al. 1999: 36 (ID).

Spiraea douglasii - Vaccinium uliginosum / Carex obnupta - Deschampsia caespitosa Association

Douglas spiraea - bog blueberry / slough sedge - tufted hairgrass

Classification:

NVCS: new
Ecological System: North Pacific Bog and Fen (CES204.063)
Rank: G2S2
Plots sampled: 57 (2 macro, 55 micro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Spiraea douglasii	89	46	0	85
Vaccinium uliginosum	77	34	0	90
Salix hookeriana	18	2	0	25
HERB LAYER				
Carex obnupta	53	8	0	50
Deschampsia caespitosa	35	8	0	45
MOSS LAYER				
Sphagnum	63	27	0	95
Moss	2	Tr	0	2

Distribution in NW Oregon: coastal

Environment:

Elevation (ft): ave. 27, range 20-100
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: seasonally to perennially moist
Soils: mostly organic, some sand

Vegetation and ecology: Habitat is coastal marshes and fens. The association forms wet lawns, low hummocks, and lake-fill mats, and occurs as a primary vegetation type on denuded peat or in degraded sites once dominated by *Ledum* associations. Trees are absent, and no reproducing trees were observed. The shrub layer is dominated by *Spiraea douglasii* 1-3 feet tall with up to 85 percent cover. *Vaccinium uliginosum* is less abundant, but when present it forms a nearly continuous layer under the *Spiraea* with up to 90 percent cover. Other shrubs present in lesser amounts include *Salix hookeriana, Ledum glandulosum,* and *Lonicera involucrata*. The herb layer is not particularly diverse, with only 9 species. *Carex obnupta* and *Deschampsia caespitosa* occur in about half the plots, with cover ranging from 0-50 percent. *Comarum palustre* is present in lesser amounts, and the rest of the taxa are present in only trace amounts. *Sphagnum angustifolium* occurs in 61 percent of the plots, with cover ranging from 0-95 percent. A network of elk trails in the peatland facilitate flows of mineral-rich water and may have long-term effect on vegetation by influencing the location and configuration of hummock-hollow topography. The abundance of *Spiraea douglasii,* the relatively poor development of hummocks, and a depauperate herb layer may indicate past or ongoing disturbance to groundwater flows or water quality. *Spiraea douglasii* tends to increase cover in disturbed peatlands, where the abundance, density, and size of the shrubs may indicate past or ongoing perturbation. This association is most frequent where human development, particularly roads, have impacted peatlands, and may be enhanced by eutrophic runoff from agricultural or urbanized areas.

Global distribution: Oregon to British Columbia

Other studies: Christy 2001a: 29. Kunze (1994) described a *Spiraea douglasii / Sphagnum* spp. association from the northern Puget Trough that is somewhat similar, but it differs in soils and hydrology, lacks *Vaccinium uliginosum*, and does not seem related to peatlands.

Spiraea douglasii / Sphagnum Association

Douglas spiraea / sphagnum

Classification:

NVCS: *Spiraea douglasii / Sphagnum* spp. Shrubland (CEGL003416)
Ecological System: North Pacific Bog and Fen (CES204.063)
Rank: G3S1
Plots sampled: 7 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
REPRODUCING TREES				
Fraxinus latifolia	14	Tr	0	1
SHRUB LAYER				
Spiraea douglasii	100	51	10	75
Rubus ursinus	29	2	0	12
HERB LAYER				
Carex cusickii	86	45	0	85
Menyanthes trifoliata	86	1	0	1
Lycopus americanus	71	5	0	20
Agrostis capillaris	57	1	0	1
Lemna minor	29	Tr	0	1
MOSS LAYER				
Sphagnum	100	57	20	90

Distribution in NW Oregon:

Environment:

Elevation (ft): 130
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: perennially saturated
Soils: organic

Vegetation and ecology: Habitat is edges of lakes and ponds, or on floating lake-fill mats in fens. The association is primarily shrub swamp and is known from only one site in Oregon, but is thought to be representative of similar stands in western Washington that have not been well studied. The tree layer is sparse and limited to a few reproducing *Fraxinus latifolia*. The shrub layer is dominated by an extensive stand of *Spiraea douglasii* 3-4 feet tall, with a minor component of *Rubus ursinus* and exotic *Rubus armeniacus*. The herb layer is dominated by *Carex cusickii* with up to 85 percent cover. Species present in lesser amounts include *Menyanthes trifoliata*, *Lycopus uniflorus*, and *Agrostis capillaris*. The moss layer is dominated by a saturated lawn of *Sphagnum squarrosum* with up to 90 percent cover beneath the shrubs. A small portion of the mat has well-developed hummocks of *Sphagnum palustre* 1-2 feet tall, and such hummocks are unknown elsewhere in Oregon except in coastal peatlands. The association may have been more widespread in Oregon historically, as large expanses of swamp vegetation once occurred on organic soils in the northern Willamette and Tualatin valleys. Similar sites on Sauvie Island (Multnomah County) and Lake Labish (Marion County) were destroyed by agricultural development as early as 1912. *Spiraea douglasii* is very common in western Oregon, but no examples are known to occur on floating mats of peat, and none with *Sphagnum*. The closest similar occurrences may be in the northern Puget Trough.

Global distribution: Oregon to British Columbia

Other studies: Kunze 1994: 18 (WA); Titus et al. 1996; Christy 2001a: 28. Kunze (1994) described a *Spiraea douglasii / Sphagnum* spp. association from the northern Puget Trough that is somewhat similar, but it differs in soils and hydrology and does not seem related to peatlands. Her *Spiraea douglasii* association is also similar in that it occurs in laggs, but it contains no *Sphagnum*.

Vaccinium caespitosum / Sanguisorba officinalis - Carex obnupta Association

Dwarf huckleberry / burnet - slough sedge

Classification:

NVCS: *Vaccinium caespitosum / Sanguisorba officinalis* Dwarf-shrubland (CEGL003438)
Ecological System: North Pacific Bog and Fen (CES204.063)
Rank: G1S1
Plots sampled: 9 (micro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Vaccinium caespitosum	100	19	1	70
HERB LAYER				
Sanguisorba officinalis	78	59	0	95
Carex obnupta	67	15	0	50
Caltha leptosepala ssp. *howellii*	67	8	0	25
Camassia quamash	44	5	0	25
Gentiana sceptrum	44	1	0	3
Senecio pseudaureus	33	1	0	2
Carex cusickii	22	1	0	10
Agrostis	22	Tr	0	2
MOSS LAYER				
Moss	67	31	0	95
Sphagnum	11	6	0	50

Distribution in NW Oregon: Coast Range

Environment:

Elevation (ft): 2800
Slope (deg): 0
Landform position: flats, basins
Hydrology: seasonally flooded to perennially moist
Soils: organic

Vegetation and ecology: Habitat is montane fen. The association consists of low hummocks of *Vaccinium caespitosum* interspersed around seasonally-flooded openings with a variable cover of stunted *Carex obnupta* and the tiny black liverwort *Cephaloziella*. *Vaccinium caespitosum* typically covers 30-70 percent of the stands but is sometimes sparse, and *Sanguisorba officinalis* may cover up to 95 percent of the herb layer. Stunted *Spiraea douglasii* and *Camassia quamash* suggest that the soil has low nutrient status. *Thuja plicata, Rhododendron macrophyllum*, and *Gaultheria shallon* occur on logs and elevated areas. The mosses *Sphagnum mendocinum* and *Aulacomnium palustre* occur among the *Vaccinium* hummocks and may cover 50-95 percent of the moss layer. *Anemone oregana* var. *felix*, a rare plant, is present in these stands. This association is known from three or four sites within a few miles of each other in the Coast Range, and is distinct from occurrences of *Vaccinium caespitosum* in remnants of Willamette Valley prairie.

Global distribution: Oregon

Other studies: Christy 2001b: 7.

Vaccinium caespitosum / Xerophyllum tenax - Sanguisorba officinalis Association

Dwarf huckleberry / beargrass - burnet

Classification:

NVCS: new
Ecological System: North Pacific Bog and Fen (CES204.063)
Rank: G1S1
Plots sampled: 8 (micro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Vaccinium caespitosum	88	12	0	40
HERB LAYER				
Xerophyllum tenax	100	56	25	80
Sanguisorba officinalis	100	35	2	50
Carex cusickii	25	Tr	0	1
MOSS LAYER				
Moss	50	24	0	90
Sphagnum	38	8	0	50

Distribution in NW Oregon: Coast Range

Environment:

Elevation (ft): 2800
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: perennially moist
Soils: organic

Vegetation and ecology: Habitat is montane fen. The association is characterized by hummocks of *Xerophyllum tenax* interspersed with pockets of *Sanguisorba officinalis*, throughout which are distributed tightly-packed mats and hummocks of red *Sphagnum capillifolium* and *Sphagnum mendocinum*. *Vaccinium caespitosum*, *Pteridium aquilinum,* and *Carex obnupta* are occasional to frequent associates. The juxtaposition of the typically upland *Xerophyllum* with typically wetland *Sanguisorba* and *Sphagnum* is peculiar, although *Xerophyllum* occasionally occurs in seasonal wetlands. Occasional rocks and the presence of dead *Thuja plicata* nearby with *Xerophyllum* suggest that this association occurs in a long-term hydrologic tension zone between upland and wetland. Changes in water levels may be mediated by beavers, humans, climatic variability, or combinations of these variables. Long-lived elements of both upland and wetland have commingled to form a plant association with a limited distribution. The hummocks of *Sphagnum capillifolium* are in part elevated above groundwater influence, lowering the nutrient status of this association. This association is known from three or four sites within a few miles of each other in the Coast Range.

Global distribution: Oregon

Other studies: Christy 2001b: 8.

Vaccinium uliginosum / Carex obnupta Association

Bog blueberry / slough sedge

Classification:

NVCS: new
Ecological System: North Pacific Maritime Coastal Sand Dune (CES200.881)
Rank: G2S2
Plots sampled: 13 (7 macro, 6 micro)

Distribution in NW Oregon: coastal

Environment:

Elevation (ft): 40-100
Slope (deg): 0
Landform position: deflation plains and marine terraces
Hydrology: seasonally flooded to perennially moist
Soils: mostly organic, some sand underlain by duripan

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Pinus contorta var. *contorta*	85	4	0	20
Picea sitchensis	8	Tr	0	2
Frangula purshiana	8	Tr	0	1
SHRUB LAYER				
Vaccinium uliginosum	85	45	0	80
Salix hookeriana	85	10	0	35
Gaultheria shallon	46	1	0	3
Malus fusca	38	1	0	3
Spiraea douglasii	31	2	0	10
Myrica californica	31	1	0	15
Vaccinium ovatum	31	1	0	5
HERB LAYER				
Carex obnupta	100	22	1	60
Veronica scutellata	85	1	0	5
Argentina egedii	77	7	0	40
Juncus lesueurii	54	2	0	10
Ranunculus flammula	46	1	0	5
Deschampsia caespitosa	31	9	0	60
Aster chilensis	31	2	0	20
Hypochaeris radicata	31	1	0	5
Lycopus uniflorus	31	Tr	0	2

Vegetation and ecology: Habitat is marsh seasonally flooded to a depth of 12 inches and usually moist throughout the growing season. Stands are remote from saltwater intrusion but may be subject to salt spray. Young *Pinus contorta* var. *contorta* are usually scattered throughout stands. *Vaccinium uliginosum* and *Salix hookeriana* are the most abundant shrubs. *Gaultheria shallon* and *Vaccinium ovatum* are confined to elevated microsites. The herb layer is dominated by *Carex obnupta* with a significant component of seasonally wet deflation plain species including *Veronica scutellata, Argentina egedii,* and *Ranunculus flammula.* The association is wetter than the *Vaccinium uliginosum / Deschampsia caespitosa - Carex obnupta* association and has a richer herb layer. *Vaccinium macrocarpon* occurs in some stands and probably originated from nearby cranberry beds where it has been grown commercially since 1885. Active and abandoned cranberry bogs are located in Clatsop County and along the southern coast of Oregon, and cranberry is readily dispersed into native wetlands by birds and vegetative fragmentation.

Global distribution: This association occurs sporadically along the coast between northern California and southwestern Washington.

Other studies: Christy et al. 1998: 84; Christy 2001a: 30.

Vaccinium uliginosum / Deschampsia caespitosa - Carex obnupta Association

Bog blueberry / tufted hairgrass - slough sedge

Classification:

NVCS: new
Ecological System: North Pacific Maritime Coastal Sand Dune (CES200.881)
Rank: G2S2
Plots sampled: 73 (micro)

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Pinus contorta var. *contorta*	11	Tr	0	15
SHRUB LAYER				
Vaccinium uliginosum	70	24	0	90
HERB LAYER				
Deschampsia caespitosa	85	32	0	80
Carex obnupta	71	10	0	50
Sanguisorba officinalis	49	2	0	15
MOSS LAYER				
Sphagnum	81	29	0	95
Moss	73	11	0	50

Distribution in NW Oregon: coastal

Environment:

Elevation (ft): ave. 130, range 50-160
Slope (deg): 0
Landscape position: old deflation plains and marine terraces
Hydrology: seasonally flooded, moist to dry in summer
Soils: sand underlain by duripan

Vegetation and ecology: Habitat is seasonally wet openings in *Pinus contorta* var. *contorta* forest. Stands are seasonally flooded to a depth of 12 inches and are dry by midsummer. Substrate is sand or a thin organic layer over sand, often with iron-cemented hardpan. *Pinus contorta* var. *contorta* is sparse and mostly restricted to the periphery of stands. A shrub layer is present in about half the plots, dominated by *Vaccinium uliginosum* with cover up to 70 percent. The shrub layer may include small amounts of *Ledum glandulosum, Spiraea douglasii*, *Vaccinium ovatum,* or *Gaultheria shallon*, the last two species occurring on elevated microsites or around the margins of the wetland. The herb layer is dominated by *Deschampsia caespitosa* with lesser amounts of *Carex obnupta*. *Sanguisorba officinalis*, *Gentiana sceptrum,* and *Pteridium aquilinum* may be present in small amounts. *Sphagnum mendocinum* and the lichen *Cladina portentosa* ssp. *pacifica* are very conspicuous at some sites. Stands are drier than the *Vaccinium uliginosum / Carex obnupta a*ssociation and have a more depauperate herb layer. They appear to be declining because of successional changes caused by dune stabilization and possibly by cessation of stand-replacing fires. It is also vulnerable to recreational and residential development, and construction of commercial cranberry bogs. Threats from development are greatest between the Siuslaw River and Heceta Head. Some stands are adjacent to areas favored for mushroom picking and can be damaged by off-road vehicles used for mushroom harvest or general recreation.

Global distribution: Apparently restricted to the immediate coastline between northern California and Heceta Head, Oregon.

Other studies: Martin & Frenkel 1978: 18, 48; Christy et al. 1998: 86; Christy 2001a: 31; Frenkel 1980: 127.

Vaccinium uliginosum / Dodecatheon jeffreyi - Caltha leptosepala ssp*. howellii* Association

Bog blueberry / Howell's marsh marigold

Classification:

NVCS: new
Ecological System: Boreal Fen (CES103.872)
Rank: G3S3
Plots sampled: 42 (18 macro, 24 micro)

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 4363, range 1900-5410
Slope (deg): ave. 0, range 0-2
Landform position: toe slopes, floodplains, basins
Hydrology: perennially moist to perennially saturated
Soils: mostly organic, some loam.

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Pinus contorta var. *latifolia*	17	2	0	35
Picea engelmannii	14	3	0	60
REPRODUCING TREES				
Picea engelmannii	17	1	0	40
Pinus contorta var. *latifolia*	17	1	0	7
Abies amabilis	12	1	0	15
Abies lasiocarpa	10	1	0	50
SHRUB LAYER				
Vaccinium uliginosum	100	41	5	85
Spiraea douglasii	33	3	0	55
Kalmia microphylla	26	1	0	25
HERB LAYER				
Dodecatheon jeffreyi	81	7	0	25
Caltha leptosepala ssp. *howellii*	64	11	0	55
Carex aquatilis var. *dives*	57	10	0	85
Ligusticum grayi	43	6	0	75
Deschampsia caespitosa	40	2	0	20
Platanthera dilatata	38	Tr	0	5
Senecio triangularis	31	1	0	11
Tofieldia glutinosa	26	1	0	6
MOSS LAYER				
Moss	62	42	0	100
UNVEGETATED				
Litter	14	2	0	40

Vegetation and ecology: Habitat is montane fens. *Vaccinium uliginosum* plots are highly variable and indicate that numerous phases are present and need further study. Twenty-five other plots were left unclassified. The species-rich association described here is similar to other wet lawn associations in montane fens, with trees and shrubs confined to hummocks or "tree islands" and the rest of the plot being a wet lawn with a large diversity of herbaceous species. Eight species of mature and reproducing trees are reported, with *Pinus contorta* var*. latifolia*, *Picea engelmannii,* and *Abies lasiocarpa* being most abundant. They occur at low constancy but may have up to 60 percent cover in some plots. *Chamaecyparis nootkatensis* is also present occasionally in the northern part of the Cascades. Twenty-five different species of shrubs are recorded, *Vaccinium uliginosum* being most abundant with an average cover of 41 percent and ranging from 5-85 percent. Other shrub species with significant patches include *Spiraea douglasii*, *Kalmia microphylla, Betula nana,* and *Vaccinium oxycoccos,* indicating peaty conditions on the hummocks. Some hummocks have very low shrub cover and are composed mostly of the mosses *Sphagnum capillifolium* and *Aulacomnium palustre*. Over 100 species are reported from the herb layer. *Dodecatheon jeffreyi, Caltha leptosepala* ssp*. howellii,* and *Carex aquatilis* var*. dives* are the primary species with the highest constancy and average cover, although *Carex aquatilis* var*. dives* may have higher percent cover than *Dodecatheon jeffreyi.* One or more of these three species may be absent in some plots, so one must search for them in stands adjacent to plots. Other species with significant patches include *Deschampsia caespitosa, Carex utriculata, Carex echinata* ssp*. echinata, Menyanthes trifoliata, Carex aquatilis* var*. aquatilis,* and *Carex exsiccata,* all indicative of the wet lawn habitat. Large patches of *Ligusticum grayi* and smaller occurrences of *Senecio triangularis, Aconitum*

columbianum, and *Rudbeckia occidentalis* occur on the hummocks and forest ecotone around the edges of the wetlands.

Global distribution: northern California to British Columbia

Other studies: Not known

III. HERBACEOUS ASSOCIATIONS

Athyrium filix-femina Association

Lady fern

Classification:

NVCS: new
Ecological System: North Pacific Intertidal Freshwater Wetland (CES204.875)
Rank: G4S3
Plots sampled: 1 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Rosa nutkana	100	2	2	2
Spiraea douglasii	100	2	2	2
Salix hookeriana	100	2	2	2
Lonicera involucrata	100	2	2	2
HERB LAYER				
Athyrium filix-femina	100	60	60	60
Scirpus microcarpus	100	25	25	25
Agrostis stolonifera	100	5	5	5
Lotus corniculatus	100	5	5	5
Aster subspicatus	100	4	4	4
Typha latifolia	100	2	2	2
Lysimachia terrestris	100	2	2	2
Argentina egedii	100	2	2	2
Oenanthe sarmentosa	100	2	2	2
Iris pseudacorus	100	2	2	2
Schoenoplectus acutus var. *occidentalis*	100	2	2	2
Juncus effusus	100	1	1	1
Carex obnupta	100	1	1	1

Distribution in NW Oregon: coastal

Environment:

Elevation (ft): 10
Slope (deg): 0
Landform position: floodplains
Hydrology: perennially saturated
Soils: organic or silt loam

Vegetation and ecology: Habitat is marsh just above the freshwater tidal zone along larger coastal rivers. The association is undersampled but has been observed in a number of sites along the lower Columbia River and is also known from similar habitats in Washington. Trees are absent from this plot, but *Picea sitchensis* or *Tsuga heterophylla* may occur on logs or stumps. The shrub layer is patchy and includes primarily *Spiraea douglasii*, *Salix hookeriana*, and *Lonicera involucrata*. The herb layer is dominated by tall, dense stands of *Athyrium filix-femina*, with lesser amounts of other diverse wetland species such as *Scirpus microcarpus*, *Oenanthe sarmentosa*, and *Carex obnupta.* These floodplains are extremely diverse and also contain a number of weedy species such as *Agrostis stolonifera, Lysimachia terrestris, Juncus effusus,* and *Iris pseudacorus*. Stands are just above the reach of daily freshwater tidal flooding, but soils are saturated year-round. The tidally-influenced hydration, species composition, and rank growth of *Athyrium filix-femina* sets this apart from other associations containing considerable amounts of *Athyrium.*

Global distribution: western Oregon to southeastern Alaska.

Other studies: Viereck et al. 1992: 194 (AK); Christy & Putera 1993: 40; Kunze 1994: 95 (WA); Boggs 2000: 168 (AK).

Azolla (*filiculoides, mexicana*) Association

Mosquitofern

Classification:

NVCS: *Azolla* (*filiculoides, mexicana*) Permanently Flooded Herbaceous Vegetation (CEGL003017)
Ecological System: Temperate Pacific Freshwater Aquatic Bed (CES200.876)
Rank: G4S4
Plots sampled: 1 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Azolla mexicana	100	99	99	99

Distribution in NW Oregon:
Coast Range, Willamette Valley

Environment:

Elevation (ft): 500
Slope (deg): 0
Landform position: floodplains, flats
Hydrology: seasonally to perennially flooded
Soils: loam, silt loam

Vegetation and ecology: Habitat is low-elevation eutrophic ponds, lakes, and sloughs with little water movement. Species of *Azolla* occur throughout northwestern Oregon, but stands extensive enough to be considered occurrences of this association are most common in low-elevation areas in the Coast Range and Willamette Valley. They typically form nearly monotypic green or reddish mats that float on the surface of lakes and ponds, often growing so dense that no open water is visible. *Azolla* needs open water to proliferate in winter and spring but it tolerates being stranded on mudflats when shallow pools dry out in summer. Mudflat sites are not uncommon, particularly on large floodplains, and in this habitat the *Azolla* mat develops a peculiar lumpy surface with varied microtopography. Elements of the *Lemna minor* association (*Lemna, Spirodela, Ricciocarpos*) may often be intermixed with *Azolla* but are always subordinate to *Azolla.* Eutrophic conditions favored by this association may be enhanced by enriched runoff in agricultural or urban landscapes.

Global distribution: Oregon to British Columbia

Other studies: Jankovsky-Jones et al. 2001: 182 (ID).

Bidens cernua Association

Nodding beggartick

Classification:

NVCS: *Bidens cernua* Herbaceous Vegetation (CEGL003324)
Ecological System: North Pacific Intertidal Freshwater Wetland (CES204.875), Temperate Pacific Freshwater Mudflat (CES200.878), Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G3S3
Plots sampled: 9 (macro)

Distribution in NW Oregon: Willamette Valley

Environment:

Elevation (ft): ave. 282, range 8-500
Slope (deg): ave. 0, range 0-1
Landform position: floodplains, flats
Hydrology: seasonally flooded to perennially saturated
Soils: silt loam

Vegetation and ecology: Habitat is low-elevation eutrophic marsh and mudflats along low-gradient streams and around shallow ponds. The association is strictly herbaceous and dominated by *Bidens cernua* and a variety of other marsh species that tolerate early-season flooding and summer drying that exposes mudflats with subirrigation. Other typical species present in lesser amounts include *Polygonum hydropiperoides, Sagittaria latifolia, Eleocharis palustris, Ludwigia palustris,* and *Leersia oryzoides,* but more than 15 other species are recorded. This association was probably fairly widespread in the Willamette Valley prior to flood control, but is now mostly restricted to the Columbia River floodplain in the Vancouver Basin. Prolonged pooling in depressions and freshwater tidal flooding along streams helps to keep invasive *Phalaris arundinacea* from invading stands.

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Bidens cernua	100	56	20	90
Polygonum hydropiperoides	56	14	0	80
Sagittaria latifolia	44	5	0	20
Eleocharis palustris	44	3	0	20
Ludwigia palustris	33	3	0	15
Leersia oryzoides	22	3	0	20
Alisma triviale	22	1	0	3
Callitriche	22	1	0	3
Sparganium angustifolium	22	Tr	0	2
Polygonum persicaria	22	Tr	0	3
Schoenoplectus americanus	11	4	0	40
Panicum capillare	11	1	0	10
Schoenoplectus tabernaemontani	11	1	0	5
Mentha arvensis	11	Tr	0	4
Elodea canadensis	11	Tr	0	3
Carex interrupta	11	Tr	0	3
Schoenoplectus acutus var. *occidentalis*	11	Tr	0	2
Myriophyllum spicatum	11	Tr	0	2
Lythrum portula	11	Tr	0	2
Polygonum punctatum	11	Tr	0	1
Veronica americana	11	Tr	0	1
Hydrocotyle ranunculoides	11	Tr	0	1
Gnaphalium palustre	11	Tr	0	Tr
Eleocharis ovata	11	Tr	0	Tr

Global distribution: western Oregon and Washington

Other studies: Christy & Putera 1993: 40; Kunze 1994: 44 (WA). The *Bidens cernua - Bidens frondosa* association of Carsey et al. 2003: 326 differs somewhat in floristic composition but habitat conditions are very similar.

Bidens frondosa Association

Devil's beggartick

Classification:

NVCS: new
Ecological System: North Pacific Intertidal Freshwater Wetland (CES204.875), Temperate Pacific Freshwater Mudflat (CES200.878), Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G4S4
Plots sampled: 2 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Bidens frondosa	100	95	90	100
Nuphar lutea ssp. *polysepala*	50	5	0	10
Poaceae	50	2	0	4
Rorippa curvisiliqua	50	Tr	0	Tr
Polygonum persicaria	50	Tr	0	Tr
Lemna minor	50	Tr	0	Tr

Distribution in NW Oregon: Willamette Valley

Environment:

Elevation (ft): 500
Slope (deg): 0
Landform position: floodplains, flats
Hydrology: seasonally flooded to moist
Soils: silt loam

Vegetation and ecology: Habitat is low-elevation marsh and mudflats along low-gradient streams and around shallow ponds. The association typically forms nearly monotypic stands of *Bidens frondosa* that can have up to 100 percent cover. *Nuphar lutea* ssp. *polysepala* is the second most abundant species reported from plots, with traces of other aquatic or mudflat species. This association was probably fairly widespread in the Willamette Valley prior to flood control, but is now mostly restricted to the Columbia River floodplain in the Vancouver Basin. Prolonged pooling in depressions and freshwater tidal flooding along streams helps to keep invasive *Phalaris arundinacea* from invading stands.

Global distribution: western Oregon and Washington

Other studies: The *Bidens cernua - Bidens frondosa* association of Carsey et al. 2003: 326 differs somewhat in floristic composition but habitat conditions are very similar.

Boykinia major Association

Large boykinia

Classification:

NVCS: new
Ecological System: North Pacific Bog and Fen (CES204.063), Boreal Fen (CES103.872)
Rank: G3S3
Plots sampled: 2 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Spiraea douglasii	50	1	0	1
HERB LAYER				
Boykinia major	100	60	50	70
Lysichiton americanus	100	12	4	20
Carex echinata ssp. *echinata*	100	3	Tr	5
Hypericum anagalloides	100	1	Tr	1
Carex utriculata	50	15	0	30
Blechnum spicant	50	8	0	15
Juncus xiphoides var. *triandrus*	50	5	0	10
Cicuta douglasii	50	5	0	10
Calamagrostis canadensis	50	5	0	10
Viola	50	3	0	5
Carex obnupta	50	1	0	2
Juncus	50	1	0	1
Carex	50	Tr	0	Tr
Carex arcta	50	Tr	0	Tr
Holcus lanatus	50	Tr	0	Tr
MOSS LAYER				
Moss	100	20	20	20

Distribution in NW Oregon:

coast, Coast Range, western Cascade Range

Environment:

Elevation (ft): ave. 1663, range 40-3285
Slope (deg): 0
Landform position: depressions, flats
Hydrology: perennially saturated
Soils: organic

Vegetation and ecology:

Habitat is coastal and montane fens, particularly sphagnum mires. The association needs more plot data, but a variety of occurrences have been observed in the field. It occurs in both open peatlands and under a partial canopy of *Thuja plicata*. *Boykinia major* is the primary species and forms a wet lawn with lesser amounts of *Lysichiton americanus, Carex echinata* ssp. *echinata, Carex utriculata, Blechnum spicant, Juncus xiphoides* var. *triandrus, Cicuta douglasii,* and *Calamagrostis canadensis*, depending on elevation. The moss layer is almost entirely *Sphagnum*.

Global distribution:

Oregon to British Columbia

Other studies:

Not known.

Brasenia schreberi Association

Watershield

Classification:

NVCS: *Brasenia schreberi* Herbaceous Vegetation (CEGL004527)
Ecological System: Temperate Pacific Freshwater Aquatic Bed (CES200.876)
Rank: G5S3
Plots sampled: 0

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): 10-2000
Slope (deg): 0
Landform position: basins
Hydrology: perennially flooded
Soils: organic

Vegetation and ecology: Habitat is low-elevation ponds, lakes, and sloughs. This is a rooted aquatic bed association that is widespread in western Oregon but has not been sampled and little information is available. *Brasenia schreberi* forms mats of floating leaves on the surface of the water and the network of submerged stems and undersides of leaves provide important habitat for aquatic invertebrates and fish. The association is not as common in northwestern Oregon as the *Nuphar* association. This association favors oligotrophic or mesotrophic waters and may be outcompeted by more aggressive species in eutrophic waters enhanced by enriched runoff in agricultural or urban landscapes.

Global distribution: California to Alaska and eastward

Other studies: Kunze 1994: 22, 79 (WA); Titus 1996.

Calamagrostis canadensis Association

Bluejoint

Classification:

NVCS: *Calamagrostis canadensis* western herbaceous vegetation (CEGL001559)
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G4S4
Plots sampled: 10 (4 macro, 6 micro)

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 4821, range 3100-5410
Slope (deg): ave. 1, range 0-5
Landform position: floodplains, flats
Hydrology: moist to perennially saturated
Soils: mostly organic, some loam

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Picea engelmannii	50	22	0	90
Abies lasiocarpa	20	1	0	8
Pinus contorta var. *latifolia*	20	1	0	10
REPRODUCING TREES				
Abies lasiocarpa	30	5	0	45
Abies amabilis	30	Tr	0	3
Pinus contorta var. *latifolia*	20	Tr	0	3
Picea engelmannii	20	Tr	0	3
SHRUB LAYER				
Vaccinium uliginosum	50	2	0	15
Spiraea densiflora	30	2	0	10
HERB LAYER				
Calamagrostis canadensis	100	46	12	95
Caltha leptosepala ssp. *howellii*	50	3	0	13
Senecio triangularis	50	1	0	5
Carex aquatilis var. *dives*	40	5	0	25
Dodecatheon jeffreyi	40	2	0	5
Ligusticum grayi	40	1	0	8
Platanthera dilatata	40	Tr	0	4
Viola	30	1	0	10
Polygonum bistortoides	30	1	0	4
MOSS LAYER				
Moss	40	18	0	100
UNVEGETATED				
Litter	30	11	0	70
Bare ground	10	1	0	10

Vegetation and ecology: Habitat is edges of montane fens. The association is extremely diverse and it was not possible to segregate meaningful vegetation groups. They are united by the dominance of *Calamagrostis canadensis* in a fairly uniform ecotone with similar moisture regimes. Mature *Picea engelmannii* may have cover of up to 90 percent, but *Abies lasiocarpa* is the most common reproducing tree. *Pinus contorta* var. *latifolia* and *Abies amabilis* are peripheral. The shrub layer contains 14 different species, the most abundant being *Vaccinium uliginosum* and *Spiraea densiflora*. More than 60 species are present in the herb layer, indicating that the association occurs in a transition zone between montane fen and upland forest and contains components of both systems. *Calamagrostis canadensis, Caltha leptosepala* ssp. *howellii,* and *Senecio triangularis* have the highest constancy, with *Calamagrostis* ranging from cover of only 12 percent in barren plots to 95 percent in well-vegetated plots. Other species may form conspicuous patches with lower constancy, particularly *Carex aquatilis* var. *dives, Deschampsia caespitosa* and *Comarum palustre.* The remaining mass of species occur only in small amounts except for a patch of *Maianthemum stellatum* in what is probably close to the forest edge.

Global distribution: California to Alaska and eastward

Other studies: Cole 1977: 100; Padgett et al. 1989: 105 (ID, UT); Crowe & Clausnitzer 1997: 38, 188; Kovalchik 1987: 138; Kovalchik 1992: 195 (WA); Jankovsky-Jones et al. 1999: 12 (ID); Carsey et al. 2003: 328 (CO).

Calamagrostis nutkaensis Association

Pacific reedgrass

Classification:

NVCS: new
Ecological System: North Pacific Bog and Fen (CES204.063)
Rank: G3S1
Plots sampled: 0

Distribution in NW Oregon: coastal

Environment:

Elevation (ft): 50-100
Slope (deg): 0
Landform position: floodplains, basins, flats
Hydrology: perennially saturated
Soils: organic

Vegetation and ecology: Habitat is coastal fens. The association has not been sampled but is present in small amounts on the north coast and in larger amounts on the south coast. It forms nearly monotypic stands of *Calamagrostis nutkaensis* with a few other species with low constancy and cover but not documented here. The moss layer may contain high cover of *Sphagnum* or may largely be concealed by litter. Some stands have expanses of mud between hummocks of *Calamagrostis* and open water is lacking. Large tussocks of *Calamagrostis nutkaensis* are slightly elevated above the surface of the mire and are used extensively by elk for bedding.

Global distribution: northern California to Alaska

Other studies: Baker 1972: 409; Howarth 1995: 13.

Callitriche heterophylla Association

Different-leaved water-starwort

Classification:

NVCS: *Callitriche heterophylla* Herbaceous Vegetation (CEGL003301)
Ecological System: Temperate Pacific Freshwater Aquatic Bed (CES200.876)
Rank: G4S4
Plots sampled: 6 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Fraxinus latifolia	17	17	0	100
HERB LAYER				
Callitriche heterophylla	100	86	75	99
Oenanthe sarmentosa	67	10	0	40
Veronica scutellata	33	Tr	0	1
Lysichiton americanus	17	3	0	20
Torreyochloa pallida var. *pauciflora*	17	1	0	5
MOSS LAYER				
Moss	17	Tr	0	1

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): ave. 733, range 500-1900
Slope (deg): 0
Landform position: bottoms
Hydrology: seasonally to perennially flooded
Soils: organic or silty loam

Vegetation and ecology: Habitat is low-elevation shallow pools, ponds, slow-moving streams, and flooded shrub swamps. *Fraxinus latifolia, Salix hookeriana, Salix lucida* ssp*. lasiandra, Salix sitchensis,* and *Spiraea douglasii* are typical associates in this habitat, but woody vegetation may also be entirely absent. *Callitriche heterophylla* is the primary species and is usually immersed with the topmost leaves floating on the surface of the water. Emergent species present may include *Oenanthe sarmentosa, Veronica scutellata, Cicuta douglasii, Torreyochloa pallida* var*. pauciflora,* and *Glyceria*.

Global distribution: Oregon to Alaska and eastward

Other studies: Titus & Christy 1996a; Boggs 2000: 173 (AK).

Caltha leptosepala ssp. *howellii* Association

Howell's marsh marigold

Classification:

NVCS: *Caltha leptosepala* Herbaceous Vegetation (CEGL001954)
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G4S4
Plots sampled: 7 (macro)

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 4319, range 2800-5300
Slope (deg): ave. 4, range 0-15
Landform position: seepage slopes to floodplains and flats
Hydrology: moist to perennially saturated
Soils: mostly organic, some loam

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Picea engelmannii	29	2	0	15
Abies amabilis	29	Tr	0	3
Tsuga mertensiana	29	Tr	0	1
Larix occidentalis	29	Tr	0	Tr
REPRODUCING TREES				
Picea engelmannii	43	1	0	5
Abies amabilis	29	Tr	0	1
Pinus contorta var. *latifolia*	29	Tr	0	1
SHRUB LAYER				
Vaccinium caespitosum	14	1	0	10
Vaccinium uliginosum	14	1	0	8
HERB LAYER				
Caltha leptosepala ssp. *howellii*	100	50	15	80
Dodecatheon jeffreyi	86	8	0	20
Senecio triangularis	71	1	0	5
Hypericum anagalloides	57	5	0	30
Carex luzulina	57	1	0	2
Platanthera stricta	57	1	0	5
Tofieldia glutinosa	43	1	0	3
Equisetum arvense	43	Tr	0	1
Carex utriculata	29	6	0	35
Polygonum bistortoides	29	5	0	30
Trifolium longipes	29	2	0	12
Carex aquatilis var. *dives*	29	2	0	10
Allium validum	29	2	0	10
MOSS LAYER				
Moss	29	19	0	95

Vegetation and ecology: 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. Plots are complex and probably a number of phases are represented that need further study. Ten plots were left unclassified. This association represents stands where *Caltha* is the primary species in the herb layer. Woody plants have scanty cover and are primarily restricted to hummocks or "tree islands" within a herbaceous matrix, or they are peripheral to the wetland. *Picea engelmannii, Abies amabilis, Tsuga mertensiana,* and *Pinus contorta* var. *latifolia* are the primary mature and reproducing trees. *Vaccinium caespitosum, Vaccinium uliginosum,* and *Salix geyeriana* are the primary shrubs but these also have scanty cover. The herb layer is extremely rich with almost 60 different species present from both wet flushes and drier hummocks or forest ecotones around the edges of these wetlands. *Caltha leptosepala* ssp. *howellii* is the primary species of flushes, with lesser amounts of *Dodecatheon jeffreyi, Hypericum anagalloides, Carex utriculata, Polygonum bistortoides*. Conspicuous herbs on hummocks include *Senecio triangularis, Trifolium longipes, Trautvetteria caroliniensis,* and *Veratrum californicum.* Rills are often filled with up to 90 percent cover of the aquatic moss *Fontinalis neomexicana* that becomes hidden by sedge growth as the season progresses. *Polygonum bistortoides* and the large leafy liverwort *Scapania paludosa* are also characteristic of these rills.

Global distribution: northern California to Alaska

Other studies: del Moral 1973: 32 (WA); Hickman 1976: 150 (WA); Hemstrom et al. 1987: 256; Padgett et al. 1989: 100 (ID, UT); Jankovsky-Jones et al. 1999: 12 (ID); Carsey et al. 2003: 330 (CO).

Caltha leptosepala ssp*. howellii - Carex obnupta* Association

Howell's marsh marigold - slough sedge

Classification:

NVCS: new
Ecological System: North Pacific Bog and Fen (CES204.063)
Rank: G4S2
Plots sampled: 30 microplots

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Caltha leptosepala ssp. *howellii*	87	35	0	90
Sanguisorba officinalis	60	41	0	95
Gentiana sceptrum	50	1	0	5
Carex obnupta	37	9	0	45
Carex cusickii	37	6	0	30
Equisetum arvense	30	1	0	10
Juncus xiphoides var. *triandrus*	27	1	0	8
Lysichiton americanus	23	1	0	18
Agrostis	23	Tr	0	2
Juncus balticus	20	3	0	40
Angelica genuflexa	20	1	0	6
Hypericum anagalloides	20	1	0	5
MOSS LAYER				
Moss	80	53	0	95
UNVEGETATED				
Litter	3	1	0	15

Distribution in NW Oregon: Coast Range

Environment:

Elevation (ft): 2800
Slope (deg): ave. 5, range 3-5
Landform position: floodplains, flats, basins
Hydrology: perennially saturated
Soils: organic

Vegetation and ecology: 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. Stands are similar to the *Caltha leptosepala* ssp*. howellii* association of the Cascade Range but species composition differs and they lack hummocks or "tree islands." *Caltha leptosepala* ssp*. howellii* and *Sanguisorba officinalis* are the primary herbs but may not be present in all plots. *Gentiana sceptrum, Carex obnupta,* and *Carex cusickii* are lesser associates not present in every plot but conspicuous adjacent to plots. They signify an affinity to low-elevation coastal peatlands and the use of *Carex obnupta* in the name separates this association from those of the Cascades. *Juncus balticus, Carex echinata* ssp*. phyllomanica, Scirpus microcarpus, Carex exsiccata,* and *Carex utriculata* occur in patches with low constancy and average cover but sometimes with cover up to 70 percent. Rills are characteristically filled with up to 90 percent cover of the aquatic moss *Fontinalis neomexicana* that becomes hidden by sedge growth as the season progresses. *Polygonum bistortoides* and the large leafy liverwort *Scapania paludosa* are also characteristic of these rills. The moss layer may have up to 95 percent cover, mostly consisting of *Sphagnum mendocinum* and *Aulacomnium palustre*.

Global distribution: Oregon to British Columbia

Other studies: Christy 2001a: 7

Camassia quamash Association

Small camas

Classification:

NVCS: *Camassia quamash* Wet Prairie Herbaceous Vegetation (CEGL003341)
Ecological System: Willamette Valley Wet Prairie (CES204.874)
Rank: G4S4
Plots sampled: 5 (1 macro, 4 micro)

Distribution in NW Oregon:

Environment:

Elevation (ft): ave. 220, range 150-500
Slope (deg): ave. 2, range 0-2
Landform position: floodplains, flats, benches
Hydrology: seasonally flooded to seasonally moist
Soils: clay loam and shallow soil over bedrock

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Camassia quamash	100	25	20	40
Saxifraga oregana	40	8	0	30
Ranunculus occidentalis	20	6	0	30
Triteleia hyacinthina	20	2	0	10
Hypochaeris radicata	20	2	0	10
Stellaria	20	1	0	4
Mimulus guttatus	20	1	0	3
Juncus bufonius	20	Tr	0	1
Aira caryophyllea	20	Tr	0	1
Galium aparine	20	Tr	0	1
MOSS LAYER				
Moss	80	76	0	100

Vegetation and ecology: Habitat is clay prairie and basalt scabland with a seasonally perched water table. *Camassia quamash* is the primary species in this association, with lesser amounts of *Saxifraga oregana, Ranunculus occidentalis,* and *Triteleia hyacinthina*. *Camassia* is conspicuous in spring and forms dense stands of gorgeous blue flowers, but it all but disappears with summer drought. Because of its seasonal presence, low elevation, and proximity to agriculture, many exotic species are present. Weeds such as *Hypochaeris radicata, Stellaria, Aira caryophyllea,* and *Galium aparine* may be inconspicuous when *Camassia* is at its peak but may dominate sites once it has disappeared. Both white and blue forms of *Camassia quamash* may be present, as well as *Camassia leichtlinii.* Camas was one of the most important staple foods for the original native peoples of the Willamette Valley and wet prairies were intensively managed for food production (Boyd 1999). Arable prairies were converted to agriculture and those on scabland sites were grazed by livestock, so that most surviving remnants are degraded with exotic species. This association may intergrade with the *Triteleia hyacinthina* association in areas of shallow soil over bedrock that have a perched water table or seasonal seepage.

Global distribution: western Oregon and Washington

Other studies: Titus & Christy 1996b. The species composition of other *Camassia quamash* associations (e.g., Jankovsky-Jones et al. 1999: 12, Jankovsky-Jones et al. 2001: 182) differs from those in the Willamette Valley.

Carex amplifolia Association

Bigleaf sedge

Classification:

NVCS: *Carex amplifolia* Herbaceous Vegetation (CEGL003427)
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998)
Rank: G3S3
Plots sampled: 1 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Carex amplifolia	100	40	40	40
Lotus	100	25	25	25
Lysichiton americanus	100	15	15	15
Scirpus microcarpus	100	10	10	10
Mimulus guttatus	100	5	5	5
MOSS LAYER				
Moss	100	30	30	30

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): 3450
Slope (deg): 7
Landform position: seepage slopes, flats
Hydrology: perennially saturated
Soils: organic

Vegetation and ecology: Habitat is seepage slopes, rivulets, or sheet flow associated with springs. The association is represented by only one plot but it has been well documented by other researchers. *Carex amplifolia* is the primary species with an average cover of 40 percent, with lesser amounts of an unidentified *Lotus*, *Lysichiton americanus,* and *Scirpus microcarpus*. Twelve other species are present in the herb layer. Most occurrences are east of the Cascade Range, but these plots appear to be similar to others reported.

Global distribution: California to British Columbia

Other studies: Kovalchik 1987: 112 (in part); Larkin 1990: 3; Crowe & Clausnitzer 1997: 204.

Carex angustata Association

Widefruit sedge

Classification:

NVCS: new
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998)
Rank: G4S4
Plots sampled: 4 (2 macro, 2 micro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Spiraea douglasii	50	2	0	5
Rosa pisocarpa	25	5	0	20
Vaccinium uliginosum	25	5	0	20
Lonicera	25	3	0	12
HERB LAYER				
Carex angustata	100	43	20	70
Juncus balticus	75	5	0	10
Veratrum californicum	50	11	0	35
Deschampsia caespitosa	50	10	0	30
Dodecatheon jeffreyi	50	9	0	20
Solidago canadensis	50	7	0	25
Polygonum bistortoides	50	1	0	1

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): 4400
Slope (deg): ave. 2, range 1-2
Landform position: floodplains, basins
Hydrology: seasonally flooded to moist
Soils: loam or organic

Vegetation and ecology: Habitat is seasonally moist montane meadows. *Spiraea douglasii* is present in half the plots but with very low cover. *Carex angustata* is the principal species in the herb layer, with an average cover of 43 percent and ranging up to 70 percent, with lesser amounts of *Juncus balticus, Veratrum californicum, Deschampsia caespitosa, Dodecatheon jeffreyi,* and *Solidago canadensis.* More than 30 other species present in trace amounts represent a mix of drier meadow and forest ecotone. Presence of *Danthonia intermedia*, *Achillea millefolium, Potentilla gracilis, Stellaria crispa,* and *Poa pratensis* strongly suggest that some sites were once grazed by livestock.

Global distribution: California to Washington

Other studies: Volland 1976: 20; Kovalchik 1987: 102. This is probably very similar to the NVCS *Picea engelmannii* / *Carex angustata* Forest association, but no trees are reported here.

Carex aperta Association

Columbia sedge

Classification:

NVCS: *Carex aperta* Herbaceous Vegetation (CEGL001801)
Ecological System: Willamette Valley Wet Prairie (CES204.874)
Rank: G1S1
Plots sampled: 10 (2 macro, 8 micro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Rubus armeniacus	30	2	0	8
Spiraea douglasii	10	1	0	5
HERB LAYER				
Carex aperta	100	88	62	98
Phalaris arundinacea	70	37	0	97
Epilobium ciliatum ssp. *watsonii*	40	4	0	13
Vicia	30	4	0	19
Cirsium arvense	30	3	0	13
Dipsacus fullonum	30	3	0	19

Distribution in NW Oregon: Willamette Valley, Cascade Range

Environment:

Elevation (ft): ave. 510, range 10-3150
Slope (deg): ave. 0, range 0-3
Landform position: floodplains, toe slopes
Hydrology: seasonally flooded to seasonally moist
Soils: mostly silt loam, some organic

Vegetation and ecology: Habitat is mostly low-elevation floodplains, but one site is known from a montane fen. Stands are seasonally flooded but are dry by mid to late summer. This association is thought to have been more widespread historically before diking and farming of the Columbia River lowlands, and the advent of exotic cultivars of *Phalaris arundinacea.* The few known stands that remain are either nearly monotypic *Carex aperta* in depressions too wet for *Phalaris arundinacea*, or in mixed stands dominated by *Phalaris arundinacea.* Elsewhere, it has been completely displaced by *Phalaris arundinacea*. The sedge itself is not rare but it is never plentiful. Most of the ten plots sampled here represent the monotypic expression because these have the fewest exotic species present. They may represent only the wettest end of the historic moisture gradient occupied by the association. Trees are absent or peripheral, but would include *Salix lucida* ssp. *lasiandra* and *Fraxinus latifolia.* Shrubs reported include *Spiraea douglasii, Sambucus racemosa,* and the exotic *Rubus armeniacus,* but all have low constancy and cover. Ten species are reported from he herb layer, *Carex aperta* being the most abundant with average cover of 88 percent and ranging from 62-98 percent. *Phalaris arundinacea* is the second most abundant species and would be more abundant if more mixed stands were sampled. Other species observed but not recorded in plots are *Polygonum amphibium, Bidens cernua, Bidens frondosa*, and *Ludwigia palustris*. *Carex aperta* once formed "extensive meadows on overflow bottomlands in the valley of the Columbia and its tributaries...largely cut for hay and regarded by farmers as the best forage sedge" and it was "common about Columbia Slough etc." (Gorman 1926). Piper and Beattie (1915) said it was "the common hay sedge of the Columbia River bottoms." It probably extended from Longview to Skamania and into the Willamette Valley as well. Like Willamette Valley prairie and savanna that have suffered so many losses, the original species composition of this association will probably never be known with certainty.

Global distribution: western Oregon and southwestern Washington

Other studies: Christy & Putera 1993: 40; Kunze 1994: 44 (WA); Piper & Beattie 1915: 80; Gorman 1926: 18; Jankovsky-Jones et al. 1999: 12 (ID).

Carex aquatilis var. *aquatilis* Association

Aquatic sedge

Classification:

NVCS: *Carex aquatilis* Herbaceous Vegetation (CEGL001802)
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G4S4
Plots sampled: 10 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
REPRODUCING TREES				
Abies lasiocarpa	10	Tr	0	Tr
Abies amabilis	10	Tr	0	Tr
SHRUB LAYER				
Salix hookeriana	10	1	0	10
Spiraea douglasii	10	1	0	8
Alnus incana	10	1	0	7
HERB LAYER				
Carex aquatilis var. *aquatilis*	100	61	30	99
Hypericum anagalloides	40	Tr	0	2
Platanthera stricta	30	Tr	0	Tr
MOSS LAYER				
Moss	40	17	0	70

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 4385, range 3320-5097
Slope (deg): ave. 1, range 0-3
Landform position: slopes, benches, basins
Hydrology: perennially saturated
Soils: organic

Vegetation and ecology: Habitat is usually montane fens. The association includes a heterogeneous mix of species that do not segregate in any meaningful way. Trees and shrubs are scarce. More than 50 species occur in the herb layer, but *Carex aquatilis* var. *aquatilis* is the most abundant and averages 61 percent cover and may have up to 99 percent cover. Many stands occur as monotypic reedswamp. Patches of other wetland species having low constancy but up to 50 percent cover include *Eleocharis quinqueflora, Carex luzulina, Boykinia major, Parnassia fimbriata, Carex aquatilis* var. *dives,* and *Caltha leptosepala* ssp. *howellii. Senecio triangularis* and *Aconitum columbianum* indicate some forest ecotone. Stands may occur on old beaver terraces on seepage slopes, and also in sag ponds on slopes prone to slumping. The *Carex aquatilis* var. *aquatilis* association is more common east of the Cascade Range and is mostly replaced by the *Carex aquatilis* var. *dives* association in and west of the Cascades.

Global distribution: California to Alaska and eastward

Other studies: Hall 1973: 6; Volland 1976: 20; Hopkins 1979: 13; Kauffman 1982: 59; Kauffman et al. 1985: 16; Kovalchik 1987: 104; Johnson & Simon 1987: 225; Padgett et al. 1989: 101 (ID, UT); Manning & Padgett 1991: 391 (NV); Kovalchik 1992: 168 (WA); 1997: 174; Titus & Christy 1996a; Stuth 1975: 66; Briggs & MacMahon 1983: 525 (UT); Jankovsky-Jones et al. 1999: 12 (ID); Carsey et al. 2003: 334 (CO); Crawford 2003: 71 (WA).

Carex aquatilis var. *dives* Association

Sitka sedge

Classification:

NVCS: *Carex aquatilis* var. *dives* Herbaceous Vegetation (CEGL001826)
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G4S4
Plots sampled: 71 (46 macro, 25 micro)

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 4378, range 2000-5428
Slope (deg): ave. 1, range 0-17
Landform position: slopes, benches, basins
Hydrology: seasonally flooded to perennially saturated
Soils: mostly organic, some loam

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Picea engelmannii	3	Tr	0	10
Pinus contorta var. *latifolia*	3	Tr	0	6
REPRODUCING TREES				
Pinus contorta var. *latifolia*	4	Tr	0	2
Tsuga heterophylla	3	Tr	0	10
Picea engelmannii	3	Tr	0	3
SHRUB LAYER				
Vaccinium uliginosum	14	1	0	20
Spiraea douglasii	14	1	0	15
Salix	7	Tr	0	5
Alnus incana	6	1	0	25
Salix geyeriana	6	Tr	0	15
Alnus viridis ssp. *sinuata*	6	Tr	0	10
HERB LAYER				
Carex aquatilis var. *dives*	100	54	5	99
Dodecatheon jeffreyi	37	3	0	20
Carex utriculata	24	4	0	40
Hypericum anagalloides	21	1	0	25
MOSS LAYER				
Moss	23	4	0	95
UNVEGETATED				
Litter	31	4	0	40
Bare ground	23	11	0	95

Vegetation and ecology: Habitat is usually montane fens. The association is widespread and important in the Cascade Range and, like the *Carex aquatilis* var. *aquatilis* association, includes a heterogeneous mix of species that do not segregate in any meaningful way. Trees and shrubs are scarce, although many different species are present. The herb layer is astonishingly diverse with more than 120 species recorded, but most of these have relatively low constancy and reflect the patchy distribution of many different taxa. *Carex aquatilis* var. dives is the primary species, averaging 54 percent cover, and many stands occur as monotypic reedswamp with cover ranging from 5 to 99 percent. Some of these stands intergrade with the *Carex utriculata* association in seasonally flooded depressions. *Dodecatheon jeffreyi, Carex utriculata,* and *Hypericum anagalloides* are the only other species with constancy higher than 20 percent. Species with significant patches include *Caltha leptosepala* ssp. *howellii, Eleocharis quinqueflora, Equisetum fluviatile, Viola macloskeyi, Cicuta douglasii,* and *Agrostis thurberiana*. Stands may occur on old beaver terraces on seepage slopes, and also in sag ponds on slopes prone to slumping. *Carex aquatilis* var. *dives* can intermix with forest ecotone or meadow taxa as long as enough soil moisture is present. Plants become progressively dwarfed as conditions become drier.

Global distribution: northern California to Alaska

Other studies: Campbell 1973: 41; Seyer 1979: 39; Frenkel et al. 1986: 33; Wilson 1986: 19; Hemstrom et al. 1987: 255; Kovalchik 1987: 114; Kunze 1994: 27, 84 (WA); Titus 1996; Boggs 2000: 142 (AK); Roach 1952: 184; Seyer 1983: 12; Titus & Christy 1996a.

Carex aquatilis var*. dives - Comarum palustre* Association

Sitka sedge - marsh cinquefoil

Classification:

NVCS: *Carex aquatilis* var*. dives - Comarum palustre* Herbaceous Vegetation (CEGL003433)
Ecological System: North Pacific Bog and Fen (CES204.063)
Rank: G2S2
Plots sampled: 54 (micro)

Distribution in NW Oregon: coast, Coast Range

Environment:

Elevation (ft): ave. 35, range 20-40
Slope (deg): 0
Landform position: floodplains, flats
Hydrology: perennially saturated
Soils: organic

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Pinus contorta var. *contorta*	2	Tr	0	2
REPRODUCING TREES				
Picea sitchensis	2	Tr	0	1
SHRUB LAYER				
Ledum glandulosum	37	6	0	35
Vaccinium uliginosum	33	6	0	40
HERB LAYER				
Carex aquatilis var*. dives*	100	47	5	90
Comarum palustre	83	17	0	55
Nuphar lutea ssp. *polysepala*	43	11	0	65
Athyrium filix-femina	31	3	0	30
UNVEGETATED				
Litter	24	5	0	40
Water	7	1	0	20

Vegetation and ecology: Habitat is coastal fens, floating lake-fill mats, and low-gradient drainages. The association is primarily minerotrophic reedswamp. The surface usually has several inches of standing water and the vegetation is typified by vegetation requiring very wet to flooded conditions. Trees are rarely present, and may include *Pinus contorta* var. *contorta* or reproducing *Picea sitchensis*. Shrubs are present in about half the plots and may include *Ledum glandulosum, Vaccinium uliginosum*, *Spiraea douglasii, Lonicera involucrata,* or *Salix hookeriana*. The herb layer is diverse, dominated by *Carex aquatilis* var*. dives* and *Comarum palustre,* with lesser amounts of hydrophytic herbs such as *Nuphar lutea* ssp. *polysepala, Athyrium filix-femina, Hypericum anagalloides*, *Oenanthe sarmentosa,* and *Lycopus uniflorus*. *Darlingtonia californica* is present along the mid-coast. *Carex obnupta* occurred only in trace amounts in the plots sampled, but may be more abundant than indicated in the stand table. *Sphagnum* and other mosses are absent except in hummocks of *Ledum* and *Spiraea*. The association is a transitional vegetation type between aquatic bed and open fen or shrub swamp.

Global distribution: central coast of Oregon north to southeastern Alaska.

Other studies: Howarth 1995: 9; Christy 2001a: 33; Christy & Brophy 2002.

Carex buxbaumii Association

Buxbaum's sedge

Classification:

NVCS: *Carex buxbaumii* Herbaceous Vegetation (CEGL001806)
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G5S3
Plots sampled: 5 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Vaccinium uliginosum	40	Tr	0	Tr
Spiraea douglasii	20	Tr	0	Tr
HERB LAYER				
Carex buxbaumii	100	49	35	70
Lycopus uniflorus	80	6	0	20
Deschampsia caespitosa	80	6	0	25
MOSS LAYER				
Moss	20	Tr	0	1

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): 4730
Slope (deg): 0
Landform position: floodplains, flats, basins
Hydrology: perennially saturated
Soils: organic

Vegetation and ecology: Habitat is montane fens. The association occurs in open fens and around the edges of wet meadows, where it intergrades with slightly drier *Deschampsia caespitosa* associations. Trees are absent from these plots but may be present in some stands on elevated hummocks or "tree islands." *Vaccinium uliginosum* and *Spiraea douglasii* occur in trace amounts only, also on hummocks. *Carex buxbaumii* is the primary species, averaging 49 percent cover but ranging up to 70 percent cover in some stands. *Lycopus uniflorus* and *Deschampsia caespitosa* are present in lesser amounts, along with 17 other fen species in trace amounts.

Global distribution: California to Alaska and eastward

Other studies: Padgett et al. 1989: 97 (ID, UT); Titus & Christy 1996a; Jankovsky-Jones et al. 1999: 13 (ID).

Carex cusickii Association

Cusick's sedge

Classification:

NVCS: *Carex cusickii* Herbaceous Vegetation (CEGL000230)
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G3S2
Plots sampled: 3 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Mahonia aquifolium	33	Tr	0	Tr
HERB LAYER				
Carex cusickii	100	80	60	95
Potentilla	33	2	0	5
Carex aquatilis var. *aquatilis*	33	2	0	5
Hypericum anagalloides	33	1	0	3
Dulichium arundinaceum	33	1	0	2
Carex leptalea	33	Tr	0	1
Carex utriculata	33	Tr	0	1
Poaceae	33	Tr	0	1
Viola	33	Tr	0	Tr
Lycopus uniflorus	33	Tr	0	Tr
Drosera rotundifolia	33	Tr	0	Tr
Carex echinata ssp. *echinata*	33	Tr	0	Tr
MOSS LAYER				
Moss	67	40	0	100

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 2057, range 1970-2200
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: perennially saturated
Soils: mostly organic, some loam

Vegetation and ecology: Habitat is low to mid-elevation fen and marsh. The association is composed of nearly monotypic stands of *Carex cusickii,* with an average cover of 80 percent and with cover up to 90 percent. Eleven other species are recorded from the herb layer, but all occur only in trace amounts. No trees are recorded and one plot records *Mahonia aquifolium*, probably from an elevated position as this is not a wetland species. The moss layer is conspicuous with an average cover of 40 percent but some plots have cover of up to 100 percent. One or two other *Carex cusickii* associations potentially occur in coastal peatlands and swamps but they need more sampling. One is a sphagnum fen habitat with *Comarum palustre, Lysichiton americanus, Menyanthes trifoliata, Drosera rotundifolia, and Eriophorum chamissonis*, which is close to the *Carex cusickii* community type of Kunze (1994: 25). The other occurs in marsh around shallow lakes, ponds, and sloughs where *Carex cusickii* forms pedestals among expanses of water and deep muck, with *Comarum palustre, Cicuta douglasii,* and *Oenanthe sarmentosa*

Global distribution: California to British Columbia

Other studies: Kovalchik 1992: 164 (WA); Crowe & Clausnitzer 1997: 176; Jankovsky-Jones et al. 1999: 13 (ID).

Carex deweyana ssp. *leptopoda* Association

Dewey sedge

Classification:

NVCS: new
Ecological System: Willamette Valley Wet Prairie (CES204.874)
Rank: GUSU
Plots sampled: 2 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Carex deweyana ssp. *leptopoda*	100	73	65	80
Myosotis laxa	100	23	15	30
Deschampsia caespitosa	100	11	2	20
Carex pellita	100	7	4	10
Carex unilateralis	100	7	4	10
Juncus tenuis	100	4	3	5
Eleocharis acicularis	100	1	Tr	1
Epilobium ciliatum	100	Tr	Tr	Tr
Galium parisiense	100	Tr	Tr	Tr
Veronica scutellata	50	10	0	20
Carex feta	50	8	0	15
Callitriche heterophylla	50	1	0	1
Beckmannia syzigachne	50	Tr	0	Tr
Eleocharis palustris	50	Tr	0	Tr
Rumex crispus	50	Tr	0	Tr
MOSS LAYER				
Moss	50	4	0	8

Distribution in NW Oregon: Willamette Valley

Environment:

Elevation (ft): 500
Slope (deg): 0
Landform position: floodplains, flats
Hydrology: seasonally flooded to moist
Soils: clay loam

Vegetation and ecology: Habitat is clay prairie with perched water table. This association is presumably a relic component of native Willamette Valley wet prairie. Although it occurs at low elevation, has a history of grazing, and is surrounded by agriculture, relatively few exotic species are recorded in the plots. It is classified here as an association because of the significant cover of *Carex deweyana* ssp. *leptopoda* in prairie rather than its more common occurrence in *Fraxinus latifolia* woodland. A significant amount of *Deschampsia caespitosa*, *Carex pellita*, and *Carex unilateralis* are also present, which are indicators of prairie remnants in the Willamette Valley. The association may represent one of a number of poorly-described native prairie types now mostly decimated by settlement. Hopefully other stands can be found and documented.

Global distribution: western Oregon and southwestern Washington.

Other studies: Not known.

Carex exsiccata Association

Western inflated sedge

Classification:

NVCS: *Carex exsiccata* Herbaceous Vegetation (CEGL003312)
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G3S3
Plots sampled: 33 (31 macro, 2 micro)

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): ave. 2490, range 100-5000
Slope (deg): ave. 0, range 0-3
Landform position: floodplains, flats, benches
Hydrology: seasonally flooded to perennially saturated
Soils: organic, silt loam, or sand

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Thuja plicata	3	Tr	0	1
Pseudotsuga menziesii	3	Tr	0	1
REPRODUCING TREES				
Thuja plicata	3	Tr	0	1
Pseudotsuga menziesii	3	Tr	0	1
SHRUB LAYER				
Spiraea douglasii	18	Tr	0	5
HERB LAYER				
Carex exsiccata	100	69	20	100
Veronica scutellata	21	2	0	35
Nuphar lutea ssp. *polysepala*	15	2	0	20
Carex obnupta	15	1	0	10
MOSS LAYER				
Moss	12	3	0	45
UNVEGETATED				
Bare ground	9	3	0	60
Litter	9	1	0	25

Vegetation and ecology: 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. *Thuja plicata* and *Pseudotsuga menziesii* were recorded from plots but are peripheral or restricted to elevated microsites. Eleven different shrub species are reported, depending on elevation, but most occur in trace amounts except for *Spiraea douglasii, Vaccinium uliginosum,* and *Alnus incana*. Stands are usually nearly monotypic reedswamp of *Carex exsiccata* in standing water or bare mud, but sometimes it occurs with other species in wet lawns. Average cover of *Carex exsiccata* is 69 percent, with cover in some plots as much as 100 percent. More than 90 other species are present in the herb layer, the great diversity due mainly to the variety of elevations at which the association occurs. Most of the other species occur only in trace amounts. Those forming significant patches include *Veronica scutellata, Nuphar lutea* ssp. *polysepala*, *Deschampsia caespitosa, Lysichiton americanus, Torreyochloa pallida* var. *pauciflora*, *Juncus patens*, and *Carex hystericina.* The association is present but uncommon at lower elevations along the coast and in interior valleys of western Oregon, and becomes more common at higher elevations in the Coast and Cascade Range. Some stands were no doubt grazed by livestock in the past, and elk and deer use may be high locally. This species has also been called *Carex vesicaria* var. *major* and the association differs substantially in composition from the *Carex vesicaria* var. *vesicaria* association reported from east of the Cascade Range.

Global distribution: western Oregon and Washington

Other studies: Kunze 1994: 28 (WA); Titus et al. 1996; Christy et al. 1998: 110; Christy 2001a: 34.

Carex feta Association

Greensheath sedge

Classification:

NVCS: new
Ecological System: Willamette Valley Wet Prairie (CES204.874)
Rank: GUSU
Plots sampled: 3 (macro)

Distribution in NW Oregon: Willamette Valley

Environment:

Elevation (ft): 500
Slope (deg): 0
Landform position: floodplains, flats
Hydrology: seasonally flooded to wet
Soils: clay loam

Vegetation and ecology: Habitat is clay prairie with perched water table. The association is presumably a relic component of native Willamette Valley wet prairie. Although it occurs at low elevation, has a history of grazing, and is surrounded by agriculture, there are relatively few exotic species recorded in the plots. It is documented here as an association because of the significant cover of *Carex feta* and *Carex deweyana* ssp. *leptopoda* in prairie with a significant amount of *Deschampsia caespitosa*. It may represent one of a number of poorly-described native prairie types now mostly decimated by settlement. Hopefully other stands can be found and documented.

Global distribution: western Oregon and southwestern Washington

Other studies: Not known

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Carex feta	100	42	35	50
Carex deweyana ssp. *leptopoda*	100	24	20	27
Epilobium ciliatum	100	1	Tr	1
Galium parisiense	100	Tr	Tr	1
Deschampsia caespitosa	67	15	0	30
Oenanthe sarmentosa	67	12	0	25
Myosotis laxa	67	11	0	25
Eleocharis palustris	67	7	0	20
Veronica scutellata	67	4	0	10
Carex unilateralis	33	2	0	6
Carex pellita	33	2	0	5
Holcus lanatus	33	1	0	4
Rumex crispus	33	1	0	3
Callitriche heterophylla	33	Tr	0	1
Mentha arvensis	33	Tr	0	1
Ranunculus alismifolius	33	Tr	0	Tr
Beckmannia syzigachne	33	Tr	0	Tr
Juncus tenuis	33	Tr	0	Tr
Danthonia californica	33	Tr	0	Tr
MOSS LAYER				
Moss	33	3	0	10

Carex lasiocarpa Association

Slender sedge

Classification:

NVCS: *Carex lasiocarpa* Herbaceous Vegetation (CEGL001810)
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G4S2
Plots sampled: 25 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Vaccinium uliginosum	4	Tr	0	Tr
HERB LAYER				
Carex lasiocarpa	100	49	15	90
Deschampsia caespitosa	48	1	0	10
Aster occidentalis	32	1	0	10
Juncus balticus	28	1	0	25
Carex utriculata	24	3	0	30
Galium trifidum	24	Tr	0	1
Potamogeton gramineus	16	Tr	0	6
Epilobium ciliatum	16	Tr	0	Tr
Calamagrostis stricta ssp. *inexpansa*	12	1	0	15
Carex aquatilis var. *dives*	12	1	0	20
Utricularia intermedia	12	Tr	0	12
Veronica scutellata	12	Tr	0	10
MOSS LAYER				
Moss	8	1	0	15

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 4680, range 4100-4730
Slope (deg): 0
Landform position: floodplains, flats
Hydrology: perennially flooded to perennially saturated
Soils: organic

Vegetation and ecology: Habitat is montane marshes and fens. This association occurs at the eastern edge of the study area and is rare in Oregon. It occurs as nearly monotypic and sometimes extensive stands of *Carex lasiocarpa* with up to 90 percent cover, with lesser amounts of *Deschampsia caespitosa, Aster occidentalis, Juncus balticus, Carex utriculata, Calamagrostis stricta* ssp. *inexpansa,* and *Carex aquatilis* var. *dives*. Stands seen by the author are flooded 1-6 inches throughout the growing season. This association was erroneously reported in Titus and Christy (1996a) as *Carex pellita.*

Global distribution: California to Alaska and eastward

Other studies: Kovalchik 1987: 108; Padgett et al. 1989: 95 (ID, UT); Kovalchik 1992: 170 (WA); Crowe & Clausnitzer 1997: 200; Kunze 1994: 26 (WA); Titus & Christy 1996a; Jankovsky-Jones et al. 1999: 13 (ID).

Carex lenticularis Association

Lakeshore sedge

Classification:

NVCS: new
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G3S2
Plots sampled: 14 (13 macro, 1 micro)

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 4151, range 3240-5146
Slope (deg): ave. 1, range 0-2
Landform position: floodplains, basins, benches
Hydrology: perennially saturated
Soils: mostly organic, some sandy

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Salix scouleriana	7	Tr	0	1
Picea engelmannii	7	Tr	0	Tr
REPRODUCING TREES				
Picea engelmannii	7	Tr	0	5
Abies amabilis	7	Tr	0	2
SHRUB LAYER				
Salix	14	1	0	8
Cornus sericea	14	1	0	5
Spiraea douglasii	14	Tr	0	3
Salix sitchensis	7	4	0	60
Alnus incana	7	1	0	10
HERB LAYER				
Carex lenticularis	100	47	20	75
Senecio triangularis	50	1	0	10
Polygonum bistortoides	43	1	0	3
Viola	29	4	0	30
Carex luzulina	29	2	0	15
Carex exsiccata	29	1	0	7
Agrostis thurberiana	29	1	0	5
Veronica americana	29	1	0	7
MOSS LAYER				
Moss	21	8	0	95

Vegetation and ecology: 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. Eleven shrub species are also present, also all with low constancy and mostly in trace amounts. The most abundant of these are an unidentified *Salix, Cornus sericea, Spiraea douglasii,* and *Salix sitchensis.* The herb layer is astonishingly diverse, with over 100 species, all from a fairly narrow elevational zone. *Carex lenticularis* ranges from 20-70 percent cover with an average cover of 47 percent. It occurs as nearly monotypic stands or with other wet meadow species. *Senecio triangularis* and *Polygonum bistortoides* occur in about half the plots but at very low cover. Other species with significant intermixed patches include an unidentified *Viola*, *Carex luzulina, Carex aquatilis* var. *dives,* and *Carex utriculata.* About one-fourth of the rest of the species occur in peripheral forest ecotone, where the substrate is elevated somewhat above the water table.

Global distribution: California to Alaska and eastward

Other studies: Titus et al. 1999 (WA); Crowe & Clausnitzer 1997: 184; Diaz & Mellen 1996: 151.

Carex limosa Association

Mud sedge

Classification:

NVCS: *Carex limosa* Herbaceous Vegetation (CEGL001811)
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G2S2
Plots sampled: 9 (micro)

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): 3360
Slope (deg): 0
Landform position: floodplains, flats
Hydrology: perennially flooded to perennially saturated
Soils: organic

Species	Const	Percent cover		
		Ave	Min	Max
REPRODUCING TREES				
Tsuga heterophylla	11	Tr	0	1
HERB LAYER				
Carex limosa	100	25	5	75
Menyanthes trifoliata	89	16	0	30
Drosera rotundifolia	44	2	0	10
Dulichium arundinaceum	33	1	0	4
Carex utriculata	22	1	0	5
Spiranthes romanzoffiana	11	Tr	0	1
MOSS LAYER				
Moss	78	75	0	100
UNVEGETATED				
Bare ground	22	7	0	40

Vegetation and ecology: Habitat is montane fens and poor fens. This association is typically species-poor, with low species cover and with considerable expanses of water 1-3 inches deep, mud, or *Sphagnum* between sparsely-distributed plants. *Tsuga heterophylla* is the only tree recorded but is restricted to low hummocks where it may be chlorotic and stunted. *Carex limosa* is the primary species in the herb layer with cover ranging from 5-75 percent but averaging only 25 percent. *Menyanthes trifoliata* is the second most abundant herb, with lesser amounts of *Drosera rotundifolia, Dulichium arundinaceum,* and *Carex utriculata,* the last two species indicative of conditions bordering on reedswamp. Although not reflected in these plots, *Utricularia intermedia*, *Drosera anglica*, and algae are frequent in the shallow pools. The moss mat is conspicuous, with an average cover of 75 percent and ranging to 100 percent, and is usually composed of *Sphagnum*. Stands may intergrade with the *Eleocharis quinqueflora* and *Carex simulata* associations that often have similar sparse vegetation and sloppy substrate.

Global distribution: California to Alaska and eastward

Other studies: Carsey et al. 2003: 440 (CO).

Carex luzulina Association

Woodrush sedge

Classification:

NVCS: new
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G3S2
Plots sampled: 8 (6 macro, 2 micro)

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 4378, range 3460-4760
Slope (deg): ave. 1, range 0-3
Landform position: floodplains, flats, basins
Hydrology: seasonally to perennially moist
Soils: mostly organic, some loam

Vegetation and ecology: Habitat is mostly montane fens. While not recorded in these plots, *Pinus contorta* var. *latifolia, Picea engelmannii,* or *Abies lasiocarpa* may be present on hummocks or "tree islands" along with seven species of shrubs reported in these plots. The most common shrub is *Vaccinium uliginosum*, present in about half the plots, with lesser amounts of *Spiraea douglasii* and *Kalmia microphylla*. The herb layer is a wet lawn with some 65 species reported from a fairly narrow elevational zone. Although *Carex luzulina* is the primary species in this association, it does not form dense monotypic stands like so many other sedges. Its cover ranges from 8 percent in sparse stands to 75 percent in more luxurious stands, but averages only 34 percent. Other abundant lawn-forming species present include *Hypericum anagalloides, Deschampsia caespitosa, Dodecatheon jeffreyi, Caltha leptosepala* ssp. *howellii,* and *Carex aquatilis* var. *dives*. *Ranunculus gormanii, Microseris borealis,* and *Muhlenbergia filiformis* form large patches but occur at much lower constancy. The moss mat is conspicuous with an average cover of 29 percent but may range up to 90 percent.

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Vaccinium uliginosum	63	6	0	30
Spiraea douglasii	25	4	0	30
HERB LAYER				
Carex luzulina	100	34	8	75
Hypericum anagalloides	75	8	0	30
Deschampsia caespitosa	75	7	0	35
Dodecatheon jeffreyi	63	8	0	40
Caltha leptosepala ssp. *howellii*	63	4	0	17
Carex aquatilis var. *dives*	63	3	0	10
Eleocharis quinqueflora	63	3	0	7
Pedicularis groenlandica	63	1	0	3
Ranunculus gormanii	38	4	0	25
Microseris borealis	38	4	0	25
Drosera anglica	38	2	0	10
Trifolium longipes	38	2	0	10
Juncus xiphoides var. *triandrus*	38	1	0	5
Carex echinata ssp. *echinata*	38	1	0	3
Scirpus congdonii	38	1	0	2
Tofieldia glutinosa	38	Tr	0	1
Platanthera dilatata	38	Tr	0	1
MOSS LAYER				
Moss	63	29	0	90
UNVEGETATED				
Water	25	9	0	40

Global distribution: California to British Columbia.

Other studies: Crowe & Clausnitzer 1997: 172.

Carex nebrascensis Association

Nebraska sedge

Classification:

NVCS: *Carex nebrascensis* Herbaceous Vegetation (CEGL001813)
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G4S4
Plots sampled: 3 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
REPRODUCING TREES				
Picea engelmannii	33	Tr	0	1
Pinus contorta var. *latifolia*	33	Tr	0	1
SHRUB LAYER				
Vaccinium uliginosum	33	5	0	15
Lonicera involucrata	33	1	0	2
Salix sitchensis	33	Tr	0	1
HERB LAYER				
Carex nebrascensis	100	29	26	34
Polygonum bistortoides	67	1	0	2
Dodecatheon alpinum	67	1	0	1
Eleocharis quinqueflora	33	3	0	8
Carex atrata var. *atrosquama*	33	1	0	3
Carex microptera	33	1	0	3
Equisetum arvense	33	1	0	2
Epilobium brachycarpum	33	Tr	0	1
Carex brunnescens	33	Tr	0	1
Deschampsia caespitosa	33	Tr	0	1
Ranunculus populago	33	Tr	0	1
Viola orbiculata	33	Tr	0	1

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 5415, range 5200-5700
Slope (deg): 1
Landform position: floodplains, flats
Hydrology: perennially saturated
Soils: organic

Vegetation and ecology: Habitat is montane fens and wet meadows. The association is very common in montane meadows of the intermountain west and is barely present along the eastern edge of the Cascade Range. *Picea engelmannii* and *Pinus contorta* var. *latifolia* are present in trace amounts and are probably peripheral, while *Vaccinium uliginosum* has a cover of 15 percent in one plot. *Carex nebrascensis* is the primary species in the herb layer, with very small amounts of *Polygonum bistortoides, Dodecatheon alpinum, Eleocharis quinqueflora* and 8 other species. The hydroperiod for the plots reported here is wetter than the norm for this association and the species composition suggests that conditions are at the wet end of the spectrum.

Global distribution: California to British Columbia.

Other studies: Hall 1973: 6; Beguin & Major 1975: 353 (CA); Christy & Cornelius 1980: plot 5; Kovalchik 1987: 100; Padgett et al. 1989: 107 (ID, UT); Manning & Padgett 1991: 416 (NV); Crowe & Clausnitzer 1997: 192; Griffiths 1902: 47; Reid & Pickford 1946: 91; Kierstead & Pogson 1976: 1-19; Ratliff 1982: 8 (CA); Evans 1989: 25 (WA); Jankovsky-Jones et al. 1999: 13 (ID); Jankovsky-Jones et al. 2001: 132 (ID); Carsey et al. 2003: 346 (CO).

Carex nigricans Association

Black alpine sedge

Classification:

NVCS: *Carex nigricans* Herbaceous Vegetation (CEGL001816)
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G4S4
Plots sampled: 14 (3 macro, 11 micro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Salix commutata	100	10	1	20
Kalmia microphylla	43	3	0	25
Phyllodoce empetriformis	36	1	0	5
Gaultheria humifusa	36	1	0	6
Vaccinium uliginosum	7	Tr	0	1
Spiraea densiflora	7	Tr	0	1
Salix	7	Tr	0	1
Salix planifolia	7	Tr	0	1
HERB LAYER				
Carex nigricans	100	33	5	95
Carex scopulorum	64	9	0	40
Pedicularis attollens	50	1	0	3
Eleocharis quinqueflora	36	4	0	20
Ligusticum grayi	29	2	0	26
Tofieldia glutinosa ssp. *occidentalis*	29	1	0	6
Packera cymbalarioides	29	1	0	5

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 5747, range 5175-6557
Slope (deg): ave. 9, range 0-25
Landform position: various slope positions, floodplains, basins
Hydrology: seasonally moist to perennially saturated
Soils: organic or loam

Vegetation and ecology: Habitat is depressions and seepy alluvial fans in subalpine heath. This association is somewhat drier than the *Salix commutata* association but intergrades with it. 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. *Salix commutata* is the primary shrub but averages only 10 percent cover and does not exceed 20 percent cover. *Kalmia microphylla* is also present with about half as much constancy and cover. The herb layer has over 35 different species present, but most occur at low constancy and cover. *Carex nigricans* is present in all plots with an average cover of 33 percent, ranging from 5-95 percent. Other herbs with significant patches include *Carex scopulorum, Ligusticum grayi,* and *Caltha leptosepala* ssp. *howellii*. About half of the remaining herbs are wet lawn species and half are drier meadow species. This is not a productive habitat and considerable bare ground may be present in plots.

***Eleocharis quinqueflora* phase:** Habitat is depressions or seepy slopes in subalpine heath. Stands occur at the wet end of the *Carex nigricans* association, and contain more *Eleocharis quinqueflora* than *Carex*. The herb layer is sparse and considerable bare ground may be present.

Global distribution: northern California to British Columbia

Other studies: Kuramoto & Bliss 1970: 325; Campbell 1973: 20, 22; Cole 1977: 113; Cole 1982: 20; Kovalchik 1987: 128; Kovalchik 1992: 172 (WA); Viereck et al. 1992: 191 (AK); Brett et al. 1998: 20 (BC); van Vechten 1960: 66; Douglas 1972: 150 (WA); Seyer 1981: 7; Jankovsky-Jones et al. 1999: 13 (ID).

Carex obnupta Association

Slough sedge

Classification:

NVCS: *Carex obnupta* Herbaceous Vegetation (CEGL003313)
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G4S4
Plots sampled: 57 (15 macro, 42 micro)

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Alnus rubra	5	Tr	0	7
Fraxinus latifolia	4	Tr	0	12
Calocedrus decurrens	2	Tr	0	6
REPRODUCING TREES				
Alnus rubra	5	Tr	0	7
Acer macrophyllum	2	Tr	0	Tr
SHRUB LAYER				
Rubus ursinus	11	1	0	20
HERB LAYER				
Carex obnupta	100	66	20	99
Athyrium filix-femina	28	4	0	95
Rorippa nasturtium-aquaticum	23	3	0	40
MOSS LAYER				
Moss	42	34	0	95

Distribution in NW Oregon:

coast, Coast Range, lower elevations in Cascade Range

Environment:

Elevation (ft): ave. 394, range 20-2800
Slope (deg): ave. 0, range 0-4
Landform position: floodplains, flats, benches
Hydrology: seasonally moist or flooded to perennially saturated
Soils: organic, muck, or loam

Vegetation and ecology: Habitats include isolated depressions with internal drainage, peatlands, shrub swamps, ancient marine terraces, and deflation plains. The *Carex obnupta* association is heterogeneous and difficult to segregate into meaningful types. Stands range from species-rich assemblages to monotypes, and dense to depauperate stands, the latter with only bare mud or sphagnum between the plants. Tussocks may be six inches in diameter, closely spaced and 1-3 feet tall, or 3 feet in diameter, 3-6 feet apart and growing up to 6 feet tall. Trees are mostly peripheral and *Alnus rubra* and *Fraxinus latifolia* are the primary species but have low constancy and cover. Fourteen species of shrubs are reported, with *Rubus ursinus* having the highest constancy of only 11 percent. Other shrubs with significant patches include *Rosa pisocarpa, Rosa gymnocarpa,* and *Corylus cornuta.* More than 80 species have been recorded from the herb layer, *Carex obnupta* being most abundant with average cover of 66 percent and ranging from 20-99 percent. Other species in the herb layer with significant patches include *Athyrium filix-femina, Rorippa nasturtium-aquaticum, Oenanthe sarmentosa, Lysichiton americanus, Veronica americana, Carex exsiccata, Myosotis laxa,* and *Carex cusickii.* The moss layer averages 34 percent cover and may range up to 95 percent cover, common species being both *Eurhynchium praelongum* and *Sphagnum mendocinum*. Some sites are old beaver swamps, cleared for pasture and then abandoned because they were too wet for livestock. Beaver subsequently reclaimed most of these sites. Elk and beaver use may be heavy.

Global distribution: Oregon to British Columbia

Other studies: Wiedemann 1966: 131; Taylor & Frenkel 1979: 58; Boss 1983: 45, 98; Ripley 1983: 109; Marshall 1985: 143; Sanville et al. 1986: 127; Kunze 1994: 26, 42, 45, 55, 81 (WA); Titus et al. 1996; Christy et al. 1998: 106; Christy 2001a: 34; Peck 1919: 347; Glad et al. 1987: 261.

Carex pachystachya Association

Chamisso sedge

Classification:

NVCS: new
Ecological System: Willamette Valley Wet Prairie (CES204.874)
Rank: GUSU
Plots sampled: 3 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Carex pachystachya	100	62	25	95
Agrostis stolonifera	100	38	10	75
Hordeum brachyantherum	100	6	5	8
Poa pratensis	100	3	1	5
Cirsium arvense	67	2	0	5
Vicia tetrasperma	67	1	0	1
Agrostis capillaris	33	1	0	4
Phalaris arundinacea	33	Tr	0	1
Rumex acetosella	33	Tr	0	1

Distribution in NW Oregon: Willamette Valley

Environment:

Elevation (ft): 500
Slope (deg): 0
Landform position: floodplains, flats
Hydrology: seasonally wet to moist
Soils: clay loam

Vegetation and ecology: Habitat is clay prairie. This association is presumably a relic component of native Willamette Valley wet prairie. Because of its low elevation, history of grazing, and proximity to agriculture, it is full of exotic species. It is documented here because of the significant cover of native *Carex pachystachya* and *Hordeum brachyantherum,* and it may represent one of a number of poorly-described native prairie types now mostly decimated by settlement. Hopefully stands in better condition can be found and documented.

Global distribution: Western Oregon and Washington

Other studies: Not known.

Carex scopulorum Association

Mountain sedge

Classification:

NVCS: *Carex scopulorum* Herbaceous Vegetation (CEGL001822)
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G4S4
Plots sampled: 8 (macro)

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 5747, range 5175-6557
Slope (deg): ave. 9, range 0-25
Landform position: various slope positions, floodplains, basins
Hydrology: seasonally moist to perennially saturated
Soils: organic or loam

Vegetation and ecology: 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. Stands on alluvial fans occur below springs and seeps and may be laced with rivulets and or irrigated by sheet flow. Trees are absent. Shrubs are sparse, *Salix commutata* being the most abundant in 25 percent of the plots, but with a very low cover. *Carex scopulorum* is the primary herbaceous species with an average cover of 49 percent and ranging from 10-90 percent. Other species with significant patches include *Deschampsia caespitosa, Eleocharis quinqueflora, Muhlenbergia filiformis, Eleocharis palustris,* and *Juncus balticus*. The other 40 species occur at low constancy and cover and are mostly wetland taxa indicative of perennial saturation.

***Eleocharis quinqueflora* phase:** Habitat is depressions or seepy slopes in subalpine heath. It occurs 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.

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Salix commutata	25	1	0	4
Salix sitchensis	13	1	0	10
Salix myrtillifolia	13	Tr	0	1
Kalmia microphylla	13	Tr	0	1
Spiraea densiflora	13	Tr	0	1
Phyllodoce empetriformis	13	Tr	0	1
HERB LAYER				
Carex scopulorum	100	49	10	90
Deschampsia caespitosa	50	9	0	70
Ligusticum grayi	50	2	0	7
Dodecatheon jeffreyi	50	1	0	2
Packera cymbalarioides	50	1	0	2
Muhlenbergia filiformis	38	4	0	25
Tofieldia glutinosa	38	3	0	15
Aster alpigenus	38	2	0	10
Carex nigricans	38	2	0	5
Epilobium alpinum	38	Tr	0	1
Equisetum arvense	38	Tr	0	1
Mimulus primuloides	25	1	0	10
Eriophorum gracile	25	1	0	7
Potentilla flabellifolia	25	1	0	6
Viola macloskeyi	25	1	0	5
Ranunculus alismifolius	25	1	0	3
Carex luzulina	25	1	0	2
Trifolium longipes	25	Tr	0	3
Carex microptera	25	Tr	0	2
Spiranthes romanzoffiana	25	Tr	0	Tr
MOSS LAYER				
Moss	25	6	0	30

Global distribution: California to British Columbia

Other studies: Campbell 1973: 36; Cole 1977: 102; Kovalchik 1987: 132; Evenden 1989: 44; Manning & Padgett 1991: 387 (NV); Kovalchik 1992: 162 (WA); Crowe & Clausnitzer 1997: 170; Seyer 1981: 6; Cole 1982: 22; Jankovsky-Jones et al. 1999: 16 (ID); Carsey et al. 2003: 356 (CO).

Carex simulata Association

Analogue sedge

Classification:

NVCS: *Carex simulata* Herbaceous Vegetation (CEGL001825)
Ecological System: Boreal Fen (CES103.872), Temperate Pacific Montane Wet Meadow (CES200.998)
Rank: G4S4
Plots sampled: 5 (4 macro, 1 micro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Carex simulata	100	47	25	65
Juncus balticus	60	3	0	10
Deschampsia caespitosa	60	Tr	0	Tr
Carex utriculata	40	6	0	30
Ranunculus flammula	40	Tr	0	Tr
Veronica scutellata	40	Tr	0	Tr
Eleocharis quinqueflora	20	2	0	10
Utricularia intermedia	20	1	0	3
Aster occidentalis	20	Tr	0	1
Mimulus primuloides	20	Tr	0	Tr
MOSS LAYER				
Moss	60	1	0	1
UNVEGETATED				
Water	20	12	0	60

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 4736, range 4730-4760
Slope (deg): 0
Landform position: floodplains, flats, basins
Hydrology: perennially saturated
Soils: organic

Vegetation and ecology: Habitat is montane fens. This association is better known from east of the Cascade Range, and is not common in the study area. The hydroperiod for the plots reported here is much wetter than the norm for this association and they must be considered at the wet end of the spectrum. No trees or shrubs are present, and only ten species are reported from the herb layer. Stands may have considerable expanses of water 1-3 inches deep, mud, or *Sphagnum* between sparsely-distributed plants. *Carex simulata* is the most abundant herb, ranging from 25-65 percent cover and averaging 47 percent. *Juncus balticus* and *Deschampsia caespitosa* occur in about half the plots but with very low cover. *Carex utriculata* may have patches with up to 30 percent cover, indicating some conditions similar to reedswamp. Other species occur mostly in trace amounts. Stands may intergrade with the *Eleocharis quinqueflora* and *Carex limosa* associations that often have similar sparse vegetation and sloppy substrate. Because it is so wet, this association probably should be separated from other concepts of the *Carex simulata* association, but more study is needed.

Global distribution: California to British Columbia.

Other studies: Christy & Cornelius 1980: plot 35; Kovalchik 1987: 106; Padgett et al. 1989: 104 (ID, UT); Manning & Padgett 1991: 395 (NV); Titus & Christy 1996a; Crowe & Clausnitzer 1997: 200; Evans 1989: 35 (WA); Jankovsky-Jones et al. 1999: 16 (ID); Jankovsky-Jones et al. 2001: 135 (ID); Carsey et al. 2003: 358 (CO).

Carex utriculata Association

Beaked sedge

Classification:

NVCS: *Carex utriculata* Herbaceous Vegetation (CEGL001562)
Ecological System: Boreal Fen (CES103.872), Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G5S4
Plots sampled: 53 (30 macro, 23 micro)

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 4475, range 1080-5428
Slope (deg): ave. 0, range 0-2
Landform position: floodplains, flats, basins, benches
Hydrology: seasonally flooded to moist
Soils: mostly organic, some loam

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Pinus contorta var. *latifolia*	2	1	0	38
REPRODUCING TREES				
Thuja plicata	2	Tr	0	Tr
Tsuga heterophylla	2	Tr	0	Tr
SHRUB LAYER				
Spiraea douglasii	6	Tr	0	2
Alnus viridis ssp. *sinuata*	4	1	0	60
Lonicera caerulea	4	1	0	50
Vaccinium uliginosum	4	Tr	0	1
Vaccinium oxycoccos	2	2	0	98
Spiraea densiflora	2	Tr	0	20
Kalmia microphylla	2	Tr	0	10
HERB LAYER				
Carex utriculata	100	52	5	100
Deschampsia caespitosa	21	3	0	50
Carex aquatilis var. *dives*	15	3	0	50
Hypericum anagalloides	13	3	0	60
Calamagrostis canadensis	11	2	0	45
MOSS LAYER				
Moss	45	9	0	100
UNVEGETATED				
Litter	51	10	0	100
Bare ground	34	18	0	95
Water	4	1	0	50

Vegetation and ecology: 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. *Pinus contorta* var. *latifolia* is present in very small amounts, as are reproducing *Thuja plicata* and *Tsuga heterophylla*, but these are restricted to elevated hummocks or "tree islands" or are peripheral to the wetlands. Fourteen different shrub species are reported, all with very low constancy but with a few showing conspicuous patch size. *Alnus viridis* ssp. *sinuata* occurs on peaty flats or in depressions, while *Lonicera caerulea, Vaccinium oxycoccos,* and *Spiraea densiflora* are restricted to hummocks. The herb layer occurs as either a nearly monotypic reedswamp of *Carex utriculata* in standing water or bare mud, or as a component of wet lawn with more than 80 other species. Average cover of *Carex utriculata* is 52 percent, with cover ranging from 5-100 percent. The most abundant secondary species in lawns include *Deschampsia caespitosa, Carex aquatilis* var. *dives, Hypericum anagalloides, Calamagrostis canadensis,* and *Carex aquatilis* var. *aquatilis,* with most of the other taxa occurring at low constancy and cover. The association has not been reported from lower elevations. Some stands were no doubt grazed by livestock in the past, and use by elk and deer may be heavy.

Global distribution: California to Alaska

Other studies: Seyer 1979: 35; Kauffman 1982: 59; Kauffman et al. 1985: 16; Frenkel et al. 1986: 33; Halpern 1986: 11 (CA); Johnson & Simon 1987: 225; Kovalchik 1987: 118, 118; Viereck et al. 1992: 183; Kunze 1994: 26, 63 (WA); Titus 1996; Titus & Christy 1996a; Boggs 2000: 141 (AK); Moseley 1998: 35 (ID); Stuth 1975: 71; Cole 1977: 102; Seyer 1981: 10; Cole 1982: 22; Ratliff 1982: 5; Evans 1989: 26 (WA); Jankovsky-Jones et al. 1999: 17 (ID).

Ceratophyllum demersum Association

Coontail

Classification:

NVCS: *Ceratophyllum demersum* Herbaceous Vegetation (CEGL004528)
Ecological System: Temperate Pacific Freshwater Aquatic Bed (CES200.876)
Rank: G5S5
Plots sampled: 0

Distribution in NW Oregon: coast, Coast Range, Willamette Valley

Environment:

Elevation (ft): 10-1000
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: aquatic, perennially flooded
Soils: organic

Vegetation and ecology: Habitat is low-elevation, low-gradient, eutrophic streams and rivers, ponds, lakes, and sloughs. This is a non-rooted aquatic association that is widespread in western Oregon, but it has not been sampled and little information is available. *Ceratophyllum demersum* forms dense, monotypic submerged beds that do not emerge above the surface of the water. Eutrophic conditions favored by this association may be enhanced by enriched runoff in agricultural or urban landscapes. Though a native species, *Ceratophyllum demersum* is a well-known pest in many lakes where rank aquatic vegetation interferes with recreation.

Global distribution: California north to British Columbia and eastward.

Other studies: Rodwell 1995: 40 (UK); Jankovsky-Jones et al. 2001: 182 (ID).

Deschampsia caespitosa montane "wet meadow" complex

Tufted hairgrass

Distribution in NW Oregon: Cascade Range
Global distribution: California to Washington or British Columbia

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. It forms a myriad of intergrading vegetation types that are often difficult to separate into meaningful entities. Added to this mix is the central role that *Deschampsia* played in farming and livestock grazing between 1850 and 1960, and the effect that these uses had on condition and species composition. At low elevations, some stands of *Deschampsia* survive as degraded relics of coastal or Willamette Valley prairie, while others are known to have developed on land previously plowed by farmers. Most stands at middle and high elevations were grazed by sheep and cattle during this period and the relative intensity of historic grazing continues to be mirrored in a wide variety of intergrading combinations of species. There are also at least three subspecies of *Deschampsia caespitosa* in the study area but it is not clear that any correlation exists between the distribution of subspecies and the different *Deschampsia* associations. Many stands of *Deschampsia caespitosa* have been sampled by many workers over the last 40 years, resulting in a large agglomeration of different stands with various disturbance histories and a huge species matrix. Because of the difficulty of separating the myriad *Deschampsia* vegetation types, many workers have chosen to refer to these simply as "wet meadow", "mountain meadow", "moist meadow", or "tufted hairgrass meadow." I have segregated some recognizable phases from this complex that make sense to me, but I stop short of calling them new associations. Association tables are not provided here but synthesis tables are given in Appendix A. Many of these phases have very similar habitat conditions and probably simply represent different patch dynamics. I did not include plots sampled on evidently disturbed sites with downcut streams, evidence of prior overgrazing, or invasion of lodgepole pine.

Deschampsia caespitosa monotypic phase: Habitat is montane fens. The flowering heads of *Deschampsia caespitosa* are conspicuous and often give the impression that *Deschampsia* has higher cover than it really does. However, it occasionally does occur in nearly monotypic stands and this phase attempts to capture that form. This type occurs in peatlands and is not the same as the much more widespread occurrence in relatively drier meadows. *Deschampsia caespitosa* is the primary species in the herb layer with cover ranging from 37-80 percent and averaging 53 percent. The remaining 11 species occur at relatively low constancy and only in trace amounts. *Achillea millefolium, Aster occidentalis,* and *Danthonia intermedia* suggest some effects from grazing.

Plots sampled: 4 (2 macro, 2 micro)
Elevation (ft): ave. 5188, range 4730-5410
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: seasonally moist to moist
Soils: organic
Other studies: not known

Caltha leptosepala ssp. howellii phase: Habitat is montane fens, forming lawns or flushes on gentle to moderate slopes below springs and seeps. The fans are laced with rivulets and are also irrigated by sheet flow. Raised hummocks or forest ecotone occupy 25-50 percent of the area sampled. *Deschampsia caespitosa* and *Caltha leptosepala* ssp. *howellii* occur in a number of intergrading species-rich assemblages. This phase represents stands where *Deschampsia* and *Caltha* co-occur as the primary species in the herb layer. Woody plants are primarily restricted to hummocks or "tree islands" within an herbaceous matrix, or they are peripheral to the wetland. *Abies lasiocarpa* has a constancy of only 13 percent but may occur with cover up to 40 percent. Reproducing *Picea engelmannii, Abies*

lasiocarpa, Tsuga mertensiana, and *Tsuga mertensiana* are mostly scarce but can have cover up to 40 percent. *Vaccinium uliginosum* occurs in half the plots with cover up to 50 percent. The herb layer has over 40 different species present, representing cover from both flush and drier hummocks that contain species typical of ecotones around the edges of these wetlands. *Deschampsia caespitosa* and *Caltha leptosepala* ssp. *howellii* are the primary species of flushes, with lesser amounts of *Dodecatheon jeffreyi, Carex luzulina, Hypericum anagalloides,* and *Calamagrostis canadensis.* Conspicuous herbs on hummocks include moist forest ecotone species such as *Ligusticum grayi, Senecio triangularis,* and *Trifolium longipes*.

Plots sampled: 8 (2 macro, 6 micro)
Elevation (ft): ave. 4550, range 4400-4700
Slope (deg): ave. 5, range 2-8
Landform position: various slope positions, basins
Hydrology: moist to perennially saturated
Soils: mostly loam, some organic
Other studies: Not known

***Carex aquatilis* var. *dives* phase:** Habitat is montane fens. This phase occurs on moist to wet lawns in fens. Trees are not recorded but would include *Picea engelmannii, Abies lasiocarpa,* and *Pinus contorta* var. *latifolia* growing on hummocks. *Vaccinium uliginosum* is the only shrub recorded and would also occur on hummocks. The herb layer is dominated by *Deschampsia caespitosa* and *Carex aquatilis* var. *dives*, with *Deschampsia* having higher average and absolute cover. *Trifolium longipes, Dodecatheon jeffreyi, Caltha leptosepala* ssp. *howellii,* and *Hypericum anagalloides* occur in about half the plots but with diminishing cover, and 16 other species are present in the herb layer in trace amounts. These are all typical species of wet lawns and indicate that the water table is high throughout the growing season.

Plots sampled: 4 (2 macro, 2 micro)
Elevation (ft): ave. 4270, range 3300-5410
Slope (deg): 0
Landform position: basins
Hydrology: perennially moist to saturated
Soils: organic
Other studies: Not known

***Carex buxbaumii* phase:** Habitat is montane fens. Trees are not recorded but would include *Picea engelmannii, Abies lasiocarpa,* and *Pinus contorta* var. *latifolia* growing on hummocks. *Vaccinium uliginosum* and *Salix geyeriana* are the most abundant shrubs, but they occur in trace amounts. *Deschampsia caespitosa* and *Carex buxbaumii* are the primary species in the herb layer, *Deschampsia* having an average cover of 54 percent and ranging to 70 percent, and *Carex buxbaumii* with about half as much average and absolute cover. Twenty other species are recorded from the herb layer, *Carex utriculata* having second highest constancy but little cover, while *Carex aquatilis, Trifolium longipes,* and *Carex lasiocarpa* have lower constancy but larger patch size. Most species are typical of wet lawns, indicating wet conditions for most of the growing season.

Plots sampled: 4 (macro)
Elevation (ft): ave. 4866, range 4749-5018
Slope (deg): 0
Landform position: basins
Hydrology: perennially moist to saturated
Soils: organic
Other studies: Not known

Carex exsiccata phase: Habitat is montane fens. Trees are not recorded but would include *Picea engelmannii, Abies lasiocarpa,* and *Pinus contorta* var. *latifolia* growing on hummocks. *Vaccinium uliginosum* occurs in 40 percent of the plots but only in trace amounts. *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. Ten other species occur with diminishing constancy and cover, most being species of wet lawns. The abundance of *Carex exsiccata* indicates wet conditions throughout the growing season.

Plots sampled: 5 (macro)
Elevation (ft): ave. 4475, range 3660-4840
Slope (deg): ave. 1, range 0-1
Landform position: basins
Hydrology: perennially saturated
Soils: organic
Other studies: Not known

Dodecatheon jeffreyi phase: Habitat is montane fens and moist meadow edges. Trees are not well represented but would include *Picea engelmannii, Abies lasiocarpa,* and *Pinus contorta* var*. latifolia* growing on hummocks. *Vaccinium uliginosum* is the primary shrub species also growing on hummocks, with four other species in lesser amounts. The herb layer has 50 different species, reflecting both wet lawn and hummock habitats. The most abundant of these are *Deschampsia caespitosa* and *Dodecatheon jeffreyi,* the former with an average cover of 44 percent and ranging up to 75 percent cover, while the latter has about one quarter as much average and absolute cover. Other less abundant species include *Carex luzulina, Caltha leptosepala* ssp*. howellii, Calamagrostis canadensis,* and *Hypericum anagalloides.* Most species are typical of wet lawns but a large patch of *Ligusticum grayi* indicates at least a few hummocks.

Plots sampled: 11 (2 macro, 9 micro)
Elevation (ft): ave. 4600, range 3690-5410
Slope (deg): ave. 1, range 0-2
Landform position: various slope positions, basins
Hydrology: perennially moist to saturated
Soils: mostly organic, some loam
Other studies: Not known

Eleocharis quinqueflora phase: Habitat is fen and edges of wet meadows. This phase occurs in similar habitat and elevational range as the *Eleocharis quinqueflora* association, but is not as flooded as is more species-rich. Woody vegetation is confined to hummocks or "tree islands," while herbaceous vegetation occurs in wet lawns. *Pinus contorta* var*. latifolia* is the primary mature and reproducing tree in the plots, but *Picea engelmannii* and *Abies lasiocarpa* may also be present on hummocks, all with low constancy and cover. *Vaccinium uliginosum* is the most abundant of four shrub species reported, again with low constancy and cover and also restricted to hummocks. The herb layer contains more than 50 species, the primary ones being *Eleocharis quinqueflora* and *Deschampsia caespitosa* with almost equal average and absolute cover. Lesser species include *Muhlenbergia filiformis, Ranunculus gormanii, Scirpus congdonii,* and *Hypericum anagalloides,* with significant patches of *Carex aquatilis* var. *dives, Carex utriculata, Pedicularis groenlandica, Packera cymbalarioides,* and *Juncus nevadensis.* The remaining species occur at low constancy and cover but reflect wet lawn conditions throughout.

Plots sampled: 14 (4 macro, 10 micro)
Elevation (ft): ave. 5030, range 4392-6150
Slope (deg): ave. 1, range 0-2
Landform position: floodplains, basins
Hydrology: seasonally moist to perennially saturated
Soils: mostly organic, some loam
Other studies: Not known

Hypericum anagalloides phase: Habitat is montane fens. Trees are not well represented but would include *Picea engelmannii, Abies lasiocarpa,* and *Pinus contorta* var*. latifolia* growing on hummocks. *Vaccinium uliginosum* is the primary shrub species also growing on hummocks, with fairly high constancy but low average cover, although at least one plot has up to 60 percent cover. Six other shrubs occur in lesser amounts. The herb layer has almost 40 different

species but most are from wet lawn habitats. The most abundant of these are *Deschampsia caespitosa* and *Hypericum anagalloides*, the former with an average cover of 43 percent and ranging up to 75 percent cover, while the latter has about two-thirds as much average and absolute cover. Other less abundant species include *Dodecatheon jeffreyi, Carex luzulina, Microseris borealis,* and *Trifolium longipes.*

Plots sampled: 14 (1 macro, 11 micro)
Elevation (ft): 4799
Slope (deg): 0
Landform position: basins
Hydrology: perennially moist to saturated
Soils: organic
Other studies: Not known

Microseris borealis phase: Habitat is montane fens. Trees are not well represented but would include *Picea engelmannii, Abies lasiocarpa,* and *Pinus contorta* var. *latifolia* growing on hummocks. *Vaccinium uliginosum* is the only shrub species also growing on hummocks, with 100 percent constancy but very low cover. *Deschampsia caespitosa* and *Microseris borealis* are the primary species in the herb layer, the former with an average cover of 53 percent and up to 70 percent cover, while the latter has about half as much cover. Lesser species include Dodecatheon jeffreyi, *Carex utriculata, Carex echinata* ssp. *echinata,* and *Eleocharis quinqueflora* with modest cover and the rest are typical wet lawn species but with very low cover.

Plots sampled: 3 (1 macro, 2 micro)
Elevation (ft): 4080
Slope (deg): 0
Landform position: basins
Hydrology: seasonally to perennially moist
Soils: organic
Other studies: Not known

Muhlenbergia filiformis phase: Habitat is montane fens. This phase is a component of wet lawns in montane fens. *Pinus contorta* var. *latifolia* is the only tree recorded from these plots, but *Picea* engelmannii and *Abies* lasiocarpa may also be present, all confined to hummocks or "tree islands" and occurring only at low constancy and cover. *Vaccinium uliginosum* and *Salix geyeriana* occur with higher constancy than the trees, but also have low cover and are likewise confined to hummocks. Thirty species are reported from the herb layer, with *Muhlenbergia filiformis* and *Deschampsia caespitosa* being the principal species. *Muhlenbergia* has an average cover of 42 percent and ranges from 35-50 percent, while *Deschampsia* has roughly half the amount of cover. Lesser species include *Hypericum anagalloides* and *Dodecatheon jeffreyi*, with significant patches of *Eleocharis quinqueflora* and *Trifolium longipes*.

Plots sampled: 5 (micro)
Elevation (ft): 4760
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: perennially saturated
Soils: organic
Other studies: Not known

Ranunculus gormanii phase: Habitat is montane fens. Trees are not well represented but would include *Picea engelmannii, Abies lasiocarpa,* and *Pinus contorta* var. *latifolia* growing on hummocks. *Vaccinium uliginosum, Salix myrtillifolia,* an unidentified *Salix,* and *Kalmia microphylla* grow on hummocks but have low constancy and even lower cover. The rich herb layer has more than 50 different species, mostly indicative of wet lawn conditions. The primary species are *Deschampsia caespitosa* and *Ranunculus gormanii,* with *Microseris borealis* also showing 100 percent constancy but with much lower cover. Species with lesser constancy and cover include *Trifolium longipes, Dodecatheon jeffreyi,* and *Carex luzulina,* with patches of *Carex buxbaumii* and *Polygonum bistortoides, Caltha leptosepala* ssp.

howellii, and *Equisetum arvense.* The association is restricted to the central Cascade Range in Lane, Deschutes, Douglas, and northwestern Klamath counties, coinciding with the primary range of *Ranunculus gormanii.*

Plots sampled: 7 (3 macro, 4 micro)
Elevation (ft): ave. 5118, range 4759-5297
Slope (deg): 0
Landform position: basins
Hydrology: perennially moist
Soils: organic
Other studies: Not known

Scirpus congdonii phase: Habitat is montane fens. Trees are not well represented but would include *Picea engelmannii, Abies lasiocarpa,* and *Pinus contorta* var*. latifolia* growing on hummocks. *Spiraea douglasii* and *Vaccinium uliginosum* occur on hummocks in one-quarter of the plots but have low percent cover. *Deschampsia caespitosa* and *Scirpus congdonii* are the primary species in the herb layer, the former with an average cover of 51 percent and up to 80 percent in some plots, while the latter has about one-third as much cover. Species with lesser cover include *Juncus balticus, Trifolium longipes* and patches of *Ranunculus gormanii*. The remaining 15 species or so occur at lower constancy and cover and represent primarily wet lawn habitat.

Plots sampled: 4 (2 macro, 2 micro)
Elevation (ft): ave. 4776, range 4759-4792
Slope (deg): 0
Landform position: basins
Hydrology: perennially saturated
Soils: organic
Other studies: Not known

Trifolium longipes phase: 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. Trees and shrubs are less likely to be confined to hummocks but still may be clumped. *Picea engelmannii* and *Pinus contorta* var*. latifolia* are the primary mature and reproducing trees but all occur at low constancy and low cover. *Vaccinium uliginosum* is the primary shrub, with four other species in lesser amounts. The herb layer contains about 80 different species, reflecting both the wet and dry habitat components as well as some grazing history. *Deschampsia caespitosa* and *Trifolium longipes* are the primary species, with *Potentilla drummondii* occurring in about half the plots but at low cover. Other species occurring at lower constancy but in significant patches include *Aster foliaceus, Muhlenbergia filiformis, Microseris borealis, Eleocharis quinqueflora, Carex scopulorum, Hypericum anagalloides, Carex leporinella, Mimulus primuloides,* and *Carex nigricans*.

Plots sampled: 17 (15 macro, 2 micro)
Elevation (ft): ave. 5419, range 4600-6635
Slope (deg): ave. 1, range 1-2
Landform position: benches, basins
Hydrology: seasonally moist to perennially moist
Soils: loam and pumice
Other studies: Not known

Deschampsia caespitosa - Artemisia lindleyana Association

Tufted hairgrass - Columbia River wormwood

Classification:

NVCS: *Deschampsia caespitosa - Artemisia lindleyana* Herbaceous Vegetation (CEGL003425)
Ecological System: Temperate Pacific Freshwater Mudflat (CES200.878), Willamette Valley Wet Prairie (CES204.874)
Rank: G1S1
Plots sampled: 2 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Salix lucida ssp. *lasiandra*	50	1	0	1
REPRODUCING TREES				
Fraxinus latifolia	50	1	0	2
SHRUB LAYER				
Salix fluviatilis	100	4	2	5
Amorpha fruticosa	50	1	0	2
HERB LAYER				
Artemisia lindleyana	100	23	20	25
Coreopsis tinctoria var. *atkinsoniana*	100	3	1	5
Trifolium arvense	100	2	1	3
Aster	100	2	1	2
Medicago lupulina	100	2	1	2
Xanthium strumarium	100	1	1	1
Deschampsia caespitosa	50	18	0	35

Distribution in NW Oregon:

Willamette Valley (Columbia River bottoms)

Environment:

Elevation (ft): 40
Slope (deg): 0
Landform position: floodplains
Hydrology: seasonally flooded to moist
Soils: river cobbles, silt

Vegetation and ecology:

Habitat is cobble beds and silt along the Columbia River at the western end of the Columbia River Gorge. The cobble beds are inundated when Bonneville Dam releases surplus water, usually in spring, and may be 1-2 feet above the summer water levels. *Salix lucida* ssp. *lasiandra* and *Fraxinus latifolia* may be present as seedlings or at shrub height. *Salix fluviatilis* is the principal species in the shrub layer, but *Amorpha fruticosa* is rapidly spreading along the riverbanks (Glad & Halse 1993). *Deschampsia caespitosa* was not recorded from one of the two plots sampled here but was present nearby and is also present in the Oregon site, and so is considered to be the principal species in the herb layer with at least 35 percent cover. *Artemisia lindleyana* is present with an average cover of 23 percent, and *Coreopsis tinctoria* var. *atkinsoniana* is a consistent associate but with very low percent cover. The other 14 species in the herb layer are scarce and over half of them are exotics, but inundation and scouring by winter flows keeps their cover low. The cobbles are coated with silt and covered with the lichen *Dermatocarpon fluviatile.* Both *Artemisia lindleyana* and *Coreopsis tinctoria* var. *atkinsoniana* are more typical of riparian areas of eastern Oregon and Washington. The association is currently known only from both sides of the river between the Pierce Island-Beacon Rock area and the Sandy River delta, where cobbles and silt predominate. The plots on the Washington side of the river are in good condition but those on the Oregon side are weedy. More plots are needed to adequately describe this association, but it may be difficult to find remnants in good condition. It is probable that this association extended much further upriver, possibly throughout the Columbia River Gorge and into eastern Oregon, but all these areas are now drowned behind a series of dams. It should be sought in the free-flowing section of the river in the Hanford Reach of Washington.

Global distribution:

Oregon and Washington

Other studies:

Christy & Putera 1993.

Deschampsia caespitosa - Danthonia californica Association

Tufted hairgrass - California oatgrass

Classification:

NVCS: *Deschampsia caespitosa - Danthonia californica* Herbaceous Vegetation
CEGL001604
Ecological System: Willamette Valley Wet Prairie (CES204.874)
Rank: G2S2
Plots sampled: 3 (macro)

Distribution in NW Oregon: Willamette Valley

Environment:

Elevation (ft): 500
Slope (deg): 0
Landform position: floodplains, flats
Hydrology: seasonally wet
Soils: clay loam

Vegetation and ecology: Habitat is clay prairie with perched water table. This association is one of the better-known components of relic native Willamette Valley wet prairie. Stands sampled or observed elsewhere often have a higher component of *Danthonia californica*, and this has traditionally been used to identify the association. Because it occurs at low elevation, has a history of grazing, and is surrounded by agriculture, there are a variety of few exotic species recorded in the plots. The only woody plant, *Rosa eglanteria*, is exotic. *Deschampsia caespitosa* is the primary species in the herb layer with an average cover of 47 percent and cover up to 60 percent. Other native species with significant cover are *Carex unilateralis* and *Plagiobothrys figuratus*, species typical of shallow depressions and suggesting that these stands are a little wetter or contain more depressions than sites with more *Danthonia californica.* Of the other 22 species, only six are exotic. This association may be one of a number of poorly-described native prairie types now mostly decimated by settlement. Hopefully other stands can be found and documented.

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Rosa eglanteria	33	Tr	0	Tr
HERB LAYER				
Deschampsia caespitosa	100	47	30	60
Galium parisiense	100	Tr	Tr	Tr
Leucanthemum vulgare	67	11	0	20
Carex unilateralis	67	5	0	15
Epilobium ciliatum	67	5	0	12
Plantago lanceolata	67	3	0	8
Holcus lanatus	67	Tr	0	1
Hypochaeris radicata	67	Tr	0	1
Plagiobothrys figuratus	33	7	0	20
Potentilla gracilis	33	5	0	16
Mentha arvensis	33	3	0	10
Camassia quamash	33	3	0	9
Alopecurus saccatus	33	1	0	3
Carex deweyana ssp. *leptopoda*	33	Tr	0	1
Myosotis laxa	33	Tr	0	1
Rumex acetosella	33	Tr	0	1
Veronica peregrina var. *xalapensis*	33	Tr	0	1
Lotus formosissimus	33	Tr	0	1
Aira caryophyllea	33	Tr	0	1
Taraxacum officinale	33	Tr	0	Tr
Danthonia californica	33	Tr	0	Tr
Sisyrinchium	33	Tr	0	Tr
MOSS LAYER				
Moss	67	13	0	25

Global distribution: western Oregon, southwestern Washington

Other studies: Lippert & Jameson 1964: 191; Kauffman & Connelly 1988: 2; Connelly & Kauffman 1991: 9-10; Wilson et al. 1993: 41, 42; Titus et al. 1996; Moir & Mika 1972: 12; Kagan 1983: 12; Savonen 1988: 5.

Deschampsia caespitosa - Juncus balticus Association

Tufted hairgrass - Baltic rush

Classification:

NVCS: new
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G4S3
Plots sampled: 7 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Salix geyeriana	14	Tr	0	1
HERB LAYER				
Deschampsia caespitosa	100	61	40	80
Juncus balticus	100	26	10	50
Muhlenbergia filiformis	71	4	0	15
Trifolium longipes	57	2	0	15
Aster foliaceus	43	4	0	25
Antennaria rosea	43	3	0	10
Gentiana newberryi	29	8	0	30
Potentilla drummondii	29	2	0	10
Ranunculus alismifolius	29	1	0	7
Dodecatheon jeffreyi	29	1	0	6
Aster alpigenus	29	1	0	2
Carex pachystachya	29	Tr	0	2
Fragaria virginiana	29	Tr	0	1
MOSS LAYER				
Moss	29	11	0	60

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 4618-6317
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: perennially moist
Soils: organic and loam

Vegetation and ecology: Habitat is wet to moist montane meadows and fens, and the association is more typical of meadows than fens. Trees are not well represented but would include *Picea engelmannii* and *Abies lasiocarpa*. The shrub layer contains only *Salix geyeriana* at low constancy and low cover, which in many areas provides elevated substrate for seedlings of *Picea engelmannii* and *Abies lasiocarpa*. The herb layer contains about 40 species, *Deschampsia caespitosa* and *Juncus balticus* being the primary species, the former with average cover of 61 percent and ranging to 80 percent, and the latter about half that. Lesser species include *Muhlenbergia filiformis* and *Trifolium longipes.* The remaining species reflect a mix of wetland and drier meadow types. The rich mix of herbs, particularly *Antennaria rosea, Potentilla drummondii, Ranunculus alismifolius,* and *Fragaria virginiana,* suggest a history of grazing.

Global distribution: California to British Columbia

Other studies: Volland 1976: 21; Hopkins 1979: 12; Kovalchik 1987: 95 (in part); Crowe & Clausnitzer 1997: 190 (in part); Titus & Christy 1996a.

Dulichium arundinaceum Association

Threeway sedge

Classification:

NVCS: *Dulichium arundinaceum* Seasonally Flooded Herbaceous Vegetation (CEGL001831)
Ecological System: Boreal Fen (CES103.872), North Pacific Bog and Fen (CES204.063), Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G3S3
Plots sampled: 9 (2 macro, 7 micro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Dulichium arundinaceum	100	56	10	90
Menyanthes trifoliata	67	7	0	30
Drosera rotundifolia	11	1	0	10
Potamogeton gramineus	11	Tr	0	4
Lysichiton americanus	11	Tr	0	2
Carex aquatilis	11	Tr	0	1
Utricularia macrorhiza	11	Tr	0	1
Carex utriculata	11	Tr	0	Tr
Carex lasiocarpa	11	Tr	0	Tr
MOSS LAYER				
Moss	11	11	0	100

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): ave. 2406, range 80-4730
Slope (deg): 0
Landform position: basins, benches
Hydrology: perennially flooded to saturated
Soils: mostly organic, some sand

Vegetation and ecology: Habitat is fens and marshes. The association forms emergent stands around the edges of shallow lakes and in perennially or seasonally flooded shallow depressions. Most stands are monotypes of *Dulichium arundinaceum* with an average cover 56 percent and ranging from 10-90 percent. *Menyanthes trifoliata* is present in more than half the plots but with low average cover. The remaining seven species reported are very sparse, and much of the space between plants is open water or exposed mud in seasonally-flooded stands. The moss layer can be nonexistent or 100 percent cover of *Sphagnum*. At one time *Dulichium arundinaceum* was thought to be rare in Oregon but is more common than originally thought. There are a few limited occurrences of this association in the Willamette Valley and it may once have been more widespread before drainage and conversion to agriculture.

Global distribution: Oregon to Alaska and eastward

Other studies: Kunze 1994: 28 (WA); Titus & Christy 1996a; Christy et al. 1998: 111; Christy 2001a: 36; Jankovsky-Jones et al. 1999: 20 (ID).

Eleocharis acicularis Association

Needle spikerush

Classification:

NVCS: Eleocharis acicularis Herbaceous Vegetation (CEGL001832)
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G4S4
Plots sampled: 1 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Eleocharis acicularis	100	60	60	60
Elodea canadensis	100	15	15	15
Callitriche heterophylla	100	10	10	10
Sparganium angustifolium	100	1	1	1
MOSS LAYER				
Moss	100	10	10	10

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): 4730
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: seasonally flooded to perennially saturated
Soils: organic or loam

Vegetation and ecology: Habitat is montane fens and seasonal pools in meadows. Plants may be relativelysparse with considerable open water or mud. This association is more common east of the Cascade Range. It is mostly a monotype of *Eleocharis acicularis* with lesser amounts of *Elodea canadensis, Callitriche heterophylla,* and *Sparganium angustifolium* recorded in this single plot. Pools may dry out in summer but the soil remains moist.

Global distribution: California to Alaska and eastward

Other studies: Christy & Cornelius 1980; Boss 1983: 147; Sanville et al. 1986: 127; Jankovsky-Jones et al. 1999: 20 (ID); Carsey et al. 2003: 374 (CO).

Eleocharis ovata - Ludwigia palustris Association

Ovate spikerush - water purslane

Classification:

NVCS: new
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G2S2
Plots sampled: 5 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Eleocharis ovata	100	54	35	98
Ludwigia palustris	80	34	0	50
Lamiaceae	40	4	0	10
Bidens cernua	20	6	0	30
Agrostis exarata	20	Tr	0	Tr
Epilobium ciliatum ssp. *watsonii*	20	Tr	0	Tr

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): ave. 800, range 500-2000
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: perennially moist to perennially saturated
Soils: silt loam

Vegetation and ecology: Habitat is edges and mudflats of shallow seasonal lakes, pools, and in freshwater tidal flats along larger coastal rivers. Stands are either monotypes of *Eleocharis ovata* or mixed in lawns with *Ludwigia palustris,* submerged early in the season but exposed on mudflats as water levels drop. Considerable amounts of open water or bare mud may be present. A few other emergent or mudflat species may be present but in low amounts. There may also be some admixture of the *Lilaeopsis occidentalis* association on mudflats.

Global distribution: Oregon to British Columbia

Other studies: Not known

Eleocharis palustris Association

Creeping spikerush

Classification:

NVCS: *Eleocharis palustris* Herbaceous Vegetation (CEGL001833)
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877), Temperate Pacific Montane Wet Meadow (CES200.998), Willamette Valley Wet Prairie (CES204.874)
Rank: G5S5
Plots sampled: 8 (7 macro, 1 micro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Salix hookeriana	25	1	0	3
Spiraea douglasii	13	Tr	0	1
HERB LAYER				
Eleocharis palustris	100	59	30	100
Deschampsia caespitosa	38	3	0	10
Carex obnupta	38	1	0	5
Phalaris arundinacea	38	1	0	2
Juncus nevadensis	25	4	0	20
Schoenoplectus americanus	25	1	0	5
Myosotis laxa	25	Tr	0	2

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): ave. 1201, range 8-4730
Slope (deg): ave. 0, range 0-1
Landform position: floodplains, basins
Hydrology: seasonally wet to perennially flooded
Soils: organic, sand, loam

Vegetation and ecology: Habitat is shallow depressions in meadows, fens, and marshes. Stands are predominantly herbaceous. The shrub layer is sparse, dominated by *Salix hookeriana* or *Spiraea douglasii* with low constancy and very low percent cover. *Eleocharis palustris* is the primary species in the herb layer, with average cover of 59 percent and cover ranging from 30-100 percent. About 40 other species are present in fairly low constancy, but with some have significant patches of *Juncus nevadensis, Polygonum hydropiperoides,* or *Juncus acuminatus,* depending on elevation. The diversity of species is due largely to the wide range of elevation and location for this association, which could not be separated satisfactorily into more coherent units.

Global distribution: California to British Columbia and eastward

Other studies: Padgett 1981: 79; Henderson & McAllister 1983: 2; Boss 1983: 67; Kovalchik 1987: 120; Evenden 1989: 45; Padgett et al. 1989: 94 (ID, UT); Manning & Padgett 1991: 384 (NV); Kunze 1994: 42, 45, 55 (WA); Rodwell 1995: 203 (UK); Crowe & Clausnitzer 1997: 182. Kovalchik 1992: 191 (WA); Moseley 1998: 47 (ID); Titus & Christy 1996a, 1996b; Griffiths 1902: 46; Harris 1954: 406 (WA); Kierstead & Pogson 1976: 1-14; Bork 1978: 69; Seyer 1981: 21; Easterday & Mamone 1980: 16; Marshall 1985: 143; Evans 1989: 28 (WA); Jankovsky-Jones et al. 1999: 20 (ID); Carsey et al. 2003: 376 (CO).

Eleocharis quinqueflora Association

Few-flowered spikerush

Classification:

NVCS: *Eleocharis quinqueflora* Herbaceous Vegetation (CEGL001836)
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G4S2
Plots sampled: 34 (9 macro, 25 micro)

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 4190, range 3120-5410
Slope (deg): ave. 0, range 0-2
Landform position: basins, benches
Hydrology: perennially moist to perennially saturated
Soils: mostly organic, some loam

Species	Const	Percent cover		
		Ave	Min	Max
REPRODUCING TREES				
Picea engelmannii	3	Tr	0	1
Pinus contorta var. *latifolia*	3	Tr	0	Tr
Tsuga mertensiana	3	Tr	0	Tr
Abies lasiocarpa	3	Tr	0	Tr
SHRUB LAYER				
Vaccinium uliginosum	18	1	0	35
Vaccinium oxycoccos	15	1	0	15
HERB LAYER				
Eleocharis quinqueflora	100	27	3	90
Drosera anglica	59	7	0	30
Carex simulata	44	5	0	30
Carex aquatilis var. *dives*	35	4	0	25
Mimulus primuloides	32	2	0	20
Dodecatheon jeffreyi	32	2	0	25
Hypericum anagalloides	32	1	0	15
MOSS LAYER				
Moss	62	33	0	95
UNVEGETATED				
Water	32	11	0	90
Litter	6	2	0	60

Vegetation and ecology: 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. Flooded stands have fewer species than saturated stands. *Picea engelmannii, Pinus contorta* var. *latifolia, Tsuga mertensiana,* and *Abies lasiocarpa* may occur as mature or reproducing trees on hummocks. Twelve species of shrubs are reported from plots, *Vaccinium uliginosum* and *Vaccinium oxycoccos* being most abundant but still with low constancy and cover. The herb layer has over 80 different species, *Eleocharis quinqueflora* being the most abundant with cover ranging from 3-90 percent. Cover is dependent on the degree of flooding that controls the density of vegetation. Species with lesser constancy and cover include *Drosera anglica, Carex simulata, Carex limosa, Carex aquatilis* var. *dives, Mimulus primuloides,* and *Dodecatheon jeffreyi,* with significant patches of *Utricularia intermedia, Eriophorum gracile,* and *Carex echinata* ssp. *echinata.* About one quarter of the remaining species occur on hummocks or are peripheral and all have low cover. A moss layer is present in about two-thirds of plots, with cover up to 90 percent. These wetlands were assumed to be *Sphagnum* mires until the late 1970s, when it was discovered that they were dominated by "brown mosses" such as *Hamatocaulis vernicosus, Tomentypnum nitens,* and *Meesia triquetra*, all well-known indicators of medium to rich fens. The vegetation and ecology of several sites were studied in detail by Seyer (1979) and Wilson (1986). Recent pH readings by the author at Gold Lake Bog averaged 6.5 in surface water and 6.3 in peat about 1 foot below the surface.

Global distribution: northern California to British Columbia and Alberta, and south in Rocky Mountains to Colorado.

Other studies: Seyer 1979: 37, 38; Wilson 1986: 19, 20; Kovalchik 1987: 110; Padgett et al. 1989: 104 (ID, UT); Kovalchik 1992: 177 (WA); Titus 1995; Crowe & Clausnitzer 1997: 199 (in part); Cole 1977: 102; Cole 1982: 22; Briggs & MacMahon 1983: 525 (UT); Jankovsky-Jones et al. 1999: 21 (ID); Carsey et al. 2003: 380 (CO).

Elodea canadensis Association

Canadian waterweed

Classification:

NVCS: new
Ecological System: Temperate Pacific Freshwater Aquatic Bed (CES200.876)
Rank: G5S5
Plots sampled: 0

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): 10-5000
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: aquatic, submerged
Soils: organic

Vegetation and ecology: Habitat is lakes, ponds, and low-gradient rivers. This is a rooted or free-floating aquatic bed association that is widespread in western Oregon. It has not been sampled and little information is available. *Elodea canadensis* forms dense mats beneath the surface of the water and may provide important habitat for aquatic invertebrates and fish. This association may favor eutrophic conditions and may be enhanced by enriched runoff in agricultural or urban landscapes.

Global distribution: California to British Columbia and eastward

Other studies: Kunze 1994: 42, 46, 55 (WA); Rodwell 1995: 76 (UK); Titus & Christy 1996a; Jankovsky-Jones et al. 2001: 182 (ID); Crawford 2003: 95 (WA).

Equisetum arvense Association

Field horsetail

Classification:

NVCS: *Equisetum arvense* Herbaceous Vegetation (CEGL003314)
Ecological System: North Pacific Lowland Riparian Forest and Shrubland (CES204.869), Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G5S5
Plots sampled: 2 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Pseudotsuga menziesii	50	6	0	12
Pinus ponderosa	50	5	0	10
REPRODUCING TREES				
Quercus garryana	50	Tr	0	Tr
SHRUB LAYER				
Rosa nutkana	50	3	0	5
Alnus incana	50	1	0	1
Symphoricarpos albus	50	Tr	0	Tr
Rubus ursinus	50	Tr	0	Tr
HERB LAYER				
Equisetum arvense	100	88	80	95
Hypericum anagalloides	50	8	0	15
Mimulus guttatus	50	5	0	10

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): ave. 2115, range 1900-2329
Slope (deg): ave. 7, range 0-13
Landform position: various slope positions, basins
Hydrology: perennially moist to saturated
Soils: mostly loam, some organic

Vegetation and ecology: Habitat is seepy alluvial fans, slopes, wet meadows, and fens. This is mostly a low to mid-elevation association, often occurring in sites with some groundwater movement. It is often small-patch size in water tracks, and the plots suggest considerable inclusions of upland species that may be an artifact of plot size or configuration in a sinuous wetland configuration. Discounting the trees and shrubs that are mostly peripheral to the stand, the primary species in the herb layer is *Equisetum arvense*, with average cover of 88 percent and cover ranging from 80-95 percent. Other wetland associates with lesser cover include *Hypericum anagalloides* and *Mimulus guttatus*. Of the other 25 species, nearly half are upland taxa and should not be part of this association. This is a widespread and well-known association in other regions and obviously undersampled locally.

Global distribution: California to British Columbia and eastward

Other studies: Crowe & Clausnitzer 1997: 210; Diaz & Mellen 1997: 159; Titus et al. 1999 (WA); Seyer 1983.

Eragrostis hypnoides - Gnaphalium palustre Association

Teal lovegrass - western marsh cudweed

Classification:

NVCS: *Eragrostis hypnoides - Gnaphalium palustre* Herbaceous Vegetation (CEGL003327)
Ecological System: Temperate Pacific Freshwater Mudflat (CES200.878), Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G2S1
Plots sampled: 4 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Salix lucida ssp. *lasiandra*	50	Tr	0	Tr
HERB LAYER				
Eragrostis hypnoides	100	37	3	85
Gnaphalium palustre	75	27	0	90
Rorippa curvisiliqua	75	1	0	4
Bidens frondosa	50	2	0	6
Polygonum hydropiperoides	50	1	0	3
Bidens cernua	50	1	0	2
Solanum dulcamara	50	Tr	0	Tr
Cirsium arvense	50	Tr	0	Tr
Lindernia dubia	25	10	0	40
Eleocharis ovata	25	1	0	2
Ludwigia palustris	25	1	0	2
Echinochloa crusgalli	25	Tr	0	Tr
Limosella aquatica	25	Tr	0	Tr
Polygonum amphibium	25	Tr	0	Tr
Panicum capillare	25	Tr	0	Tr
Rumex crispus	25	Tr	0	Tr
Scutellaria lateriflora	25	Tr	0	Tr
Senecio vulgaris	25	Tr	0	Tr
Epilobium ciliatum	25	Tr	0	Tr
MOSS LAYER				
Moss	25	3	0	10

Distribution in NW Oregon:

Willamette Valley and Columbia River bottoms in Vancouver Basin

Environment:

Elevation (ft): ave. 385, range 40-500
Slope (deg): 0
Landform position: floodplains
Hydrology: seasonally flooded to saturated
Soils: silt loam

Vegetation and ecology:

Habitat is low-elevation dried beds of dried shallow seasonal pools and lakes. Trees are peripheral and not included in plots, but the setting is usually adjacent to bottomland forest of *Fraxinus latifolia* and *Populus balsamifera* ssp. *trichocarpa*. *Salix lucida* ssp. *lasiandra* is present in half the plots, and *Salix fluviatilis* is also often present, but neither occurs in large amounts. The herb layer contains about 20 annual and perennial species adapted to early-season inundation and subsequent exposure as lakes and ponds dry up. Most exotic species are excluded by inundation extending into the growing season. *Eragrostis hypnoides* is the primary species with an average cover of 37 percent and cover ranging up to 85 percent, while *Gnaphalium palustre* has somewhat lower constancy but similar cover when present. *Lindernia dubia* forms patches in some stands. The remaining species occur only in trace amounts. *Eragrostis hypnoides* forms a loose and patchy sod with *Gnaphalium* and considerable bare gound may be present. These sites appear to be drier than those occupied by the mudflat vegetation of the *Lilaeopsis occidentalis* or *Azolla* associations, the mud often cracking deeply and the top layer losing most of its moisture.

Global distribution:

California to British Columbia and eastward

Other studies:

Titus et al. 1996.

Euthamia occidentalis Association

Western goldentop

Classification:

NVCS: *Euthamia occidentalis* Herbaceous Vegetation (CEGL003328)
Ecological System: Temperate Pacific Freshwater Mudflat (CES200.878)
Rank: G3S3
Plots sampled: 2 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
REPRODUCING TREES				
Salix fluviatilis	50	2	0	3
HERB LAYER				
Euthamia occidentalis	100	38	30	45
Artemisia vulgaris	100	1	1	1
Cyperus erythrorhizos	50	10	0	20

Distribution in NW Oregon: Willamette River, Columbia River in Vancouver Basin

Environment:

Elevation (ft): 20
Slope (deg): 2
Landform position: floodplains
Hydrology: moist
Soils: silt loam

Vegetation and ecology: Habitat is gently sloping, silty river shores exposed at seasonal low flows, between the high water cutbank and the water line. No trees are present below the high water cutbank, but *Salix fluviatilis* and *Salix lucida* ssp. *lasiandra* are frequently present at the toe of the cutbank and sometimes form extensive stands along the flat shore adjacent to this association. The exotic *Amorpha fruticosa* is rapidly spreading along the riverbanks in this habitat (Glad & Halse 1993). The herb layer contains over 20 different species, some exotics and some opportunists on seasonally scoured and inundated shorelines. *Euthamia occidentalis* is the principal species and forms tall stands with an average cover of 38 percent and ranging from 30-45 percent. Most of the other species are incidental and have low cover values, but are of interest because some are uncommon except in this habitat.

Global distribution: Oregon to British Columbia

Other studies: Christy & Putera 1993: 41; Kunze 1994: 49 (WA); Jankovsky-Jones et al. 2001: 182 (ID).

Glyceria striata Association

Fowl mannagrass

Classification:

NVCS: *Glyceria striata* Herbaceous Vegetation (CEGL000219)
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872), Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G5S4
Plots sampled: 5 (3 macro, 2 micro)

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 3818, range 2800-4720
Slope (deg): ave. 2, range 0-3
Landform position: floodplains, basins
Hydrology: perennially saturated
Soils: organic, loam, or sand

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Picea engelmannii	20	4	0	22
Tsuga mertensiana	20	Tr	0	1
REPRODUCING TREES				
Tsuga mertensiana	20	1	0	4
SHRUB LAYER				
Ribes	20	3	0	16
Alnus viridis ssp. *sinuata*	20	1	0	5
Spiraea douglasii	20	Tr	0	1
Vaccinium	20	Tr	0	Tr
HERB LAYER				
Glyceria striata	100	48	13	80
Viola	60	10	0	35
Veratrum viride	40	15	0	40
Deschampsia caespitosa	40	5	0	15
Caltha leptosepala ssp. *howellii*	40	4	0	20
Veronica americana	40	4	0	12
Epilobium ciliatum ssp. *watsonii*	40	3	0	10
Galium trifidum	40	1	0	3
Senecio triangularis	40	1	0	2
Mimulus guttatus	40	1	0	2
Epilobium ciliatum ssp. *glandulosum*	40	Tr	0	2
Carex microptera	40	Tr	0	2
Agrostis exarata	40	Tr	0	1
Polygonum bistortoides	20	4	0	20
Cornus canadensis	20	4	0	19
Carex utriculata	20	2	0	10

Vegetation and ecology: Habitat is montane marshes, fens, and edges of wet meadows. *Glyceria striata* forms tall and often nearly monotypic stands, and some standing water may be present into the growing season. The plots reported here document occurrences of this association in fens. Most woody vegetation is peripheral to the wetland or confined to hummocks or "tree islands," and most herbaceous vegetation forms wet lawns. *Picea engelmannii, Tsuga mertensiana,* and *Tsuga mertensiana* are the primary mature and reproducing trees, while an unidentified *Ribes* and *Alnus viridis* ssp. *sinuata* are the primary shrubs, but all occur at low constancy and cover. The herb layer contains almost 40 different species, with *Glyceria striata* being most abundant with average cover of 48 percent and ranging to 80 percent. Wetland species with lesser cover include *Deschampsia caespitosa, Caltha leptosepala* ssp*. howellii,* and *Polygonum bistortoides*. Hummock or edge species such as *Veratrum viride, Rudbeckia occidentalis,* and *Senecio triangularis* may be conspicuous. This association is more common east of the Cascades. *Glyceria elata* is now considered a synonym of *Glyceria striata.*

Global distribution: Oregon to Alaska

Other studies: Kauffman 1982: 59; Kauffman et al. 1985: 16; Manning & Padgett 1991: 452 (NV); Crowe & Clausnitzer 1997: 208; Titus & Christy 1996a; Strickler 1966: 30; Evans 1989: 29 (WA).

Hippuris vulgaris Association

Common mare's-tail

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Hippuris vulgaris	100	37	25	50
Cicuta douglasii	20	1	0	5
UNVEGETATED				
Water	100	62	50	75

Classification:

NVCS: *Hippuris vulgaris* Herbaceous Vegetation (CEGL003315)
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G5S3
Plots sampled: 5 (micro)

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): 20
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: seasonally flooded to perennially saturated
Soils: organic

Vegetation and ecology: Habitat is shallow depressions and pools in marshes and fens. This association is widespread but uncommon locally. The plots reported here are from the coast and probably don't reflect the range of subordinate species that may be present elsewhere. Stands are often extensive monotypes of *Hippuris vulgaris* with an average cover of 37 percent and ranging from 25 to 50 percent. Most of the remaining cover is open water or mud if water levels drop. These plots report *Cicuta douglasii* as an associate, and other species such as *Scirpus acutus*, *Scirpus tabernaemontani*, or *Potamogeton* may be present. Where pools dry up, the substrate remains moist to saturated, and *Hippuris* cannot survive complete desiccation.

Global distribution: California to Alaska and eastward

Other studies: Viereck et al. 1992: 205 (AK); Kunze 1994: 22 (WA); Boggs 2000: 160 (AK); Christy & Brophy 2002; Jankovsky-Jones et al. 2001: 182 (ID); Carsey et al. 2003: 440 (CO).

Hydrocotyle ranunculoides Association

Floating marshpennywort

Classification:

NVCS: new
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877), North Pacific Bog and Fen (CES204.063)
Rank: G5S3
Plots sampled: 0

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): 0-5000
Slope (deg): 0
Landform position: floodplains, flats, basins
Hydrology: seasonally flooded to perennially saturated
Soils: organic

Vegetation and ecology: Habitat is shallow lakes, ponds, pools, or low-gradient streams, sometimes in fens. This is a rooted aquatic bed association that is widespread in western Oregon but uncommon locally. It has not been sampled and little information is available. It forms nearly monotypic emergent stands that may cover the entire surface of shallow lakes, ponds, and pools in peatlands. Cover ranges from 60-95 percent. It is not clear if this association favors eutrophic conditions or may be enhanced by enriched runoff in agricultural or urban landscapes.

Global distribution: Oregon to British Columbia

Other studies: Christy et al. 1998: 132.

Isoetes nuttallii Association

Nuttall's quillwort

Classification:

NVCS: *Isoetes nuttallii* Herbaceous Vegetation (CEGL003343)
Ecological System: Willamette Valley Wet Prairie (CES204.874)
Rank: G3S3
Plots sampled: 5 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Isoetes nuttallii	100	57	40	85
Lotus pinnatus	60	12	0	50
Poaceae	60	7	0	25
Veronica scutellata	40	4	0	10
Mimulus guttatus	40	2	0	8
Triteleia hyacinthina	20	Tr	0	1
Camassia quamash	20	Tr	0	1
Gratiola	20	Tr	0	1
Epilobium ciliatum	20	Tr	0	1
Juncus tenuis	20	Tr	0	1

Distribution in NW Oregon: Willamette Valley

Environment:

Elevation (ft): 500
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: seasonally flooded to perennially moist
Soils: silt loam

Vegetation and ecology: Habitat is beds of intermittent streams and seasonally-flooded pools in clay prairie, riparian woodland, or on shallow-soiled basalt scabland. This association forms linear bands of vegetation in ephemeral streams and pools. Trees and shrubs were absent from the plots described here that were sampled in open prairie. Of the ten species in the herb layer, *Isoetes nuttallii* is the principal species with average cover of 57 percent and ranging from 40-85 percent. *Lotus pinnatus* and an unidentified grass had 60 percent constancy and cover of 50 and 25 percent, respectively. Most of the remaining herbs occur only in trace amounts. A number of these species, including *Isoetes nuttallii*, dry up and disappear by midsummer. Other stands have been observed in mixed *Fraxinus latifolia* - *Quercus garryana* riparian forest.

Global distribution: California to British Columbia

Other studies: Titus et al. 1996.

Juncus balticus Association

Baltic rush

Classification:

NVCS: *Juncus balticus* Herbaceous Vegetation (CEGL001838)
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998)
Rank: G5S5
Plots sampled: 6 (macro)

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 5070, range 4400-6300
Slope (deg): ave. 2, range 0-9
Landform position: floodplains, basins, benches
Hydrology: seasonally moist to perennially flooded
Soils: mostly loam, some organic

Vegetation and ecology: Habitat is montane meadows and fens. This association occurs in both seasonally moist meadows as well as perennially wet fens. Species composition is diverse but no obvious segregate associations are apparent. Trees and shrubs are usually clumped in meadows and confined to hummocks in fens. *Picea engelmannii* and *Abies lasiocarpa* are the principal mature and reproducing trees, but none of the seven species recorded have significant constancy or cover. The eight species of shrubs also have no significant constancy or cover. The herb layer contains more than 60 different species, the primary being *Juncus balticus* with an average cover of 48 percent and ranging from 25-80 percent. *Polygonum bistortoides* is the only other secondary species with any significant cover. *Trifolium longipes, Carex lenticularis,* and *Aster occidentalis* occur in patches with some significant cover. About two-thirds of the other species present reflect moist to wet meadow conditions, and one-third occur on hummocks or in peripheral forest ecotones. The species diversity in some stands no doubt reflects a history of grazing, and *Juncus balticus* itself is an increaser under moderate grazing. This association is widespread at higher elevations and is most common east of the Cascades Range.

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Picea engelmannii	33	2	0	13
Abies lasiocarpa	33	1	0	2
REPRODUCING TREES				
Abies lasiocarpa	17	1	0	3
Picea engelmannii	17	Tr	0	2
SHRUB LAYER				
Rubus lasiococcus	33	Tr	0	Tr
Vaccinium membranaceum	33	Tr	0	Tr
Vaccinium scoparium	33	Tr	0	Tr
HERB LAYER				
Juncus balticus	100	48	25	80
Polygonum bistortoides	50	10	0	50
Carex scopulorum	50	4	0	12
Pedicularis groenlandica	50	1	0	6
Caltha leptosepala ssp. *howellii*	33	2	0	9
Deschampsia caespitosa	33	2	0	10
Senecio triangularis	33	2	0	10
Mimulus guttatus	33	2	0	10
Hypericum anagalloides	33	1	0	4
Packera cymbalarioides	33	1	0	2
Dodecatheon jeffreyi	33	Tr	0	1
Veratrum californicum	33	Tr	0	1
Ligusticum grayi	33	Tr	0	1
Erigeron peregrinus	33	Tr	0	1
Equisetum arvense	33	Tr	0	1
Epilobium ciliatum ssp. *glandulosum*	33	Tr	0	1
MOSS LAYER				
Moss	17	Tr	0	Tr

Global distribution: California to British Columbia and eastward

Other studies: Volland 1976: 20; Taylor & Frenkel 1979: 60; Taylor 1980: 57; Padgett 1981: 73; Henderson & McAllister 1983: 2; Kovalchik 1987: 138; Evenden 1989: 47; Padgett et al. 1989: 111 (ID, UT); Manning & Padgett 1991: 436 (NV); Kunze 1994: 22 (WA); Crowe & Clausnitzer 1997: 194; Titus & Christy 1996a, 1996c; Kierstead & Pogson 1976: 1-13; Evans 1989: 30 (WA); Jankovsky-Jones et al. 1999: 22 (ID); Jankovsky-Jones et al. 2001: 153 (ID).

Juncus effusus Association

Soft rush

Classification:

NVCS: *Juncus effusus* Seasonally Flooded Herbaceous Vegetation (CEGL004112)
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G5S5
Plots sampled: 6 (macro)

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): ave. 1848, range 900-3450 (also to sea level)
Slope (deg): ave. 2, range 0-7
Landform position: slopes, floodplains, basins
Hydrology: seaonally moist to perennially saturated
Soils: mostly loam, some organic

Vegetation and ecology: Habitat is meadows, fens, and old pastures. This association is generally thought of as a disturbance type resulting from grazing, but some occurrences suggest that it is native in some places because they are unlikely to have ever been heavily grazed. It is a widespread at a variety of elevations but is especially abundant at low elevations in western Oregon. The plots here are from the Coast Range and Cascade Range. Trees are nearly absent but may include *Alnus rubra, Fraxinus latifolia, Quercus garryana,* or conifers peripheral to the wetland. Eight shrub species are recorded, with *Salix sitchensis* being most abundant, but their cover is negligible. The herb layer includes about 60 different species, with *Juncus effusus* being most abundant with an average cover of 52 percent and ranging from 20 to 85 percent. *Juncus xiphoides* var. *triandrus* is a consistent associate but has very low cover, while *Hypericum anagalloides* is much more abundant but present with slightly lower constancy. Other species occurring in significant patches include *Scirpus microcarpus, Equisetum arvense, Oenanthe sarmentosa,* and *Athyrium filix-femina*, and five species are exotics. Old pastures at low elevations may also have large amounts of *Ranunculus repens* but this species wasn't recorded in these plots.

Global distribution: California to British Columbia and eastward

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Alnus rubra	17	Tr	0	Tr
REPRODUCING TREES				
Pseudotsuga menziesii	17	1	0	3
SHRUB LAYER				
Salix sitchensis	33	Tr	0	1
HERB LAYER				
Juncus effusus	100	52	20	85
Juncus xiphoides var. *triandrus*	100	2	Tr	5
Hypericum anagalloides	83	43	0	75
Galium trifidum	67	Tr	0	1
Scirpus microcarpus	50	5	0	25
Equisetum arvense	50	3	0	20
Oenanthe sarmentosa	50	3	0	20
Carex obnupta	50	1	0	5
Mimulus moschatus	50	Tr	0	1
Lotus corniculatus	33	4	0	20
Athyrium filix-femina	33	4	0	20
Sparganium angustifolium	33	3	0	15
Prunella vulgaris	33	2	0	10
Platanthera dilatata	33	2	0	10
Veronica americana	33	1	0	2
Anthoxanthum odoratum	33	1	0	2
Holcus lanatus	33	Tr	0	1
Carex stipata	33	Tr	0	1
Mimulus guttatus	33	Tr	0	1
Cirsium vulgare	33	Tr	0	1
Glyceria striata	33	Tr	0	1
Geum macrophyllum	33	Tr	0	Tr
Carex echinata ssp. *echinata*	33	Tr	0	Tr
Veronica scutellata	33	Tr	0	Tr
MOSS LAYER				
Moss	83	11	0	49

Other studies: Titus 1996; Jankovsky-Jones et al. 1999: 22. (ID); Jankovsky-Jones et al. 2001: 165 (ID).

Juncus nevadensis Association

Nevada rush

Classification:

NVCS: new
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877), Temperate Pacific Montane Wet Meadow (CES200.998)
Rank: G4S4
Plots sampled: 2 (macro)

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 4560, range 4389-4730
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: perennially saturated
Soils: organic or loam

Species	Const	Percent cover		
		Ave	Min	Max
REPRODUCING TREES				
Picea engelmannii	50	Tr	0	Tr
Pinus contorta var. *latifolia*	50	Tr	0	Tr
SHRUB LAYER				
Vaccinium uliginosum	50	2	0	4
Salix geyeriana	50	Tr	0	Tr
Alnus incana	50	Tr	0	Tr
HERB LAYER				
Juncus nevadensis	100	38	35	40
Mimulus primuloides	50	10	0	20
Carex utriculata	50	5	0	10
Hypericum anagalloides	50	5	0	10
Triantha occidentalis	50	4	0	7
Carex simulata	50	3	0	5
Menyanthes trifoliata	50	3	0	5
Poa palustris	50	3	0	5
Carex aquatilis var. *dives*	50	2	0	3
Deschampsia caespitosa	50	2	0	3
Muhlenbergia filiformis	50	1	0	2
Lysichiton americanus	50	1	0	1
Sanguisorba occidentalis	50	1	0	1
Carex lasiocarpa	50	1	0	1
Utricularia macrorhiza	50	Tr	0	1
Aster foliaceus	50	Tr	0	Tr
Eleocharis quinqueflora	50	Tr	0	Tr
Spiranthes romanzoffiana	50	Tr	0	Tr
Potamogeton gramineus	50	Tr	0	Tr
MOSS LAYER				
Moss	50	50	0	99

Vegetation and ecology: Habitat is montane marshes and fens. *Juncus nevadensis* usually forms nearly monotypic stands in seasonally or perennially flooded shallow depressions and requires more water than *Juncus balticus*. It is widespread but most common east of the Cascade Range. The two plots reported here are in fens, where trees and shrubs are mostly confined to hummocks or "tree islands" and the herb layer is mostly a wet lawn. This occurrence appears to be at the wet end of the spectrum for this association, is undersampled, and appears to differ somewhat in composition and structure from occurrences reported elsewhere. Woody species are scarce but typical for montane wetlands, and the most common include *Picea engelmannii, Pinus contorta* var. *latifolia,* and *Vaccinium uliginosum.* The herb layer is moderately diverse with about 20 species, and is dominated by *Juncus nevadensis* with an average cover of 38 percent and a narrow range from 35 to 40 percent. *Mimulus primuloides* is the only other species with significant patch size and indicates wet conditions. The moss layer in one plot is nearly 100 percent *Sphagnum*.

Global distribution: California to British Columbia and eastward

Other studies: Christy & Cornelius 1980: plot 6, 24; Kovalchik 1987: 138; Manning & Padgett 1991: 453 (NV); Titus & Christy 1996a.

Lemna minor Association

Common duckweed

Classification:

NVCS: *Lemna minor* Herbaceous Vegetation (CEGL003305)
Ecological System: Temperate Pacific Freshwater Aquatic Bed (CES200.876)
Rank: G5S5
Plots sampled: 2 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Lemna minor	100	90	80	100
Carex obnupta	50	35	0	70
Lysichiton americanus	50	5	0	10
Callitriche heterophylla	50	1	0	1

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): ave. 650, range 500-800 (and to sea level)
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: seasonally to perennially flooded
Soils: silt loam

Vegetation and ecology: Habitat is seasonal to perennial pools, ponds, lakes, and sloughs, usually at lower elevations. This association forms bright green floating mats on the surface of the water, usually growing so dense that no open water is visible. *Lemna* needs open water to proliferate in winter and spring but it tolerates being stranded on mudflats when ponds and pools dry out in summer. Although not included in these two plots, other small floating species are common components of this association, particularly *Spirodela polyrrhiza, Azolla, Wolffia*, and the aquatic liverworts *Ricciocarpos natans* and *Riccia fluitans*, but they are always subordinate to *Lemna.* All of these species can survive stranding on mud, but cannot survive complete desiccation. It is not clear if this association is enhanced by eutrophic conditions caused by enriched runoff in agricultural or urban landscapes.

Global distribution: California to Alaska and eastward

Other studies: Kunze 1994: 43, 46, 56 (WA); Rodwell 1995: 30 (UK); Titus et al. 1996; Jankovsky-Jones et al. 2001: 182 (ID).

Lilaeopsis occidentalis Association

Western grasswort

Classification:

NVCS: new
Ecological System: Temperate Pacific Freshwater Mudflat (CES200.878), North Pacific Intertidal Freshwater Wetland (CES204.875)
Rank: G3S3
Plots sampled: 3 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Lilaeopsis occidentalis	100	28	20	35
Crassula aquatica	100	13	1	35
Limosella aquatica	100	7	1	10
Eleocharis palustris	67	15	0	40
Eleocharis acicularis	67	7	0	10
Callitriche	67	2	0	5
Schoenoplectus americanus	33	3	0	10
Bidens cernua	33	1	0	3
Sium suave	33	1	0	3
Polygonum hydropiperoides	33	1	0	3
Juncus oxymeris	33	1	0	2
Elodea canadensis	33	Tr	0	1
Equisetum arvense	33	Tr	0	1
Myriophyllum spicatum	33	Tr	0	1
Alisma triviale	33	Tr	0	1
Gratiola neglecta	33	Tr	0	1
Sagittaria latifolia	33	Tr	0	1
Myriophyllum ussuriense	33	Tr	0	1
Ceratophyllum demersum	33	Tr	0	1
Juncus nevadensis	33	Tr	0	1

Distribution in NW Oregon: Coast Range, Willamette Valley

Environment:

Elevation (ft): ave. 5, range 1-10
Slope (deg): 0
Landform position: floodplains
Hydrology: perennially moist
Soils: silt loam

Vegetation and ecology: Habitat is mudflats in seasonal ponds and within or just above freshwater tidal zone of larger coastal rivers. This peculiar association is made up primarily of small, annual species on mud with a scattering of perennial species near the upper edge of the mudflats. *Lilaeopsis occidentalis, Crassula aquatica*, and *Limosella aquatica* are always present but with diminishing percent cover. They form clumps or mats that may migrate with receding moisture on seasonal lakebeds, or stay in place in perennially-irrigated muds within the freshwater tidal zone. *Eleocharis palustris, Eleocharis acicularis,* and an unidentified *Callitriche* are present in about half the plots, sometimes with cover up to 40 percent. *Lilaeopsis occidentalis* is more commonly seen in brackish estuaries but is also not infrequent in freshwater systems.

Global distribution: California to British Columbia

Other studies: Christy & Putera 1993: 40; Kunze 1994: 56, 97 (WA).

Ludwigia palustris - Polygonum hydropiperoides Association

Water-purslane - swamp smartweed

Classification:

NVCS: *Ludwigia palustris - Polygonum hydropiperoides* Herbaceous Vegetation (CEGL003330)
Ecological System: Temperate Pacific Freshwater Mudflat (CES200.878), Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G2S2
Plots sampled: 16 (12 macro, 4 micro)

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Salix lucida ssp. *lasiandra*	6	Tr	0	3
HERB LAYER				
Polygonum hydropiperoides	94	57	0	99
Ludwigia palustris	63	34	0	90
Bidens cernua	38	5	0	40
Eleocharis palustris	25	1	0	15

Distribution in NW Oregon: coast, Coast Range, Willamette Valley, Vancouver Basin

Environment:

Elevation (ft): ave. 288, range 10-500
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: seasonally flooded to moist
Soils: mostly silt loam, some organic

Vegetation and ecology: Habitat is seasonally flooded eutrophic lakes, ponds, and sloughs at low elevations. This association forms extensive stands in shallow seasonal lakes and ponds on floodplains and deflation plains, subject to drying in summer. It is more common in interior valleys on *Fraxinus* latifolia floodplains, but occurs sporadically along the coast. *Salix lucida* ssp. *lasiandra* is the only tree or shrub present but it has low constancy and cover because of extensive seasonal ponding. *Polygonum hydropiperoides* is the primary species with an average cover of 57 percent and ranges to 99 percent. It is not always present, and when absent the associated *Ludwigia palustris* is conspicuous. *Ludwigia* has a constancy of 63 percent, an average cover of 34 percent, and may range to 90 percent. Eighteen other species in the herb layer occur at low constancy and cover, except for significant patches of *Bidens cernua, Sagittaria latifolia*, or *Leersia oryzoides*. *Phalaris arundinacea* may also form patches but is inhibited by seasonal ponding. The association tolerates eutrophic conditions and flashy hydroperiods associated with urban and agricultural landscapes.

Global distribution: Oregon to Washington

Other studies: Christy & Putera 1993: 40; Kunze 1994: 46 (WA); Titus et al. 1996; Christy et al. 1998: 131.

Menyanthes trifoliata Association

Bogbean

Classification:

NVCS: *Menyanthes trifoliata* Herbaceous Vegetation (CEGL003410)
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877), North Pacific Bog and Fen (CES204.063), Boreal Fen (CES103.872)
Rank: G5S4
Plots sampled: 5 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Menyanthes trifoliata	100	32	10	60
Cicuta douglasii	40	1	0	5
Carex limosa	40	1	0	5
Lysichiton americanus	40	1	0	5
Carex echinata ssp. *echinata*	40	Tr	0	Tr
Carex arcta	20	2	0	12
Carex utriculata	20	2	0	10
Carex aquatilis var. *dives*	20	1	0	5
Drosera rotundifolia	20	1	0	5
Carex aquatilis	20	1	0	5
Cinna latifolia	20	1	0	5
Poa palustris	20	1	0	4
MOSS LAYER				
Moss	80	70	0	98

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): ave. 3664, range 3285- 4580 (also to sea level)
Slope (deg): 0
Landform position: floodplains, benches, basins
Hydrology: perennially flooded or saturated
Soils: organic

Vegetation and ecology: Habitat is in perennially flooded or saturated depressions, the edges of ponds, and in wet lawns in peatlands. This association is usually composed of nearly monotypic stands of *Menyanthes trifoliata,* with an average cover of 32 percent and ranging from 10-60 percent. Most of the remaining space between plants is open water, mud, or *Sphagnum*. About 10 other herbaceous species are recorded from these plots but all occur at low constancy and cover. Water levels may drop in summer but the substrate remains moist to saturated. The association is common between 2,000 and 6,000 feet elevation throughout western Oregon. Several historic occurrences were known from the Willamette Valley but only two are currently known. *Menyanthes* is fairly common in coastal peatlands but its occurrence as a plant association is limited. Here it may occur in wet lawns with more typical coastal peatland species such as *Carex cusickii, Comarum palustre, Carex obnupta,* and *Eriophorum chamissonis.*

Global distribution: northern California to Alaska and eastward

Other studies: Viereck et al. 1992: 198 (AK); Shephard 1995: 197 (AK); Crowe & Clausnitzer 1997: 200; Titus et al. 1996; Boggs 2000: 163 (AK); Christy 2001a: 38; Carsey et al. 2003: 440 (CO).

Nephrophyllidium crista-galli Association

Deer cabbage

Classification:

NVCS: new
Ecological System: North Pacific Bog and Fen (CES204.063),
Temperate Pacific Montane Wet Meadow (CES200.998)
Rank: G4S1
Plots sampled: 2 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Nephrophyllidium crista-galli	100	75	60	90
Carex aquatilis var. *aquatilis*	100	12	3	20
Boykinia major	100	9	3	15
Tofieldia glutinosa	100	4	2	5
Polygonum bistortoides	100	3	1	5
Parnassia fimbriata	100	1	1	1
Agrostis thurberiana	100	Tr	Tr	Tr
Senecio triangularis	100	Tr	Tr	Tr
Carex laeviculmis	50	3	0	5
Poaceae	50	Tr	0	Tr
Platanthera stricta	50	Tr	0	Tr
Luzula campestris	50	Tr	0	Tr
Platanthera dilatata	50	Tr	0	Tr
Epilobium ciliatum ssp. watsonii	50	Tr	0	Tr
Hypericum anagalloides	50	Tr	0	Tr
MOSS LAYER				
Moss	50	45	0	90

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 3585, range 3550-3620
Slope (deg): ave. 4, range 2-6
Landform position: slopes
Hydrology: perennially saturated
Soils: organic

Vegetation and ecology: Habitat is montane fens, forming extensive wet lawns or flushes on gentle to moderate slopes below springs and seeps. The slopes are laced with rivulets and are also irrigated by sheet flow. *Nephrophyllidium crista-galli* resembles *Caltha leptosepala ssp. howellii* and forms similar but denser stands in similar sloping, seepy habitats. Woody plants have scanty cover and are primarily restricted to hummocks or "tree islands" within a matrix of wet lawn, or they are peripheral to the wetland. *Nephrophyllidium* is the primary species in the herb layer, with average cover of 75 percent and ranging from 60-90 percent. *Carex aquatilis* var. *aquatilis* and *Boykinia major* may form significant patches. The twelve other species occur at very low cover values. *Nephrophyllidium* is rare in Oregon and was only recently discovered on the Salem BLM District. It has also been called *Fauria crista-galli.* These are probably the southernmost occurrences of this species in North America.

Global distribution: northern Oregon to Alaska

Other studies: Viereck et al. 1992: 50 (AK); Brett et al. 1998: 38 (BC), Boggs 2000: 169 (AK). All current NVCS listings of *Nephrophyllidium* are included in *Tsuga mertensiana* associations from Alaska and British Columbia, that evidently include forest edge or tree islands within the plot matrix. In Oregon the association occurs at much lower elevations than the *Tsuga mertensiana* zone, and species composition differs somewhat from stands reported from Alaska and British Columbia.

Nuphar lutea ssp. *polysepala* Association

Pond lily

Classification:

NVCS: *Nuphar lutea* ssp. *polysepala* Herbaceous Vegetation (CEGL002001)
Ecological System: Temperate Pacific Freshwater Aquatic Bed (CES200.876), Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G5S5
Plots sampled: 5 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Spiraea douglasii	20	Tr	0	1
HERB LAYER				
Nuphar lutea ssp. *polysepala*	100	34	2	60
Potamogeton natans	60	4	0	20
Sparganium angustifolium	20	6	0	30
Myriophyllum sibiricum	20	4	0	20
Lemna minor	20	3	0	15

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): ave. 2732, range 100-5010
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: seasonally to perennially flooded
Soils: mostly loam, some organic

Vegetation and ecology: Habitat is eutrophic ponds, lakes, and sloughs. *Nuphar lutea* ssp. *polysepala* forms rooted aquatic beds in ponds and lakes. It tolerates seasonal drying that may reveal its enormous, prehistoric-looking fleshy rhizomes at the bottom of mud cracks. Trees and shrubs are peripheral to the wetland. The herb layer in these plots contains 18 species, dominated by *Nuphar* with an average of 34 percent cover and ranging from 2-60 percent. *Potamogeton natans, Sparganium angustifolium,* and *Myriophyllum sibiricum* form significant patches in these plots, and other commonly associated species include species of *Glyceria*, *Brasenia schreberi, Dulichium arundinaceum, Menyanthes trifoliata, Utricularia macrorhiza,* and *Carex exsiccata.* The leaves of *Nuphar* float on the surface of the water or protrude 1-2 feet above it. Stands may cover extensive areas or be relatively sparse.

Global distribution: California to Alaska

Other studies: Seyer 1979: 46; Kovalchik 1992: 183 (WA); Viereck et al. 1992: 204 (AK); Kunze 1994: 23, 80 (WA); Rodwell 1995: 48 (UK); Shephard 1995: 187 (AK); Boggs 2000: 170 (AK); Christy et al. 1998: 134; Titus & Christy 1996a; Peck 1919: 347; Egler 1934: 14; Hansen 1942: 525; Seyer 1981: 7; Jankovsky-Jones et al. 1999: 23 (ID); Jankovsky-Jones et al. 2001: 182 (ID).

Oenanthe sarmentosa Association

Water parsley

Classification:

NVCS: *Oenanthe sarmentosa* Herbaceous Vegetation (CEGL003319)
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G4S4
Plots sampled: 7 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Alnus rubra	29	3	0	20
Fraxinus latifolia	14	11	0	80
Thuja plicata	14	Tr	0	Tr
Frangula purshiana	14	Tr	0	Tr
SHRUB LAYER				
Salix sitchensis	29	1	0	5
HERB LAYER				
Oenanthe sarmentosa	100	68	40	99
Carex deweyana ssp. *leptopoda*	43	Tr	0	1
Callitriche heterophylla	29	10	0	70
Typha latifolia	29	6	0	40
Eleocharis palustris	29	5	0	25
Poa trivialis	29	3	0	20
MOSS LAYER				
Moss	29	4	0	25

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): ave. 820, range 500-2340
Slope (deg): ave. 0, range 0-1
Landform position: floodplains, basins
Hydrology: seasonally flooded to perennially saturated
Soils: loam

Vegetation and ecology: Habitat is muddy openings in forested wetland (swamp), marsh, or shrub-swamp. *Oenanthe sarmentosa* typically forms stands in muddy openings in both deciduous and coniferous swamp and is most common at lower elevations. *Alnus rubra* and *Fraxinus latifolia* are the primary deciduous species, and *Thuja plicata* and *Picea sitchensis* are the primary conifers, but none of these occur with much constancy or cover and are mostly peripheral to the wetland. Shrubs are also scarce, with *Salix sitchensis* being the most common one in the plots. The herb layer may be diverse and over 40 species are recorded here, but most of them occur with low constancy and cover. *Oenanthe sarmentosa* is the primary species with average cover of 68 percent and a range of 40-99 percent. Other species with significant patches include *Callitriche heterophylla, Typha latifolia, Eleocharis palustris*, *Ranunculus uncinatus,* and *Lysichiton americanus*. Stands are usually flooded early in the season and dry down in summer, but the soil usually remains moist.

Global distribution: Oregon to British Columbia

Other studies: Frenkel et al. 1978: 99; Taylor & Frenkel 1979: 54; Taylor 1980: 51; Mitchell 1981: 114; Boss 1983: 107; Frenkel & Morlan 1990: 47; Titus et al. 1996.

Paspalum distichum Association

Knotgrass

Classification:

NVCS: *Paspalum distichum* Herbaceous Vegetation (CEGL003320)
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G3S3
Plots sampled: 3 (macro)

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): ave. 33, range 20-40
Slope (deg): ave. 2, range 0-5
Landform position: floodplains, basins
Hydrology: seasonally flooded to perennially moist
Soils: silt loam, sand

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Salix lucida ssp. *lasiandra*	67	1	0	2
REPRODUCING TREES				
Salix lucida ssp. *lasiandra*	33	2	0	5
SHRUB LAYER				
Salix fluviatilis	33	1	0	3
Salix sitchensis	33	Tr	0	1
HERB LAYER				
Paspalum distichum	100	57	40	70
Equisetum arvense	67	14	0	40
Eleocharis palustris	67	7	0	15
Phalaris arundinacea	67	6	0	15
Carex vulpinoidea	67	5	0	10
Helenium autumnale	67	4	0	8
Juncus effusus	67	3	0	8
Mentha pulegium	67	2	0	5
Polygonum hydropiperoides	67	2	0	4
Schoenoplectus tabernaemontani	67	1	0	2
Carex interrupta	33	3	0	10
Carex feta	33	3	0	10
Carex aperta	33	2	0	5
Lindernia dubia	33	2	0	5
Plantago major	33	Tr	0	1
Rumex crispus	33	Tr	0	1
Poa pratensis	33	Tr	0	1
Euthamia occidentalis	33	Tr	0	1

Vegetation and ecology: Habitat is shallow depressions in floodplains and wet prairie. This association forms dense, nearly monotypic stands on mud or sand flats. Stands are flooded seasonally but dry out in summer, although the water table is never far below the soil surface. Most occurrences are in the Willamette Valley and on the Columbia River floodplain in the Vancouver Basin. Here, *Salix lucida* ssp. *lasiandra, Salix fluviatilis,* and *Salix sitchensis* may be present but with low cover. Eighteen species are recorded from the herb layer, dominated by *Paspalum distichum* with an average cover of 57 percent and ranging from 40-70 percent. Other species with significant cover include *Equisetum arvense, Eleocharis palustris,* and *Phalaris arundinacea*. *Paspalum distichum* provides good forage for waterfowl but some managers consider it a nuisance in irrigation projects because it obstructs ditches.

Global distribution: California to Washington

Other studies: Christy & Putera 1993: 40; Kunze 1994: 47 (WA); Christy et al. 1998: 114; Jankovsky-Jones et al. 2001: 167 (ID).

Polygonum amphibium Association

Water smartweed

Classification:

NVCS: *Polygonum amphibium* Permanently Flooded Herbaceous Vegetation (CEGL002002)
Ecological System: Temperate Pacific Freshwater Aquatic Bed (CES200.876), Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G5S3
Plots sampled: 0

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): 10-1000
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: submerged aquatic
Soils: organic

Vegetation and ecology: Habitat is low-elevation eutrophic ponds, lakes, and sloughs. This is a rooted aquatic bed association that is widespread in western Oregon but has not been sampled and little information is available. *Polygonum amphibium* may form extensive floating mats on the surface of lakes and ponds but it also tolerates seasonal drying. Stands sampled elsewhere are usually monotypic, with 30-95 percent cover. This association is most common at low elevations and provides important habitat for aquatic invertebrates and fish. It is likely that it is enhanced by enriched runoff in agricultural or urban landscapes.

Global distribution: California to British Columbia

Other studies: Christy & Putera 1993; Kunze 1994: 47 (WA); Rodwell 1995: 56 (UK); Christy et al. 1998: 133; Jankovsky-Jones et al. 2001: 180 (ID).

Potamogeton natans Association

Floating-leaved pondweed

Classification:

NVCS: *Potamogeton natans* Herbaceous Vegetation (CEGL002925)
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877), Temperate Pacific Freshwater Aquatic Bed (CES200.876)
Rank: G5S5
Plots sampled: 3 (2 macro, 1 micro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Potamogeton natans	100	70	60	85
Utricularia	33	20	0	60
Sparganium angustifolium	33	12	0	35
Spirodela polyrrhiza	33	7	0	20
Polygonum	33	2	0	5
Eleocharis palustris	33	2	0	5
Argentina egedii	33	Tr	0	1
Myosotis laxa	33	Tr	0	1
Veronica scutellata	33	Tr	0	1
Polygonum hydropiperoides	33	Tr	0	Tr

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): ave. 633, range 100-1200
Slope (deg): 0
Landform position: floodplains, benches, basins
Hydrology: seasonally to perennially flooded
Soils: silt loam, sand, organic

Vegetation and ecology: Habitat is ponds, pools, lakes, and sloughs. This association forms rooted aquatic beds with mats of leaves that float on the surface of the water, and can tolerate seasonal drying if the substrate remains wet. *Potamogeton natans* is the primary species with an average cover of 70 percent and ranging from 60-85 percent. Other species present with significant patches include *Utricularia macrorhiza*, *Nuphar lutea* ssp. *polysepala,* and *Brasenia schreberi. Potamogeton* frequently intermixes with adjoining associations and many ecologists sample these mixed stands rather than the monotypic stands.

Global distribution: California to Alaska and eastward

Other studies: Kunze 1994: 23 (WA); Rodwell 1995: 53 (UK); Titus 1996; Boggs 2000: 173 (AK); Christy et al. 1998: 136; Titus & Christy 1996a; Peck 1919: 347

Ranunculus aquatilis Association

Water crowfoot

Classification:

NVCS: *Ranunculus aquatilis* Herbaceous Vegetation (CEGL003307)
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877), Temperate Pacific Freshwater Aquatic Bed (CES200.876)
Rank: G5S5
Plots sampled: 3 (2 macro, 1 micro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Ranunculus aquatilis	100	88	75	98
Alopecurus aequalis	67	4	0	6
Veronica scutellata	67	3	0	6
Callitriche	33	18	0	55
Eleocharis acicularis	33	10	0	30
Mentha arvensis	33	4	0	12
MOSS LAYER				
Moss	33	1	0	2

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): ave. 1483, range 500-2800
Slope (deg): 0
Landform position: floodplains, benches
Hydrology: seasonally to perennially flooded
Soils: organic or loam

Vegetation and ecology: Habitat is shallow pools or ponds in open or wooded situations. *Ranunculus aquatilis* forms beds of rooted aquatic vegetation, usually in nearly monotypic stands. It occurs in both hardwood forests of *Fraxinus latifolia, Alnus rubra,* and *Acer* macrophyllum, and also in forests of *Pseudotsuga menziesii* and *Thuja plicata.* No woody vegetation is recorded from these plots. Twelve species are repored from the herb layer, *Ranunculus aquatilis* being the most abundant with an average cover of 88 percent and ranging from 75-98 percent. *Alopecurus aequalis* and *Veronica scutellata* occur in slightly over half the plots but at very low cover. An unidentified *Callitriche* and *Eleocharis acicularis* form some significant patches, but the rest of the species occur only in very small amounts. Smaller pools containing this association often dry up in summer and the plants die and disappear when desiccated. These seasonal pools are favored egg-laying sites for amphibians.

Global distribution: California to British Columbia

Other studies: Viereck et al. 1992: 206 (AK); Rodwell 1995: 87 (UK); Titus et al. 1996; Jankovsky-Jones et al. 2001: 182 (ID); Crawford 2003: 95 (WA).

Ranunculus flammula Association

Creeping buttercup

Classification:

NVCS: new
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877), Temperate Pacific Freshwater Aquatic Bed (CES200.876)
Rank: G5S3
Plots sampled: 8 (1 macro, 7 micro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Ranunculus flammula	100	51	15	70
Carex aquatilis var. *dives*	25	3	0	13
Potamogeton	13	6	0	45
Carex utriculata	13	3	0	20
Dodecatheon jeffreyi	13	Tr	0	1
Carex lenticularis	13	Tr	0	Tr
MOSS LAYER				
Moss	25	1	0	5

Distribution in NW Oregon:

Coast Range, Cascade Range

Environment:

Elevation (ft): ave. 3886, range 2800-5410
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: seasonally flooded to perennially moist
Soils: organic or loam

Vegetation and ecology:

Habitat is seasonally flooded depressions where peat or mud are exposed at low water. *Ranunculus flammula* forms sparse to dense aquatic mats in shallow depressions that dry out as summer progresses, when plants persist and flower in stoloniferous mats over the mud. Woody vegetation is peripheral to the wetland and may include various species of *Salix, Vaccinium uliginosum*, and *Spiraea douglasii*. *Ranunculus flammula* is the principal herbaceous species with an average cover of 51 percent and ranging from 15 to 90 percent. Five other species of herbs are recorded, all with low constancy and cover, except for patches of an unidentified *Potamogeton* and *Carex utriculata*. Occurrences can become quite dry late in the season and *Ranunculus flammula* disappears under heavy trampling by elk. These seasonal pools are favored egg-laying sites for amphibians.

Global distribution:

California to British Columbia

Other studies:

Not known

Sagittaria latifolia Association

Broadleaf arrowhead

Classification:

NVCS*: Sagittaria latifolia* Herbaceous Vegetation (CEGL003321)

Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877), North Pacific Intertidal Freshwater Wetland (CES204.875)

Rank: G3S2

Plots sampled: 14 (8 macro, 6 micro)

Species	Const	Percent cover		
		Ave	Min	Max
REPRODUCING TREES				
Salix lucida ssp. *lasiandra*	7	1	0	10
HERB LAYER				
Sagittaria latifolia	100	52	25	85
Eleocharis palustris	64	4	0	15
Bidens cernua	36	7	0	35
Schoenoplectus tabernaemontani	36	3	0	35
Lindernia dubia	36	2	0	20
Eleocharis ovata	29	4	0	25
Elatine	21	2	0	20
Ludwigia palustris	21	Tr	0	2

Distribution in NW Oregon:

Willamette Valley, Columbia River bottoms, Coast Range

Environment:

Elevation (ft): ave. 121, range 6-500

Slope (deg): 0

Landform position: floodplains, basins

Hydrology: seasonally or perennially flooded to perennially saturated

Soils: silt loam

Vegetation and ecology: Habitat is seasonal pools, ponds, sloughs, and freshwater tidal mudflats. This association forms emergent marsh and is primarily a low-elevation wetland type in western Oregon. Stands are flooded early in the season and may dry out as summer progresses, or may remain flooded throughout the growing season, and some are irrigated by daily freshwater tides along the lower Columbia River. They typically occur in floodplain openings ringed by often extensive stands of the *Salix lucida* ssp. *lasiandra* association and are generally too wet for *Fraxinus latifolia* or *Spiraea douglasii*. Twenty-nine herbaceous species are recorded from these plots, *Sagittaria latifolia* being the most abundant with an average cover of 52 percent and ranging from 25-85 percent. *Eleocharis palustris* is present in more than half the plots but at low cover. Other species with significant patches include *Bidens cernua, Schoenoplectus tabernaemontani,* Sparganium angustifolium, *Potamogeton natans, Leersia oryzoides*, and *Eleocharis ovata.* Conditions are usually too wet for *Phalaris arundinacea* except around the edges of ponds and sloughs where competition is intense. *Sagittaria latifolia* was a well-documented staple food of the Kalapuya and Chinook people and intensively managed (Darby 1996, Boyd 1999). It was probably widespread on floodplains in the Willamette Valley but has become rare because of loss of pond and slough habitat to flood control, agriculture, urban development, and *Phalaris arundinacea.* The largest populations remaining in the region occur on Sauvie Island.

Global distribution: California to British Columbia

Other studies: Christy & Putera 1993: 40; Kunze 1994: 48, 57 (WA); Titus et al. 1996; Smith 1976: 1; Darby 1996.

Sanguisorba officinalis - Carex aquatilis var*. dives* Association

Burnet - Sitka sedge

Classification:

NVCS: new
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G4S3
Plots sampled: 13 (8 macro, 5 micro)

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 3148, range 1650-3800
Slope (deg): ave. 1, range 0-3
Landform position: slopes, basins
Hydrology: perennially saturated
Soils: mostly organic, some loam

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Vaccinium uliginosum	23	5	0	60
Salix commutata	23	1	0	6
HERB LAYER				
Sanguisorba officinalis	100	48	10	85
Carex aquatilis var. *dives*	77	20	0	70
Caltha leptosepala ssp. *howellii*	38	8	0	70
Hypericum anagalloides	31	2	0	25
Parnassia fimbriata	31	2	0	10
Trientalis europaea ssp. *arctica*	31	1	0	10
Tofieldia glutinosa	31	1	0	7
Equisetum arvense	31	Tr	0	1
Platanthera dilatata	31	Tr	0	Tr
Dodecatheon jeffreyi	23	1	0	7
Drosera rotundifolia	23	1	0	5
Equisetum fluviatile	23	Tr	0	4
Pedicularis groenlandica	23	Tr	0	3
Gentiana sceptrum	23	Tr	0	1
MOSS LAYER				
Moss	54	12	0	50

Vegetation and ecology: Habitat is montane fens. This association forms sloping to level wet lawn vegetation interspersed with scattered hummocks or "tree islands." Stands are irrigated by sheet flow from springs and seeps. Some stands occur in aapamire or "string fen," a distinctive boreal peatland formation where clusters of small elliptical or elongated pools 3-15 feet in diameter form on gentle slopes of peat, their long axes oriented parallel to the contour much like a series of small rice paddies on a hillside. A few sites containing aapamire are known from the Oregon Cascades and these may be the southernmost occurrence of this formation in North America. Trees are not reported from these plots but may include *Pinus contorta* var. *latifolia, Picea sitchensis,* and *Abies lasiocarpa* that occur on scattered hummocks. *Vaccinium uliginosum* and *Salix commutata* are the only shrubs reported here and also are confined to hummocks. Almost 50 different species are reported from the herb layer, the principal species being *Sanguisorba officinalis* and *Carex aquatilis* var*. dives. Sanguisorba* has an average cover of 48 percent and ranges from 10 to 85 percent. *Carex aquatilis* var*. dives* is usually present in plots or evident nearby, with cover ranging up to 70 percent. Other species with significant patches include *Caltha leptosepala* ssp*. howellii, Hypericum anagalloides*, and *Sphagnum.*

Global distribution: Oregon to British Columbia

Other studies: Not known. This association is close to the NVCS *Carex utriculata - Carex aquatilis* var*. dives - Sanguisorba officinalis / Sphagnum* spp. Herbaceous Vegetation type.

Schoenoplectus acutus Association

Hardstem bulrush

Classification:

NVCS: *Schoenoplectus acutus* Herbaceous Vegetation (CEGL001840)
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G5S5
Plots sampled: 7 (4 macro, 3 micro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Vaccinium uliginosum	14	Tr	0	1
Spiraea douglasii	14	Tr	0	1
HERB LAYER				
Schoenoplectus acutus	100	43	20	80
Athyrium filix-femina	29	4	0	25
Iris pseudacorus	29	4	0	15
Oenanthe sarmentosa	29	1	0	5
Aster subspicatus	29	1	0	4
Lotus corniculatus	29	Tr	0	1

Distribution in NW Oregon: coast, Coast Range

Environment:

Elevation (ft): ave. 26, range 5-100
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: seasonally flooded to perennially flooded
Soils: mostly organic, some loam

Vegetation and ecology: Habitat is emergent marsh around the margins of lakes and ponds. *Schoenoplectus acutus* typically forms extensive, nearly monotypic stands that may tolerate summer drying as long as the substrate remains damp. Trees are absent because conditions are too wet. *Vaccinium uliginosum* and *Spiraea douglasii* are reported from these plots but it is more typical to see stands of *Schoenoplectus acutus* with no shrubs and few other herbaceous species. *Schoenoplectus* is the primary species in the herb layer, with an average cover of 43 percent and a range of 20-80 percent. Total herb cover, exclusive of bulrush, ranges from 0-50 percent, with the lowest values occurring in permanently-flooded stands. *Potamogeton natans* and *Brasenia schreberi* are frequent associates in flooded sites, but much of the remaining area is open water or litter between stems of *Schoenoplectus.* Other herbs in slightly drier sites may be *Athyrium filix-femina*, *Typha latifolia*, and *Scirpus microcarpus.* The ground is typically covered with dense litter from the previous year's stand of *Schoenoplectus* unless the site has been burned. Although *Schoenoplectus acutus* thrives under perennially-flooded conditions, there are limits to the depth of inundation that it can tolerate, and a prolonged rise in water levels caused by new beaver dams or water control structures can completely kill extensive stands. This association appears to be most common along the coast and east of the Cascade Range, particularly in alkaline areas, while the *Schoenoplectus tabernaemontani* association appears to be more common in the interior valleys of western Oregon. This difference in distribution, if real, has been obscured to some extent in the Willamette Valley by plantings of *Schoenoplectus acutus* for wildlife habitat. Mixed stands are frequent in the Columbia River estuary. No plot data were available for the *Schoenoplectus tabernaemontani* association, but structure and associated species are quite similar.

Global distribution: California to British Columbia

Other studies: Christy & Cornelius 1980: plot 13; Dethier 1990: 36 (WA); Kunze 1994: 24, 58, 81 (WA); Christy et al. 1998: 116; Moseley 1998: 36 (ID); Griffiths 1902: 46; Jefferson 1975: 54; Kierstead & Pogson 1976: 1-13; MacDonald 1977: 172; Copeland 1979a: 12. Thomas 1980: 10; Sawyer & Keeler-Wolf 1995: 35 (CA); Padgett et al. 1989: 116 (ID, UT); Evans 1989: 30 (WA); Jankovsky-Jones et al. 1999: 34 (ID).

Scirpus microcarpus Association

Small-fruited bulrush

Classification:

NVCS: *Scirpus microcarpus* Herbaceous Vegetation (CEGL003322)
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G4S4
Plots sampled: 20 (15 macro, 5 micro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Alnus incana	4	Tr	0	5
Rosa pisocarpa	4	Tr	0	2
Salix	4	Tr	0	1
Salix commutata	4	Tr	0	Tr
Rubus laciniatus	4	Tr	0	Tr
Spiraea douglasii	4	Tr	0	Tr
Rubus spectabilis	4	Tr	0	Tr
Rubus ursinus	4	Tr	0	Tr
HERB LAYER				
Scirpus microcarpus	100	75	15	98
Glyceria striata	39	2	0	15
Mimulus guttatus	35	1	0	10
Lysichiton americanus	30	4	0	35
Athyrium filix-femina	30	3	0	60
Oenanthe sarmentosa	26	6	0	80
Stachys ajugoides var. *rigida*	26	6	0	40
MOSS LAYER				
Moss	30	4	0	49

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): ave. 2732, range 560-4100
Slope (deg): ave. 2, range 0-25
Landform position: slopes, basins
Hydrology: seasonally moist to perennially saturated
Soils: organic, loam, sand

Vegetation and ecology: Habitat is marshes, fens, or springs. Data from these plots is highly variable and a number of different phases could be segregated with further study. Stands are usually monotypic and may reach heights of 3 feet. Trees are peripheral to the wetlands and can be both deciduous or conifers. Eight shrubs are reported from these stands but all have negligible constancy and cover. Almost 80 species are reported from the herb layer, presumably because of the great variety of habitats and elevations in which the association occurs. *Scirpus microcarpus* is the primary species, with average cover of 75 percent and ranging from 15-98 percent. Most other species have much lower constancy and cover. Associated species with significant patches include *Lysichiton americanus*, *Athyrium filix-femina, Oenanthe sarmentosa, Stachys ajugoides* var. *rigida, Carex aquatilis* var. *dives*, and *Senecio triangularis*.

Global distribution: northern California and Alaska

Other studies: Frenkel et al. 1978: 82; Ganskopp 1979: 39; Boss 1983: 113; Kovalchik 1987: 112; Evenden 1989: 44; Kovalchik 1992: 179 (WA); Diaz & Mellen 1996: 187; Titus 1996; Crowe & Clausnitzer 1997: 206; Christy 2001a: 37; Glad et al. 1987: 261; Evans 1989: 31 (WA); Jankovsky-Jones et al. 1999: 35 (ID); Jankovsky-Jones et al. 2001: 169 (ID).

Senecio triangularis Association

Arrowleaf groundsel

Classification:

NVCS: *Senecio triangularis* Herbaceous Vegetation (CEGL001987)
Ecological System: Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G4S4
Plots sampled: 21 (16 macro, 5 micro)

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 3805, range 3120-5150
Slope (deg): ave. 17, range 0-70
Landform position: floodplains, basins, slopes
Hydrology: seasonally moist to perennially saturated
Soils: organic, loam, or rocky

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Picea engelmannii	24	8	0	100
Abies lasiocarpa	10	1	0	15
REPRODUCING TREES				
Picea engelmannii	33	1	0	7
Tsuga heterophylla	24	Tr	0	4
SHRUB LAYER				
Vaccinium ovalifolium	29	1	0	7
Alnus incana	24	1	0	15
HERB LAYER				
Senecio triangularis	90	13	0	35
Aconitum columbianum	52	4	0	25
Platanthera stricta	48	Tr	0	3
Trautvetteria caroliniensis	43	6	0	60
Stachys ciliata	43	1	0	6
Valeriana sitchensis	43	Tr	0	3
Tiarella trifoliata var. *unifoliata*	38	Tr	0	2
Veratrum viride	33	8	0	45
Caltha leptosepala ssp. *howellii*	33	5	0	35
Epilobium alpinum	33	1	0	10
Mimulus guttatus	33	1	0	5
Mertensia paniculata	33	1	0	5
Aster modestus	29	3	0	20
Glyceria striata	29	3	0	30
Heracleum lanatum	29	1	0	6
Veronica americana	29	Tr	0	4

Vegetation and ecology: 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. Floristically it is extremely diverse because it contains elements of both wetlands and uplands, and it is difficult to segregate types that are meaningful. Twelve different species of mature and reproducing trees are present, most with low constancy and cover. *Picea engelmannii* is the primary species, occurring in up to one-third of the plots and with up to 100 percent cover, but with less than 10 percent average cover. Twenty different species are recorded from the shrub layer, also with low constancy and cover, *Vaccinium ovalifolium* being the most common. An astonishing 130 species are reported from the herb layer, but most of these occur at very low constancy and cover. *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*. Other species with significant patches include *Trautvetteria caroliniensis, Trifolium longipes, Deschampsia caespitosa*, *Solidago canadensis,* and *Elymus glaucus.*

Global distribution: California to Alaska

Other studies: Hemstrom et al. 1987: 251; Kovalchik 1987: 124; Manning & Padgett 1991: 95, 365, 373 (NV); Diaz & Mellen 1996: 191; Crowe & Clausnitzer 1997: 212; Hickman 1976: 150.

Sparganium angustifolium Association

Simplestem bur-reed

Classification:

NVCS: *Sparganium angustifolium* Herbaceous Vegetation (CEGL001990)
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G4S3
Plots sampled: 11 (6 macro, 5 micro)

Species	Const	Percent cover		
		Ave	Min	Max
SHRUB LAYER				
Spiraea douglasii	9	1	0	12
HERB LAYER				
Sparganium angustifolium	100	60	20	80
Callitriche heterophylla	55	6	0	50
Veronica scutellata	45	1	0	4
Oenanthe sarmentosa	18	4	0	40
Juncus effusus	18	1	0	12
Callitriche	18	1	0	5
Torreyochloa pallida var. *pauciflora*	18	Tr	0	2

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): ave. 1810, range 100-2800
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: seasonally flooded to perennially flooded
Soils: organic or loam

Vegetation and ecology: Habitat is seasonally or perennially-flooded shallow pools, ponds, and freshwater tidal flats. *Sparganium angustifolium* forms nearly monotypic stands and can fill entire basins. It tolerates draw-down of water levels in summer but the substrate must remain moist. Trees are absent from these plots and shrubs are scarce and usually peripheral to stands sampled. *Salix hookeriana* and *Spiraea douglasii* are typical associates. About 25 species are reported from the herb layer, but most occur only in trace amounts. *Sparganium angustifolium* is the primary species with average cover of 60 percent and ranging from 20-80 percent. *Callitriche heterophylla* is present in about half the plots, with cover up to 50 percent. Other species with significant patches include *Oenanthe sarmentosa, Potamogeton natans, Juncus effusus,* and *Carex obnupta*. Most of the area between plants is open water or bare mud. Growth is clonal, the plants spreading by rhizomes. These sites are favored feeding areas for beaver.

Global distribution: California to British Columbia

Other studies: Kovalchik 1992: 185 (WA); Kunze 1994: 50, 59 (WA); Christy & Putera 1993: 40; Titus et al. 1996; Christy et al. 1998: 138; Titus & Christy 1996a; Jankovsky-Jones et al. 2001: 182 (ID).

Sparganium eurycarpum Association

Broadfruit bur-reed

Classification:

NVCS: *Sparganium eurycarpum* Herbaceous Vegetation (CEGL003323)
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G5S3
Plots sampled: 5 (micro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Sparganium eurycarpum	100	34	20	45
Cicuta douglasii	20	2	0	10
UNVEGETATED				
Litter	100	45	15	70
Water	80	19	0	35

Distribution in NW Oregon: coast, Coast Range, Willamette Valley

Environment:

Elevation (ft): 20-200
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: seasonally to perennially flooded
Soils: organic, loam

Vegetation and ecology: Habitat is shallow lakes, ponds, and sloughs. *Sparganium eurycarpum* forms nearly monotypic emergent stands with most of the space between plants occupied by litter or open water. *Sparganium* has an average cover of 34 percent and ranges from 20-45 percent cover. No other vegetation is reported here except for *Cicuta douglasii,* but almost any common emergent species could be present in small amounts. The association appears to be limited to low elevations.

Global distribution: California to British Columbia

Other studies: Kunze 1994: 81(WA); Christy & Brophy 2002; Evans 1989: 33 (WA); Carsey et al. 2003: 440 (CO); Crawford 2003: 95 (WA).

Torreyochloa pallida var*. pauciflora* Association

Pale false mannagrass

Classification:

NVCS: new
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877), Temperate Pacific Montane Wet Meadow (CES200.998), Boreal Fen (CES103.872)
Rank: G3S2
Plots sampled: 6 (macro)

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): ave. 1848, range 880-3825
Slope (deg): ave. 0, range 0-2
Landform position: floodplains, basins, benches
Hydrology: perennially moist to flooded
Soils: mostly loam, some sand or organic

Vegetation and ecology: Habitat is sodden edges of fens, meadows, and marshes, including beaver marshes. *Torreyochloa pallida* var. *pauciflora* forms sparse to dense stands of low to moderate diversity. Most trees are peripheral but *Alnus rubra* may be present in small amounts. Shrubs are also peripheral and *Salix sitchensis* is the most common species reported here, but at low constancy and cover. More than 35 species are reported from the herb layer, but most occur at very low constancy and cover. *Torreyochloa pallida* var. *pauciflora* is most abundant, with average cover of 56 percent and ranging from 30-80 percent. Other species with significant patches may include *Juncus effusus, Typha latifolia,* and *Lysichiton americanus.* Most of the surface between plants is mud or open water.

Global distribution: California to British Columbia

Other studies: Crowe & Clausnitzer 1997: 212.

Species	Const	Percent cover		
		Ave	Min	Max
REPRODUCING TREES				
Alnus rubra	17	Tr	0	Tr
SHRUB LAYER				
Salix sitchensis	33	Tr	0	Tr
Rubus ursinus	17	Tr	0	Tr
HERB LAYER				
Torreyochloa pallida var. *pauciflora*	100	56	30	80
Veronica americana	67	1	0	3
Scirpus microcarpus	67	1	0	1
Juncus effusus	50	9	0	30
Typha latifolia	50	5	0	25
Oenanthe sarmentosa	50	1	0	5
Lysichiton americanus	33	9	0	50
Callitriche	33	2	0	6
Sparganium angustifolium	33	2	0	6
Carex obnupta	33	1	0	3
Myosotis laxa	33	Tr	0	2
Phalaris arundinacea	33	Tr	0	Tr
Stellaria calycantha	33	Tr	0	Tr
MOSS LAYER				
Moss	17	Tr	0	Tr

Trichophorum caespitosum Association

Tufted clubrush

Classification:

NVCS: *Trichophorum caespitosum* Saturated Herbaceous Vegetation (CEGL002679)
Ecological System: Boreal Fen (CES103.872)
Rank: G4S2
Plots sampled: 9 (macro)

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): ave. 3442, range 2650-4240
Slope (deg): ave. 5, range 0-15
Landform position: floodplains, basins
Hydrology: perennially moist to perennially saturated
Soils: mostly organic, some loam

Vegetation and ecology: Habitat is montane fens, forming wet lawns on flats or gentle to moderate slopes below springs and seeps. *Trichophorum caespitosum* forms conspicuous tussocks in montane peatlands but is not common in Oregon. The habitat is similar to other montane fens in similar sloping, seepy sites. Trees have scanty cover and are primarily restricted to hummocks or "tree islands" within a matrix of wet lawn, or they are peripheral to the wetland. Species include *Pinus monticola, Thuja plicata, Tsuga heterophylla,* and *Abies amabilis,* but all have low constancy and cover. Nine different species are reported from the shrub layer, the primary one being *Vaccinium uliginosum*, but these also have low constancy and cover. Over 40 species are reported from the herb layer, most of them typical of wet lawns in fens. *Trichophorum caespitosum* is most abundant with 44 percent cover and ranging from 20-75 percent. *Tofieldia glutinosa* is present in all plots but with low cover. Other species with significant patches include *Hypericum anagalloides, Caltha leptosepala* ssp. *howellii, Sanguisorba officinalis, Eriophorum gracile, Carex aquatilis* var. *dives,* and *Carex utriculata.* *Trichophorum caespitosum* is uncommon in Oregon and occurrences of this association are limited to the northern part of the Cascade Range.

Global distribution: Oregon to Alaska

Other studies: Viereck et al. 1992: 44 (AK); Shephard 1995: 173 (AK)

Species	Const	Percent cover		
		Ave	Min	Max
MATURE TREES				
Pinus monticola	11	Tr	0	2
REPRODUCING TREES				
Thuja plicata	33	3	0	22
SHRUB LAYER				
Vaccinium uliginosum	67	3	0	7
Gaultheria ovatifolia	33	Tr	0	1
HERB LAYER				
Trichophorum caespitosum	100	44	20	75
Tofieldia glutinosa	100	5	Tr	15
Hypericum anagalloides	89	29	0	65
Caltha leptosepala ssp. *howellii*	89	9	0	20
Sanguisorba officinalis	67	11	0	25
Eriophorum gracile	67	4	0	30
Dodecatheon jeffreyi	56	3	0	15
Drosera rotundifolia	56	2	0	6
Agrostis thurberiana	56	1	0	7
Parnassia fimbriata	56	1	0	5
Gentiana sceptrum	56	Tr	0	Tr
Carex aquatilis var. *dives*	44	7	0	30
Carex luzulina	44	2	0	8
Platanthera dilatata	44	1	0	5
Deschampsia caespitosa	44	Tr	0	1
Trientalis europaea ssp. *arctica*	44	Tr	0	1
Blechnum spicant	33	2	0	15
Pedicularis groenlandica	33	2	0	15
Packera cymbalarioides	33	1	0	8
MOSS LAYER				
Moss	67	2	0	7

Triteleia hyacinthina Association

White brodiaea

Classification:

NVCS: new
Ecological System: Willamette Valley Wet Prairie (CES204.874)
Rank: G2S2
Plots sampled: 12 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Triteleia hyacinthina	100	62	35	95
Hypochaeris radicata	92	12	0	40
Camassia quamash	75	11	0	30
Danthonia californica	50	1	0	3
Prunella vulgaris	33	8	0	45
Lotus pinnatus	33	1	0	8
Centaurium erythraea	33	Tr	0	2
Hypericum anagalloides	25	Tr	0	1
Eleocharis acicularis	25	Tr	0	1
MOSS LAYER				
Moss	58	15	0	60

Distribution in NW Oregon: Willamette Valley

Environment:

Elevation (ft): 500
Slope (deg): 0
Landform position: floodplains
Hydrology: seasonally moist
Soils: loam

Vegetation and ecology: Habitat is seasonally wet prairie on shallow soil over basalt bedrock. This is a poorly-documented association in prairie with a seasonal perched water table. Woody species are absent from these plots but may include *Quercus garryana*, *Symphoricarpos albus,* or *Spiraea douglasii*. A shallow mantle of soil supports a mix of dry upland prairie species (e.g., *Poa scabrella, Festuca roemeri, Danthonia californica, Lomatium utriculatum, Plectritis congesta*) on convex surfaces and wet prairie species in concave surfaces. The concave surfaces pool water in winter and spring and support at least 25 herbaceous species recorded in these plots, about one-third of which are exotics. The primary species is *Triteleia hyacinthina* with average cover of 62 percent and ranging from 35-95 percent. The exotic *Hypochaeris radicata* is the second most abundant species, but other native species with significant patches include *Camassia quamash* and *Prunella vulgaris*. The moss layer may contain *Polytrichum piliferum* and *Racomitrium ericoides* that indicate severe drying later in the summer. Conspicuous sheets of algae turn white when they dry and delineate areas of seasonally pooled water, a good secondary indicator of hydric conditions in sites that don't otherwise meet wetland criteria because of a lack of hydric soils. A challenging aspect of this association is that most of the *Triteleia* is sterile, showing only short terete shoots, and some researchers have called this the "unknown *Brodiaea* association." Stands intergrade with the *Camassia quamash* association where deeper pockets of soil occur.

Global distribution: Oregon to British Columbia

Other studies: Titus & Christy 1996b; Huddleston 1999; Borgias 1993: 3.

Typha latifolia Association

Broadleaf cattail

Classification:

NVCS: *Typha latifolia* Western Herbaceous Vegetation (CEGL002010)
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G5S5
Plots sampled: 4 (macro)

Distribution in NW Oregon: throughout at lower elevations

Environment:

Elevation (ft): ave. 1299, range 500-1950
Slope (deg): 0-1
Landform position: floodplains, basins, flats
Hydrology: seasonally moist to perennially saturated
Soils: loam

Vegetation and ecology: Habitat is shallow depressions, marshes, edges of lakes, and freshwater tidal flats. This is a common association but is overlooked and undersampled. The general aspect is usually a monotype of *Typha latifolia,* but closer inspection shows some differentiation based on patches of other vegetation. The only woody species recorded in these four plots are *Frangula purshiana* and *Salix hookeriana* with 25 percent constancy but with only trace cover. About twenty species are recorded from the herb layer, with *Typha latifolia* being most abundant with an average cover of 54 percent and ranging from 40-65 percent. All other species have low constancy, but some with significant patches include *Myosotis laxa,* and unidentified *Mentha,* and *Scirpus microcarpus.* Some exotics are evident and indicate low elevation and proximity to settlement. Although this association is native, it appears to respond positively to eutrophic conditions caused by agricultural and urban runoff. Changes in surface and groundwater flows associated with road construction also appear to have a strong influence on this association.

Species	Const	Percent cover		
		Ave	Min	Max
REPRODUCING TREES				
Frangula purshiana	25	Tr	0	Tr
SHRUB LAYER				
Salix hookeriana	25	1	0	2
HERB LAYER				
Typha latifolia	100	54	40	65
Myosotis laxa	25	9	0	35
Mentha	25	8	0	30
Scirpus microcarpus	25	8	0	30
Equisetum arvense	25	3	0	13
Carex stipata	25	3	0	10
Cirsium arvense	25	2	0	9
Glyceria striata	25	2	0	7
Stachys ciliata	25	1	0	5
Veronica scutellata	25	1	0	5
Cicuta douglasii	25	1	0	3
Elymus glaucus	25	1	0	2
Epilobium glaberrimum	25	Tr	0	1
Agrostis stolonifera	25	Tr	0	1
Lysichiton americanus	25	Tr	0	1
Agrostis thurberiana	25	Tr	0	1
Carex echinata ssp. *echinata*	25	Tr	0	1
Athyrium filix-femina	25	Tr	0	1
Galium aparine	25	Tr	0	1
Polygonum hydropiper	25	Tr	0	1
MOSS LAYER				
Moss	25	24	0	95

Global distribution: California to Alaska

Other studies: Copeland 1979a: 12; Boss 1983: 51, 98; Sanville et al. 1986: 127; Padgett et al. 1989: 94 (ID, UT); Dethier 1990: 36 (WA); Kovalchik 1992: 189 (WA); Kunze 1994: 24, 97 (WA); Rodwell 1995: 179 (in part; UK); Crowe & Clausnitzer 1997: 202; Titus et al. 1999 (WA); Evans 1989: 33 (WA); Jankovsky-Jones et al. 1999: 38 (ID); Jankovsky-Jones et al. 2001: 181 (ID); Crawford 2003: 94 (WA).

Utricularia macrorhiza Association

Common bladderwort

Classification:

NVCS: *Utricularia macrorhiza* Herbaceous Vegetation (G5, CEGL003310)
Ecological System: Temperate Pacific Freshwater Aquatic Bed (CES200.876)
Rank: G5S3
Plots sampled: 0

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): 10-2000
Slope (deg): 0
Landform position: floodplains, basins
Hydrology: submerged aquatic
Soils: organic

Vegetation and ecology: Habitat is lakes and ponds, usually with perennial water. This is an unrooted aquatic bed association that is widespread in western Oregon but it has not been sampled and little information is available. *Utricularia macrorhiza* is insectivorous and characterized by its large bladders blackened with the remains of aquatic invertebrates. It forms sparse to dense masses of nearly monotypic submerged vegetation with cover ranging from 40-95 percent. It provides important habitat for aquatic invertebrates and fish. It is the most common *Utricularia* at lower elevations and the only one to form extensive stands, but it is not as common as some other aquatic bed associations. It is not clear if this association favors eutrophic conditions or may be enhanced by enriched runoff in agricultural or urban landscapes.

Global distribution: northern California to Alaska

Other studies: Titus & Christy 1996a; Boggs 2000: 174 (AK); Christy 2001a: 38; Christy et al. 1998: 141.

IV. NONVASCULAR ASSOCIATIONS

Fontinalis antipyretica Association

Fountain moss

Classification:

NVCS: new
Ecological System: Temperate Pacific Freshwater Aquatic Bed (CES200.876)
Rank: G5S5
Plots sampled: 1 (macro)

Species	Const	Percent cover		
		Ave	Min	Max
MOSS LAYER				
Moss	100	10	10	10

Distribution in NW Oregon: throughout

Environment:

Elevation (ft): 3800
Slope (deg): 0
Landform position: floodplains, basins, benches
Hydrology: seasonally flooded to perennially flooded
Soils: organic or loam

Vegetation and ecology: Habitat is seasonally or perennially flooded pools, ponds, and sloughs. *Fontinalis antipyretica* usually forms extensive submerged beds that tolerate both perennial submergence or seasonal exposure. Beds may be 2-3 feet thick when submerged, and dry down to a 6-inch thick turf if the pool loses all its water in summer. Although this association is represented by only one plot and is obviously undersampled, it is widespread in the region. The plot data here represent a perennially flooded pool with a cover of only 10 percent, but covers of 80-100 are the norm. There is no evidence that this association increases under eutrophic conditions, and only a few stands have been observed that would approach these conditions. Most occur in clean, cold, slow or non-flowing water. Pearsons (1989) and Markle et al. (1991) found that this association provides important cover for the federally-listed Oregon chub. *Fontinalis neomexicana* is a related species that occurs in cold flowing water in both streams and fen or flush rivulets.

Global distribution: Oregon to British Columbia

Other studies: Seyer 1979: 45, 46; Viereck et al. 1992: 209 (AK); Kienholz 1931: 645 (WA); Pearsons 1989: 12; Markle et al. 1991: 288.

Polytrichum commune Association

Haircap moss

Classification:

NVCS: new
Ecological System: Temperate Pacific Freshwater Emergent Marsh (CES200.877)
Rank: G4S4
Plots sampled: 5 (micro)

Species	Const	Percent cover		
		Ave	Min	Max
HERB LAYER				
Carex utriculata	20	Tr	0	1
MOSS LAYER				
Moss	100	64	5	100
UNVEGETATED				
Litter	100	21	1	95
Bare ground	20	17	0	85

Distribution in NW Oregon: Cascade Range

Environment:

Elevation (ft): 5410
Slope (deg): 0
Landform position: basins
Hydrology: perennially to seasonally moist
Soils: organic

Vegetation and ecology: This association is most common in seasonally-flooded depressions in the *Tsuga mertensiana* zone. Stands may occur in small depressions among trees, but most occur in larger seasonal ponds with no forest canopy. Heavy snow accumulations persist longer into the growing season and together with subsequent meltwater suppress most other vegetation. Stands are usually monotypic mats composed entirely of the moss *Polytrichum commune* up to 6 inches thick. Where slopes around depressions are steep enough, *Polytrichum* occupies a seasonally-flooded zone between upland and late-season ponded water often occupied by *Carex utriculata*, *Nuphar lutea* ssp. *polysepala*, or *Glyceria. Deschampsia caespitosa* is often present at the upper margin of this zone. In shallow depressions with less perceptible slopes, *Polytrichum* may completely carpet the bottom of the depression, forming extensive lawns. Thick mats act as insulating blankets and retain moisture throughout the growing season. The 1996 Torrey Lake fire in Lane County scorched or killed 60-99 percent of *Polytrichum* mats in some transects, but regeneration from uninjured tissue below the surface was evident within two years and is ongoing. Dead stands were replaced by *Glyceria* or *Calamagrostis*.

Global distribution: California to Alaska and eastward

Other studies: Lippert & McCain 1997; McCain 1998.

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Appendix A.

Species	ALNINC/LYSAME 7 Plots CON	AVE	ALNRUB/ATHFIL-LYSAME ALNRUB/CAROBN-LYSAME 21 Plots CON	AVE	26 Plots CON	AVE	ALNVIRS/LYSAME 3 Plots CON	AVE	ALNVIRS/SCIMIC 2 Plots CON	AVE	ATHFIL 1 Plots CON	AVE	AZOLLA 1 Plots CON	AVE
MATURE TREES														
Acer macrophyllum	.	.	5	0	.	.	.	.	.	.	.	.	.	.
Picea engelmannii	57	4	.	.	.	.	.	.	50	2	.	.	.	.
Pinus monticola	.	.	.	.	.	.	33	2	.	.	.	.	.	.
Pinus contorta var. latifolia	.	.	.	.	.	.	.	.	50	30	.	.	.	.
Alnus rubra	.	.	95	72	100	89	.	.	.	.	.	.	.	.
Abies amabilis	14	1	.	.	.	.	.	.	.	.	.	.	.	.
Frangula purshiana	.	.	.	.	8	0	.	.	.	.	.	.	.	.
Tsuga heterophylla	29	1	.	.	8	0	.	.	.	.	.	.	.	.
Thuja plicata	14	2	10	0	8	1	.	.	.	.	.	.	.	.
Picea sitchensis	.	.	.	.	8	1	.	.	.	.	.	.	.	.
REPRODUCING TREES														
Malus fusca	.	.	5	0	.	.	.	.	.	.	.	.	.	.
Picea engelmannii	29	1	5	0	.	.	33	0	50	1	.	.	.	.
Abies amabilis	14	1	.	.	.	.	.	.	50	1	.	.	.	.
Tsuga heterophylla	57	1	5	0	.	.	33	0	50	0	.	.	.	.
Thuja plicata	14	1	10	0	4	0	33	3	50	0	.	.	.	.
Alnus rubra	.	.	19	3	.	.	.	.	.	.	.	.	.	.
Abies grandis	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Pseudotsuga menziesii	.	.	.	.	4	Tr	.	.	.	.	.	.	.	.
Picea sitchensis	.	.	.	.	4	0	.	.	.	.	.	.	.	.
SHRUB LAYER														
Ribes sanguineum	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Salix monochroma	.	.	.	.	.	.	33	0	.	.	.	.	.	.
Ribes divaricatum	.	.	10	0	.	.	.	.	.	.	.	.	.	.
Alnus viridis ssp. sinuata	.	.	.	.	.	.	100	72	100	58	.	.	.	.
Alnus incana	100	50	.	.	.	.	.	.	.	.	.	.	.	.
Ribes bracteosum	43	2	.	.	.	.	67	4	.	.	.	.	.	.
Sorbus sitchensis	14	1	.	.	.	.	.	.	.	.	.	.	.	.
Vaccinium	.	.	.	.	.	.	33	0	.	.	.	.	.	.
Ribes lacustre	29	0	.	.	.	.	33	2	.	.	.	.	.	.
Amelanchier alnifolia	.	.	.	.	.	.	.	.	50	5	.	.	.	.
Lonicera involucrata	14	0	.	.	8	0	.	.	.	.	100	2	.	.
Vaccinium membranaceum	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Rhododendron macrophyllum	14	0	.	.	.	.	33	0	.	.	.	.	.	.
Acer circinatum	29	0	24	4	8	1	.	.	.	.	.	.	.	.

Sambucus racemosa	.	.	14	0	.	.	33	0	.	.	.	.	.	.
Crataegus douglasii	.	.	.	.	.	.	33	0	.	.	.	.	.	.
Physocarpus capitatus	14	0	10	0	.	.	33	1	.	.	.	.	.	.
Rosa nutkana	.	.	.	.	.	.	.	.	.	.	100	2	.	.
Rosa gymnocarpa	14	0	.	.	4	0	.	.	.	.	.	.	.	.
Corylus cornuta	.	.	5	1	4	0	.	.	.	.	.	.	.	.
Vaccinium ovalifolium	29	1	.	.	.	.	.	.	.	.	.	.	.	.
Rubus ursinus	14	0	19	0	15	0	33	0	.	.	.	.	.	.
Cornus sericea	.	.	5	4	4	3	.	.	.	.	.	.	.	.
Symphoricarpos albus	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Spiraea douglasii	.	.	10	0	8	0	33	0	.	.	100	2	.	.
Rubus spectabilis	14	1	43	3	8	0	.	.	.	.	.	.	.	.
Oemleria cerasiformis	.	.	5	0	.	.	.	.	.	.	.	.	.	.
Salix hookeriana	.	.	.	.	12	3	.	.	.	.	100	2	.	.
Malus fusca	.	.	5	0	4	1	.	.	.	.	.	.	.	.
Rubus parviflorus	.	.	.	.	4	0	.	.	.	.	.	.	.	.
Vaccinium parvifolium	.	.	10	Tr	4	0	.	.	.	.	.	.	.	.
Oplopanax horridum	.	.	5	Tr	.	.	.	.	.	.	.	.	.	.
Gaultheria shallon	.	.	5	0	12	0	.	.	.	.	.	.	.	.
Vaccinium ovatum	.	.	.	.	4	0	.	.	.	.	.	.	.	.
HERB LAYER														
Veronica anagallis-aquatica	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Anemone lyallii	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Hydrophyllum	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Cardamine pulcherrima	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Dicentra formosa	.	.	14	2	.	.	.	.	.	.	.	.	.	.
Galium asperrimum	.	.	.	.	4	0	.	.	.	.	.	.	.	.
Actaea rubra	.	.	.	.	.	.	33	0	.	.	.	.	.	.
Tiarella trifoliata	14	1	.	.	4	Tr	33	0	.	.	.	.	.	.
Viola sempervirens	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Azolla mexicana	.	.	.	.	.	.	.	.	.	.	.	.	100	99
Maianthemum racemosum	.	.	5	Tr	.	.	.	.	.	.	.	.	.	.
Lysimachia terrestris	.	.	.	.	.	.	.	.	.	.	100	2	.	.
Stachys	.	.	.	.	4	Tr	.	.	.	.	.	.	.	.
Stellaria	.	.	.	.	4	Tr	.	.	.	.	.	.	.	.
Pyrola asarifolia	14	0	.	.	.	.	.	.	50	0	.	.	.	.
Hydrophyllum tenuipes	.	.	19	4	.	.	.	.	.	.	.	.	.	.
Angelica arguta	43	2	10	Tr	.	.	33	0	.	.	.	.	.	.
Luzula parviflora	29	0	10	Tr	.	.	33	0	.	.	.	.	.	.
Nemophila parviflora	.	.	10	Tr	4	Tr	.	.	.	.	.	.	.	.
Angelica	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Orthilia secunda	14	0	.	.	.	.	.	.	100	1	.	.	.	.
Gymnocarpium dryopteris	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Aster subspicatus	.	.	.	.	.	.	.	.	.	.	100	4	.	.

Unknown herb	.	.	5	Tr	.	.	.	.	50	3	.	.	.	.
Tolmiea menziesii	14	1	33	3	4	Tr	.	.	.	.	.	.	.	.
Hypericum formosum	.	.	.	.	.	.	33	0	.	.	.	.	.	.
Maianthemum stellatum	57	2	.	.	.	.	.	.	50	2	.	.	.	.
Tellima grandiflora	.	.	24	3	.	.	.	.	.	.	.	.	.	.
Epilobium glaberrimum	14	0	5	0	.	.	33	0	50	1	.	.	.	.
Calamagrostis canadensis	14	1	.	.	.	.	.	.	.	.	.	.	.	.
Carex lenticularis	.	.	.	.	.	.	.	.	50	2	.	.	.	.
Mitella pentandra	29	4	5	Tr	.	.	.	.	.	.	.	.	.	.
Agrostis stolonifera	.	.	5	Tr	.	.	.	.	.	.	100	5	.	.
Stachys ciliata	71	1	52	2	.	.	33	5	.	.	.	.	.	.
Carex laeviculmis	71	6	.	.	.	.	33	0	50	2	.	.	.	.
Lotus corniculatus	.	.	.	.	.	.	.	.	.	.	100	5	.	.
Epilobium alpinum	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Viola	14	0	5	0	.	.	33	0	.	.	.	.	.	.
Saxifraga oregana	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Equisetum telmateia	.	.	19	1	4	Tr	.	.	.	.	.	.	.	.
Poaceae	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Lycopus uniflorus	.	.	5	0	.	.	.	.	.	.	.	.	.	.
Claytonia sibirica	14	0	48	3	8	0	.	.	.	.	.	.	.	.
Anemone deltoidea	14	0	.	.	.	.	.	.	50	2	.	.	.	.
Equisetum	.	.	.	.	4	Tr	.	.	.	.	.	.	.	.
Angelica genuflexa	.	.	10	0	.	.	33	1	.	.	.	.	.	.
Circaea alpina	29	0	19	0	8	0	.	.	.	.	.	.	.	.
Carex luzulina	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Stellaria crispa	14	0	10	Tr	.	.	.	.	.	.	.	.	.	.
Mimulus guttatus	43	1	10	0	4	Tr	67	0	50	0	.	.	.	.
Mitella	.	.	5	Tr	.	.	33	0	.	.	.	.	.	.
Carex canescens	.	.	5	0	.	.	.	.	.	.	.	.	.	.
Viola palustris	14	0	14	0	.	.	.	.	50	10	.	.	.	.
Polygonum bistortoides	.	.	.	.	.	.	33	0	.	.	.	.	.	.
Glyceria striata	86	5	24	1	.	.	67	8	.	.	.	.	.	.
Boykinia occidentalis	.	.	5	Tr	.	.	.	.	.	.	.	.	.	.
Galium trifidum	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Trautvetteria caroliniensis	57	1	.	.	.	.	.	.	.	.	.	.	.	.
Aconitum columbianum	29	0	.	.	.	.	33	0	.	.	.	.	.	.
Veratrum californicum	29	0	10	2	.	.	.	.	.	.	.	.	.	.
Galium bifolium	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium ciliatum	14	0	5	Tr	.	.	.	.	.	.	.	.	.	.
Achillea millefolium	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Carex	14	0	10	Tr	.	.	.	.	.	.	.	.	.	.
Carex echinata ssp. echinata	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hypericum perforatum	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Senecio triangularis	71	4	10	0	.	.	33	13	50	1	.	.	.	.
Boykinia major	.	.	5	0	.	.	.	.	.	.	.	.	.	.

Urtica dioica ssp. gracilis	.	.	33	1	4	Tr	.	.	.	.	.	.	.	.
Clintonia uniflora	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Schoenoplectus acutus var. occidentalis	.	.	.	.	.	.	.	.	.	.	100	2	.	.
Hypericum anagalloides	29	2	5	Tr	.	.	.	.	.	.	.	.	.	.
Platanthera dilatata	14	0	.	.	.	.	.	.	50	0	.	.	.	.
Athyrium filix-femina	86	14	95	17	23	1	67	9	50	0	100	60	.	.
Aster	29	0	.	.	.	.	.	.	.	.	.	.	.	.
Iris pseudacorus	.	.	.	.	.	.	.	.	.	.	100	2	.	.
Carex deweyana ssp. leptopoda	.	.	29	0	.	.	33	0	.	.	.	.	.	.
Scirpus microcarpus	14	0	10	0	4	0	33	5	100	65	100	25	.	.
Heracleum lanatum	29	0	14	0	.	.	.	.	.	.	.	.	.	.
Ligusticum grayi	.	.	5	0	.	.	.	.	.	.	.	.	.	.
Epilobium ciliatum ssp. glandulosum	57	0	.	.	.	.	.	.	.	.	.	.	.	.
Cornus canadensis	43	0	.	.	.	.	33	0	50	8	.	.	.	.
Viola glabella	57	1	5	Tr	4	0	.	.	.	.	.	.	.	.
Cirsium vulgare	.	.	5	Tr	.	.	.	.	.	.	.	.	.	.
Platanthera stricta	43	0	5	0	.	.	.	.	.	.	.	.	.	.
Veronica americana	71	0	.	.	.	.	33	0	.	.	.	.	.	.
Geum macrophyllum	57	0	.	.	.	.	.	.	.	.	.	.	.	.
Carex aquatilis var. dives	.	.	5	0	.	.	.	.	.	.	.	.	.	.
Aster modestus	14	1	.	.	.	.	33	0	.	.	.	.	.	.
Lysichiton americanus	100	34	100	50	92	57	100	53	.	.	.	.	.	.
Linnaea borealis	29	0	.	.	.	.	.	.	50	2	.	.	.	.
Epilobium ciliatum ssp. watsonii	.	.	5	Tr	.	.	67	0	.	.	.	.	.	.
Cinna latifolia	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Polypodium glycyrrhiza	.	.	5	Tr	4	0	33	0	.	.	.	.	.	.
Trillium ovatum	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Equisetum arvense	43	0	24	0	.	.	.	.	.	.	.	.	.	.
Veratrum	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Botrychium virginianum	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Galium triflorum	29	0	14	0	.	.	33	0	.	.	.	.	.	.
Juncus effusus	.	.	.	.	.	.	.	.	.	.	100	1	.	.
Equisetum fluviatile	.	.	.	.	.	.	.	.	50	2	.	.	.	.
Tiarella trifoliata var. unifoliata	29	0	5	0	.	.	.	.	.	.	.	.	.	.
Asarum caudatum	.	.	10	0	8	Tr	33	0	.	.	.	.	.	.
Agrostis exarata	.	.	.	.	.	.	33	2	.	.	.	.	.	.
Cicuta douglasii	.	.	5	Tr	.	.	.	.	.	.	.	.	.	.
Anemone oregana	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Oenanthe sarmentosa	.	.	57	4	4	Tr	33	3	.	.	100	2	.	.
Argentina egedii	.	.	.	.	.	.	.	.	.	.	100	2	.	.
Veronica scutellata	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Cardamine	.	.	19	0	.	.	33	0	.	.	.	.	.	.
Dryopteris austriaca	.	.	5	Tr	.	.	.	.	.	.	.	.	.	.
Achlys triphylla	29	1	.	.	.	.	.	.	.	.	.	.	.	.
Osmorhiza berteroi	.	.	5	Tr	.	.	.	.	.	.	.	.	.	.

Pleuropogon refractus	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Mitella breweri	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Polystichum munitum	.	.	5	0	15	2	.	.	.	.	.	.	.	.
alium aparine	14	0	19	0	4	0	.	.	.	.	.	.	.	.
Poa trivialis	.	.	10	Tr	.	.	.	.	.	.	.	.	.	.
Veratrum viride	.	.	5	Tr	.	.	.	.	.	.	.	.	.	.
Stachys ajugoides var. rigida	14	3	5	Tr	.	.	.	.	.	.	.	.	.	.
Carex obnupta	.	.	10	0	100	29	.	.	.	.	100	1	.	.
Typha latifolia	.	.	.	.	.	.	.	.	.	.	100	2	.	.
Maianthemum dilatatum	.	.	19	3	8	0	.	.	.	.	.	.	.	.
Streptopus amplexifolius	.	.	5	Tr	.	.	.	.	.	.	.	.	.	.
Oxalis oregana	.	.	14	0	.	.	.	.	.	.	.	.	.	.
Torreyochloa pallida var. pauciflora	.	.	.	.	.	.	33	0	.	.	.	.	.	.
Mimulus moschatus	.	.	5	Tr	.	.	.	.	.	.	.	.	.	.
Blechnum spicant	.	.	5	0	4	Tr	.	.	.	.	.	.	.	.
Oxalis trilliifolia	.	.	.	.	4	0	.	.	.	.	.	.	.	.
Scutellaria lateriflora	.	.	.	.	4	Tr	.	.	.	.	.	.	.	.
Glyceria	.	.	5	Tr	.	.	.	.	.	.	.	.	.	.
Galium	.	.	.	.	4	Tr	.	.	.	.	.	.	.	.
Listera cordata	.	.	5	Tr	.	.	.	.	.	.	.	.	.	.
Petasites frigidus	.	.	5	0	.	.	.	.	.	.	.	.	.	.
Lycopus americanus	.	.	5	Tr	.	.	.	.	.	.	.	.	.	.
MOSS LAYER														
Moss	14	6	43	7	8	0	33	5	.	.	.	.	.	.
UNVEGETATED														
Bare ground	.	.	.	.	50	7	.	.	.	.	.	.	.	.
Litter	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Water	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Species	BETNAN/CARAQUD 2 Plots		BIDCER 9 Plots		BIDFRO 2 Plots		BOYMAJ 2 Plots		CALCAN 10 Plots		CALHET 6 Plots		CALLEPH 7 Plots	
	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE
MATURE TREES														
Larix occidentalis	.	.	.	.	.	.	.	.	.	.	.	.	29	0
Picea engelmannii	.	.	.	.	.	.	.	.	50	22	.	.	29	2
Pinus monticola	.	.	.	.	.	.	.	.	.	.	.	.	14	1
Pinus contorta var. latifolia	.	.	.	.	.	.	.	.	20	1	.	.	14	0
Tsuga mertensiana	.	.	.	.	.	.	.	.	.	.	.	.	29	0
Abies lasiocarpa	.	.	.	.	.	.	.	.	20	1	.	.	.	.
Abies amabilis	.	.	.	.	.	.	.	.	10	0	.	.	29	0
Fraxinus latifolia	.	.	.	.	.	.	.	.	.	.	17	17	.	.
REPRODUCING TREES														
Picea engelmannii	.	.	.	.	.	.	.	.	20	0	.	.	43	1
Chamaecyparis nootkatensis	.	.	.	.	.	.	.	.	10	Tr	.	.	.	.
Abies lasiocarpa	.	.	.	.	.	.	.	.	30	5	.	.	14	1
Pinus contorta var. latifolia	.	.	.	.	.	.	.	.	20	0	.	.	29	0
Abies amabilis	.	.	.	.	.	.	.	.	30	0	.	.	29	0
Tsuga mertensiana	.	.	.	.	.	.	.	.	10	Tr	.	.	14	0
SHRUB LAYER														
Rubus idaeus	.	.	.	.	.	.	.	.	10	0	.	.	.	.
Alnus viridis ssp. sinuata	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Salix	.	.	.	.	.	.	.	.	20	0	.	.	.	.
Salix myrtillifolia	50	28	.	.	.	.	.	.	.	.	.	.	.	.
Viburnum edule	50	2	.	.	.	.	.	.	.	.	.	.	.	.
Spiraea densiflora	.	.	.	.	.	.	.	.	30	2	.	.	14	0
Rhododendron albiflorum	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Betula nana	100	43	.	.	.	.	.	.	.	.	.	.	.	.
Lonicera involucrata	50	5	.	.	.	.	.	.	10	Tr	.	.	.	.
Vaccinium membranaceum	.	.	.	.	.	.	.	.	20	0	.	.	14	0
Rhododendron macrophyllum	.	.	.	.	.	.	.	.	.	.	.	.	14	1
Vaccinium deliciosum	.	.	.	.	.	.	.	.	20	0	.	.	.	.
Kalmia microphylla	.	.	.	.	.	.	.	.	10	0	.	.	.	.
Vaccinium uliginosum	50	0	.	.	.	.	.	.	50	2	.	.	14	1
Vaccinium ovalifolium	.	.	.	.	.	.	.	.	20	1	.	.	14	1
Salix geyeriana	50	20	.	.	.	.	.	.	.	.	.	.	14	1
Cornus sericea	50	2	.	.	.	.	.	.	10	0	.	.	.	.
Vaccinium scoparium	.	.	.	.	.	.	.	.	10	Tr	.	.	.	.
Spiraea douglasii	50	15	.	.	.	.	50	1	20	1	.	.	14	0
Rubus spectabilis	.	.	.	.	.	.	.	.	.	.	.	.	14	1

Rubus lasiococcus	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Menziesia ferruginea	.	.	.	.	.	.	.	.	10	Tr	.	.	.	.
Gaultheria ovatifolia	.	.	.	.	.	.	.	.	10	1	.	.	.	.
Vaccinium caespitosum	.	.	.	.	.	.	.	.	.	.	.	.	14	1
HERB LAYER														
Maianthemum racemosum	.	.	.	.	.	.	.	.	10	Tr	.	.	.	.
Lythrum portula	.	.	11	0	.	.	.	.	.	.	.	.	.	.
Polygonum persicaria	.	.	22	0	50	0	.	.	.	.	.	.	.	.
Hydrocotyle ranunculoides	.	.	11	0	.	.	.	.	.	.	.	.	.	.
Monotropa hypopitys	.	.	.	.	.	.	.	.	10	Tr	.	.	.	.
Pedicularis racemosa	.	.	.	.	.	.	.	.	10	Tr	.	.	.	.
Eriophorum angustifolium	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Pyrola asarifolia	50	0	.	.	.	.	.	.	.	.	.	.	.	.
Angelica arguta	.	.	.	.	.	.	.	.	10	1	.	.	.	.
Hieracium gracile	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Solidago	.	.	.	.	.	.	.	.	.	.	.	.	14	1
Orthilia secunda	.	.	.	.	.	.	.	.	20	0	.	.	14	0
Maianthemum stellatum	.	.	.	.	.	.	.	.	10	3	.	.	.	.
Carex jonesii	50	1	.	.	.	.	.	.	.	.	.	.	.	.
Carex arcta	.	.	.	.	.	.	50	0	.	.	.	.	.	.
Allium validum	.	.	.	.	.	.	.	.	.	.	.	.	29	2
Calamagrostis canadensis	.	.	.	.	.	.	50	5	100	46	.	.	.	.
Carex lenticularis	.	.	.	.	.	.	.	.	.	.	.	.	29	1
Microseris borealis	.	.	.	.	.	.	.	.	10	0	.	.	.	.
Mitella pentandra	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Stachys ciliata	.	.	.	.	.	.	.	.	20	0	.	.	.	.
Carex illota	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Aquilegia formosa	50	1	.	.	.	.	.	.	.	.	.	.	.	.
Bidens frondosa	.	.	.	.	100	95	.	.	.	.	.	.	.	.
Lupinus latifolius	.	.	.	.	.	.	.	.	10	0	.	.	.	.
Epilobium alpinum	50	0	.	.	.	.	.	.	.	.	.	.	14	0
Viola	.	.	.	.	.	.	50	3	30	1	.	.	.	.
Saxifraga oregana	50	1	.	.	.	.	.	.	.	.	.	.	.	.
Ranunculus populago	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Poaceae	.	.	.	.	50	2	.	.	.	.	.	.	14	0
Ranunculus alismifolius	.	.	.	.	.	.	.	.	20	1	.	.	14	0
Carex feta	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Carex exsiccata	.	.	.	.	.	.	.	.	20	1	.	.	.	.
Equisetum	.	.	.	.	.	.	.	.	10	Tr	.	.	.	.
Panicum capillare	.	.	11	1	.	.	.	.	.	.	.	.	.	.
Aster occidentalis	.	.	.	.	.	.	.	.	10	0	.	.	.	.
Juncus balticus	.	.	.	.	.	.	.	.	10	1	.	.	14	0
Eleocharis quinqueflora	50	3	.	.	.	.	.	.	.	.	.	.	29	1
Carex luzulina	.	.	.	.	.	.	.	.	10	0	.	.	57	1

Stellaria crispa	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Carex microptera	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Mimulus guttatus	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Carex aurea	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Mitella	.	.	.	.	.	.	.	.	10	0	.	.	.	.
Potentilla drummondii	.	.	.	.	.	.	.	.	10	1	.	.	.	.
Trifolium longipes	.	.	.	.	.	.	.	.	10	1	.	.	29	2
Viola palustris	.	.	.	.	.	.	.	.	20	0	.	.	.	.
Danthonia intermedia	.	.	.	.	.	.	.	.	10	1	.	.	.	.
Polygonum bistortoides	50	2	.	.	.	.	.	.	30	1	.	.	29	5
Erigeron peregrinus	.	.	.	.	.	.	.	.	20	0	.	.	14	0
Carex utriculata	50	1	.	.	.	.	50	15	20	1	.	.	29	6
Trautvetteria caroliniensis	.	.	.	.	.	.	.	.	.	.	.	.	29	1
Aconitum columbianum	.	.	.	.	.	.	.	.	20	1	.	.	14	0
Veratrum californicum	.	.	.	.	.	.	.	.	10	Tr	.	.	29	0
Rorippa curvisiliqua	.	.	.	.	50	0	.	.	.	.	.	.	.	.
Potentilla flabellifolia	.	.	.	.	.	.	.	.	20	1	.	.	.	.
Dodecatheon jeffreyi	.	.	.	.	.	.	.	.	40	2	.	.	86	8
Pedicularis groenlandica	50	1	.	.	.	.	.	.	.	.	.	.	29	0
Carex	.	.	.	.	.	.	50	0	20	1	.	.	.	.
Carex echinata ssp. echinata	.	.	.	.	.	.	100	3	10	Tr	.	.	29	1
Aster alpigenus	.	.	.	.	.	.	.	.	10	1	.	.	.	.
Saxifraga punctata	.	.	.	.	.	.	.	.	.	.	.	.	14	3
Senecio triangularis	.	.	.	.	.	.	.	.	50	1	.	.	71	1
Boykinia major	.	.	.	.	.	.	100	60	.	.	.	.	.	.
Holcus lanatus	.	.	.	.	.	.	50	0	.	.	.	.	.	.
Deschampsia caespitosa	.	.	.	.	.	.	.	.	20	6	.	.	.	.
Schoenoplectus acutus var. occidentalis	.	.	11	0	.	.	.	.	.	.	.	.	.	.
Mimulus primuloides	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hypericum anagalloides	50	1	.	.	.	.	100	1	10	1	.	.	57	5
Platanthera dilatata	.	.	.	.	.	.	.	.	40	0	.	.	29	0
Cardamine californica	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex scopulorum	.	.	.	.	.	.	.	.	20	2	.	.	14	1
Athyrium filix-femina	.	.	.	.	.	.	.	.	10	Tr	.	.	14	1
Castilleja miniata	.	.	.	.	.	.	.	.	10	Tr	.	.	14	0
Bidens cernua	.	.	100	56	.	.	.	.	.	.	.	.	.	.
Ligusticum grayi	.	.	.	.	.	.	.	.	40	1	.	.	14	0
Epilobium ciliatum ssp. glandulosum	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Cornus canadensis	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Viola glabella	50	0	.	.	.	.	.	.	.	.	.	.	.	.
Platanthera stricta	.	.	.	.	.	.	.	.	.	.	.	.	57	1
Veronica americana	50	0	11	0	.	.	.	.	.	.	.	.	.	.
Geum macrophyllum	.	.	.	.	.	.	.	.	10	0	.	.	.	.
Carex aquatilis var. dives	100	65	.	.	.	.	.	.	40	5	.	.	29	2
Carex aquatilis	.	.	.	.	.	.	.	.	.	.	.	.	14	0

Callitriche heterophylla	.	.	.	.	.	.	.	.	.	.	100	86	.	.
Aster modestus	.	.	.	.	.	.	.	.	10	2	.	.	.	.
Lysichiton americanus	100	2	.	.	.	.	100	12	10	1	17	3	14	0
Epilobium ciliatum ssp. watsonii	.	.	.	.	.	.	.	.	10	0	.	.	.	.
Alisma triviale	.	.	22	1	.	.	.	.	.	.	.	.	.	.
Agrostis	50	0	.	.	.	.	.	.	20	1	.	.	.	.
Nuphar lutea ssp. polysepala	.	.	.	.	50	5	.	.	.	.	.	.	.	.
Gnaphalium palustre	.	.	11	0	.	.	.	.	.	.	.	.	.	.
Juncus xiphoides var. triandrus	50	0	.	.	.	.	50	5	10	1	.	.	.	.
Caltha leptosepala ssp. howellii	.	.	.	.	.	.	.	.	50	3	.	.	100	50
Schoenoplectus americanus	.	.	11	4	.	.	.	.	.	.	.	.	.	.
Elodea canadensis	.	.	11	0	.	.	.	.	.	.	.	.	.	.
Eleocharis palustris	.	.	44	3	.	.	.	.	.	.	.	.	.	.
Myriophyllum spicatum	.	.	11	0	.	.	.	.	.	.	.	.	.	.
Equisetum arvense	50	2	.	.	.	.	.	.	.	.	.	.	43	0
Eleocharis ovata	.	.	11	0	.	.	.	.	.	.	.	.	.	.
Luzula campestris	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Ludwigia palustris	.	.	33	3	.	.	.	.	.	.	.	.	.	.
Tiarella trifoliata var. unifoliata	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Vicia americana	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cicuta douglasii	.	.	.	.	.	.	50	5	10	0	.	.	.	.
Anemone oregana	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Oenanthe sarmentosa	.	.	.	.	.	.	.	.	.	.	67	10	.	.
Carex interrupta	.	.	11	0	.	.	.	.	.	.	.	.	.	.
Veronica scutellata	.	.	.	.	.	.	.	.	.	.	33	0	.	.
Elymus glaucus	.	.	.	.	.	.	.	.	10	0	.	.	.	.
Rudbeckia occidentalis	.	.	.	.	.	.	.	.	10	0	.	.	.	.
Osmorhiza berteroi	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Perideridia gairdneri	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Mentha arvensis	.	.	11	0	.	.	.	.	.	.	.	.	.	.
Trientalis borealis ssp. latifolia	.	.	.	.	.	.	.	.	10	Tr	.	.	.	.
Mitella breweri	.	.	.	.	.	.	.	.	10	Tr	.	.	14	0
Epilobium	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Leersia oryzoides	.	.	22	3	.	.	.	.	.	.	.	.	.	.
Sagittaria latifolia	.	.	44	5	.	.	.	.	.	.	.	.	.	.
Lemna minor	.	.	.	.	50	Tr	.	.	.	.	.	.	.	.
Streptopus roseus	.	.	.	.	.	.	.	.	10	Tr	.	.	14	0
Polygonum hydropiperoides	.	.	56	14	.	.	.	.	.	.	.	.	.	.
Agrostis thurberiana	.	.	.	.	.	.	.	.	.	.	.	.	29	0
Carex obnupta	.	.	.	.	.	.	50	1	.	.	.	.	.	.
Tofieldia glutinosa	.	.	.	.	.	.	.	.	.	.	.	.	43	1
Valeriana sitchensis	.	.	.	.	.	.	.	.	10	Tr	.	.	.	.
Gentiana sceptrum	.	.	.	.	.	.	.	.	10	Tr	.	.	14	0
Anaphalis margaritacea	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polygonum punctatum	.	.	11	0	.	.	.	.	.	.	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Torreyochloa pallida var. pauciflora	.	.	.	.	.	.	.	.	.	.	17	1	.	.
Arnica mollis	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Poa	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sparganium angustifolium	.	.	22	0	.	.	.	.	.	.	.	.	.	.
Blechnum spicant	.	.	.	.	.	.	50	8	.	.	.	.	.	.
Juncus	.	.	.	.	.	.	50	1	.	.	.	.	.	.
Schoenoplectus tabernaemontani	.	.	11	1	.	.	.	.	.	.	.	.	.	.
Eriophorum gracile	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Callitriche	.	.	22	1	.	.	.	.	.	.	.	.	.	.
Parnassia fimbriata	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Sanguisorba officinalis	.	.	.	.	.	.	.	.	10	0	.	.	14	1
MOSS LAYER														
Moss	50	10	.	.	.	.	100	20	40	18	17	0	29	19
UNVEGETATED														
Bare ground	.	.	.	.	.	.	.	.	10	1	.	.	.	.
Litter	.	.	.	.	.	.	.	.	30	11	.	.	.	.
Water	.	.	.	.	.	.	.	.	.	.	.	.	.	.

	CALLEPH-SANOFF		CAMQUA		CARAMP		CARANG		CARAPE		CARAQUA		CARAQUD	
	30 Plots		5 Plots		1 Plots		4 Plots		10 Plots		10 Plots		71 Plots	
Species	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE
MATURE TREES														
Acer macrophyllum	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Picea engelmannii	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Pinus monticola	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Pinus contorta var. latifolia	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Abies lasiocarpa	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Tsuga heterophylla	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Chamaecyparis nootkatensis	.	.	.	.	.	.	.	.	.	.	.	.	1	0
REPRODUCING TREES														
Abies concolor	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Picea engelmannii	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Chamaecyparis nootkatensis	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Abies lasiocarpa	.	.	.	.	.	.	.	.	.	.	10	Tr	.	.
Pinus contorta var. latifolia	.	.	.	.	.	.	.	.	.	.	.	.	4	0
Abies amabilis	.	.	.	.	.	.	.	.	.	.	10	Tr	.	.
Tsuga heterophylla	.	.	.	.	.	.	.	.	.	.	.	.	3	0

Thuja plicata	.	.	.	.	.	.	.	.	.	.	.	.	1	Tr
Pseudotsuga menziesii	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Pinus monticola	.	.	.	.	.	.	.	.	.	.	.	.	1	Tr
SHRUB LAYER														
Lonicera	.	.	.	.	.	.	25	3	.	.	.	.	.	.
Alnus viridis ssp. sinuata	.	.	.	.	.	.	.	.	.	.	.	.	6	0
Alnus incana	.	.	.	.	.	.	.	.	.	.	10	1	6	1
Ribes bracteosum	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sorbus sitchensis	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Vaccinium	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Salix	.	.	.	.	.	.	.	.	.	.	.	.	7	0
Salix myrtillifolia	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Spiraea densiflora	.	.	.	.	.	.	.	.	.	.	.	.	4	0
Betula nana	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Lonicera involucrata	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Vaccinium membranaceum	.	.	.	.	.	.	.	.	.	.	10	Tr	3	0
Rubus armeniacus	.	.	.	.	.	.	.	.	30	2	.	.	.	.
Rosa pisocarpa	.	.	.	.	.	.	25	5	.	.	.	.	.	.
Kalmia microphylla	.	.	.	.	.	.	.	.	.	.	10	Tr	1	0
Vaccinium uliginosum	.	.	.	.	.	.	25	5	.	.	10	0	14	1
Salix commutata	.	.	.	.	.	.	.	.	.	.	10	0	4	0
Salix geyeriana	.	.	.	.	.	.	.	.	.	.	.	.	6	0
Rubus ursinus	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Spiraea douglasii	.	.	.	.	.	.	50	2	10	1	10	1	14	1
Vaccinium oxycoccos	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Rubus spectabilis	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Rubus lasiococcus	.	.	.	.	.	.	.	.	.	.	.	.	1	Tr
Salix hookeriana	.	.	.	.	.	.	.	.	.	.	10	1	.	.
Salix sitchensis	.	.	.	.	.	.	.	.	.	.	10	0	3	0
Gaultheria ovatifolia	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Salix pedicellaris	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Lonicera caerulea	.	.	.	.	.	.	.	.	.	.	.	.	1	0
HERB LAYER														
Tiarella trifoliata	3	0	.	.	.	.	.	.	.	.	.	.	1	0
Viola sempervirens	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Pedicularis racemosa	.	.	.	.	.	.	.	.	.	.	.	.	1	Tr
Tiarella trifoliata var. laciniata	3	0	.	.	.	.	.	.	.	.	.	.	.	.
Luzula divaricata	3	0	.	.	.	.	.	.	.	.	.	.	.	.
Stellaria	.	.	20	1	.	.	.	.	.	.	.	.	.	.
Pyrola asarifolia	.	.	.	.	.	.	.	.	.	.	.	.	1	Tr
Arabis glabra	.	.	.	.	.	.	25	0	.	.	.	.	.	.
Arnica chamissonis	.	.	.	.	.	.	25	0	.	.	.	.	.	.
Phacelia	.	.	.	.	.	.	.	.	10	0	.	.	.	.

Hypericum	.	.	.	.	.	.	.	.	10	Tr	.	.	.	.
Vicia	.	.	.	.	.	.	.	.	30	4	.	.	.	.
Dipsacus fullonum	.	.	.	.	.	.	.	.	30	3	.	.	.	.
Angelica arguta	.	.	.	.	.	.	.	.	.	.	10	Tr	1	Tr
Luzula parviflora	.	.	.	.	.	.	.	.	.	.	10	Tr	.	.
Carex disperma	.	.	.	.	.	.	.	.	.	.	10	1	.	.
Calamagrostis	.	.	.	.	.	.	.	.	.	.	10	0	.	.
Agoseris glauca var. monticola	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Saxifraga lyallii	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Lycopodium annotinum	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Conium maculatum	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Stellaria longipes	.	.	.	.	100	0	.	.	.	.	.	.	.	.
Luzula	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Solidago canadensis	7	0	.	.	.	.	50	7	.	.	.	.	.	.
Solidago	.	.	.	.	100	1	.	.	.	.	10	0	.	.
Aster ledophyllus	.	.	.	.	.	.	.	.	.	.	.	.	1	Tr
Lotus	.	.	.	.	100	25	.	.	.	.	.	.	.	.
Carex angustata	.	.	.	.	.	.	100	43	.	.	.	.	.	.
Stenanthium occidentale	.	.	.	.	100	0	.	.	.	.	.	.	.	.
Unknown herb	.	.	.	.	.	.	.	.	10	0	.	.	.	.
Hypericum formosum	.	.	.	.	100	0	.	.	.	.	.	.	6	0
Maianthemum stellatum	.	.	.	.	.	.	.	.	.	.	.	.	1	Tr
Carex jonesii	.	.	.	.	.	.	25	1	.	.	10	0	1	0
Allium validum	.	.	.	.	.	.	50	2	.	.	.	.	.	.
Calamagrostis canadensis	.	.	.	.	.	.	.	.	.	.	10	Tr	13	1
Carex amplifolia	.	.	.	.	100	40	.	.	.	.	.	.	.	.
Carex lenticularis	.	.	.	.	.	.	.	.	.	.	10	0	1	Tr
Agoseris aurantiaca	.	.	.	.	.	.	25	0	.	.	.	.	.	.
Stachys ciliata	.	.	.	.	.	.	.	.	.	.	.	.	1	Tr
Carex illota	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Carex laeviculmis	.	.	.	.	.	.	.	.	.	.	.	.	1	Tr
Lythrum salicaria	.	.	.	.	.	.	.	.	10	Tr	.	.	.	.
Carex buxbaumii	.	.	.	.	.	.	50	1	.	.	.	.	.	.
Lupinus latifolius	.	.	.	.	.	.	25	3	.	.	.	.	.	.
Ranunculus occidentalis	.	.	20	6	.	.	.	.	.	.	.	.	.	.
Epilobium alpinum	.	.	.	.	.	.	25	0	.	.	.	.	4	0
Potentilla gracilis	.	.	.	.	.	.	25	1	.	.	.	.	.	.
Saxifraga oregana	.	.	40	8	.	.	.	.	.	.	10	0	.	.
Poaceae	.	.	.	.	.	.	.	.	10	0	.	.	.	.
Carex aperta	.	.	.	.	.	.	.	.	100	88	.	.	.	.
Carex exsiccata	13	2	.	.	.	.	.	.	20	1	10	Tr	4	0
Microseris borealis	.	.	.	.	.	.	50	2	.	.	10	0	3	0
Scirpus congdonii	.	.	.	.	.	.	25	0	.	.	.	.	6	0
Ranunculus gormanii	.	.	.	.	.	.	50	4	.	.	.	.	4	0
Lycopus uniflorus	.	.	.	.	.	.	.	.	.	.	10	0	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Claytonia sibirica	.	.	.	.	.	.	.	.	.	.	.	.	1	Tr
Viola macloskeyi	.	.	.	.	.	.	.	.	.	.	10	Tr	10	1
Hordeum brachyantherum	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Poa pratensis	.	.	.	.	.	.	25	0	.	.	.	.	1	Tr
Equisetum	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Angelica genuflexa	20	1	.	.	.	.	.	.	.	.	10	Tr	7	0
Camassia leichtlinii	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Aster occidentalis	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Juncus balticus	20	3	.	.	.	.	75	5	.	.	.	.	6	0
Eleocharis quinqueflora	.	.	.	.	.	.	.	.	.	.	20	4	15	2
Juncus bufonius	.	.	20	0	.	.	.	.	.	.	.	.	.	.
Carex luzulina	.	.	.	.	.	.	.	.	.	.	20	4	8	0
Stellaria crispa	.	.	.	.	.	.	25	0	.	.	.	.	1	Tr
Mimulus guttatus	.	.	20	1	100	5	50	2	.	.	10	Tr	7	0
Carex simulata	7	1	.	.	.	.	.	.	.	.	.	.	3	0
Potentilla drummondii	.	.	.	.	.	.	.	.	.	.	.	.	1	Tr
Carex canescens	.	.	.	.	.	.	.	.	.	.	10	2	4	0
Trifolium longipes	.	.	.	.	.	.	25	5	.	.	10	Tr	3	0
Myosotis	.	.	.	.	.	.	.	.	10	1	.	.	.	.
Ranunculus orthorhynchus	.	.	.	.	.	.	50	1	.	.	.	.	.	.
Viola palustris	.	.	.	.	.	.	25	0	.	.	10	Tr	10	0
Danthonia intermedia	.	.	.	.	.	.	25	1	.	.	.	.	.	.
Polygonum bistortoides	17	1	.	.	.	.	50	1	.	.	20	1	7	0
Veronica wormskjoldii	.	.	.	.	.	.	25	0	.	.	.	.	.	.
Glyceria striata	.	.	.	.	100	1	.	.	.	.	.	.	3	0
Boykinia occidentalis	.	.	.	.	.	.	.	.	.	.	10	Tr	.	.
Carex utriculata	10	1	.	.	.	.	.	.	.	.	10	2	24	4
Galium trifidum	.	.	.	.	100	0	.	.	.	.	.	.	4	0
Carex limosa	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Comarum palustre	.	.	.	.	.	.	.	.	.	.	20	0	7	1
Aconitum columbianum	.	.	.	.	.	.	.	.	.	.	10	5	4	0
Veratrum californicum	.	.	.	.	.	.	50	11	.	.	.	.	.	.
Galium bifolium	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Aira caryophyllea	.	.	20	0	.	.	.	.	.	.	.	.	.	.
Achillea millefolium	.	.	.	.	.	.	25	1	.	.	.	.	1	0
Dodecatheon jeffreyi	.	.	.	.	.	.	50	9	.	.	20	1	37	3
Pedicularis groenlandica	.	.	.	.	.	.	25	1	.	.	10	1	7	0
Carex	7	1	.	.	.	.	.	.	.	.	10	2	7	0
Carex echinata ssp. echinata	.	.	.	.	.	.	.	.	.	.	20	0	11	0
Hypericum perforatum	.	.	.	.	.	.	.	.	20	1	.	.	.	.
Senecio triangularis	7	3	.	.	.	.	25	4	.	.	20	1	10	1
Boykinia major	.	.	.	.	.	.	.	.	.	.	20	3	.	.
Cirsium arvense	.	.	.	.	.	.	.	.	30	3	.	.	.	.
Holcus lanatus	3	0	.	.	.	.	.	.	.	.	.	.	.	.
Deschampsia caespitosa	7	1	.	.	.	.	50	10	.	.	.	.	18	1

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Danthonia californica	.	.	.	.	.	.	25	0	.	.	.	.	.	.
Triantha occidentalis	.	.	.	.	.	.	.	.	.	.	10	1	.	.
Hypericum anagalloides	20	1	.	.	.	.	.	.	.	.	40	0	21	1
Platanthera dilatata	10	0	.	.	100	0	25	1	.	.	20	1	17	0
Agrostis scabra	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Carex scopulorum	.	.	.	.	.	.	.	.	.	.	10	1	1	0
Athyrium filix-femina	.	.	.	.	100	0	.	.	.	.	10	Tr	1	0
Spiranthes romanzoffiana	17	0	.	.	.	.	.	.	.	.	.	.	6	0
Aster	.	.	.	.	.	.	.	.	.	.	.	.	4	0
Castilleja miniata	.	.	.	.	.	.	25	0	.	.	.	.	1	Tr
Calamagrostis stricta ssp. inexpansa	.	.	.	.	.	.	25	0	.	.	.	.	3	0
Carex deweyana ssp. leptopoda	.	.	.	.	.	.	.	.	.	.	10	Tr	.	.
Muhlenbergia filiformis	.	.	.	.	.	.	.	.	.	.	10	0	7	1
Scirpus microcarpus	13	3	.	.	100	10	.	.	.	.	.	.	3	0
Epilobium ciliatum ssp. glandulosum	7	0	.	.	.	.	.	.	.	.	.	.	10	0
Cornus canadensis	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Cirsium vulgare	.	.	.	.	.	.	.	.	10	0	.	.	.	.
Aster foliaceus	.	.	.	.	.	.	.	.	.	.	.	.	4	0
Platanthera stricta	.	.	.	.	.	.	.	.	.	.	30	0	3	0
Veronica americana	.	.	.	.	100	0	.	.	.	.	10	Tr	6	0
Carex aquatilis var. dives	.	.	.	.	.	.	.	.	.	.	10	4	100	54
Carex aquatilis	.	.	.	.	.	.	.	.	.	.	100	61	.	.
Polygonum	.	.	.	.	.	.	.	.	20	0	.	.	.	.
Aster modestus	.	.	.	.	.	.	.	.	.	.	.	.	6	1
Carex nigricans	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Carex brunnescens	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Lysichiton americanus	23	1	.	.	100	15	.	.	.	.	10	Tr	11	1
Epilobium ciliatum ssp. watsonii	3	0	.	.	.	.	.	.	40	4	20	1	6	0
Agrostis	23	0	.	.	.	.	.	.	.	.	.	.	3	0
Juncus xiphoides var. triandrus	27	1	.	.	.	.	.	.	.	.	20	0	4	0
Caltha leptosepala ssp. howellii	87	35	.	.	.	.	.	.	.	.	10	3	18	2
Viola adunca	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Elodea canadensis	.	.	.	.	.	.	.	.	.	.	.	.	1	Tr
Eleocharis palustris	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Equisetum arvense	30	1	.	.	.	.	.	.	.	.	20	2	7	0
Potentilla glandulosa	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Calamagrostis stricta var. stricta	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Galium boreale	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Luzula campestris	7	0	.	.	.	.	.	.	.	.	.	.	1	Tr
Juncus effusus	.	.	.	.	.	.	.	.	10	1	.	.	.	.
Juncus nevadensis	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Equisetum fluviatile	.	.	.	.	.	.	.	.	.	.	.	.	11	1
Agrostis exarata	.	.	.	.	.	.	.	.	.	.	.	.	1	Tr
Cicuta douglasii	.	.	.	.	.	.	.	.	.	.	.	.	10	1
Oenanthe sarmentosa	.	.	.	.	.	.	.	.	.	.	10	2	3	0

Veronica scutellata	.	.	.	.	.	.	25	1	.	.	10	Tr	3	0
Camassia quamash	.	.	100	25	.	.	.	.	.	.	10	2	.	.
Carex cusickii	37	6	.	.	.	.	.	.	.	.	10	Tr	.	.
Elymus glaucus	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Drosera rotundifolia	10	0	.	.	.	.	.	.	.	.	.	.	3	0
Pleuropogon refractus	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Epilobium	.	.	.	.	.	.	.	.	10	Tr	.	.	3	Tr
Menyanthes trifoliata	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Utricularia macrorhiza	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Heuchera micrantha	3	0	.	.	.	.	.	.	.	.	.	.	.	.
Carex echinata ssp. phyllomanica	13	4	.	.	.	.	.	.	.	.	.	.	.	.
Galium aparine	.	.	20	0	.	.	.	.	.	.	.	.	3	0
Phalaris arundinacea	.	.	.	.	.	.	.	.	70	37	.	.	.	.
Fragaria vesca	.	.	.	.	.	.	.	.	.	.	.	.	1	Tr
Veronica	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Ranunculus flammula	.	.	.	.	.	.	.	.	.	.	.	.	4	0
Agrostis thurberiana	.	.	.	.	.	.	.	.	.	.	.	.	10	1
Carex obnupta	37	9	.	.	.	.	.	.	.	.	.	.	1	0
Tofieldia glutinosa	.	.	.	.	.	.	.	.	.	.	.	.	8	0
Mitella ovalis	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Maianthemum dilatatum	3	0	.	.	.	.	.	.	.	.	.	.	.	.
Lupinus polyphyllus	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Gentiana sceptrum	50	1	.	.	.	.	.	.	.	.	.	.	1	Tr
Anaphalis margaritacea	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Torreyochloa pallida var. pauciflora	.	.	.	.	.	.	.	.	.	.	10	0	.	.
Arnica mollis	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Mimulus moschatus	7	1	.	.	.	.	.	.	.	.	.	.	.	.
Eriophorum gracile	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Antennaria argentea	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Parnassia fimbriata	.	.	.	.	.	.	.	.	.	.	10	4	3	0
Agrostis oregonensis	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Glyceria grandis	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Galium	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Triteleia hyacinthina	.	.	20	2	.	.	.	.	.	.	.	.	.	.
Pyrola uniflora	.	.	.	.	.	.	.	.	.	.	.	.	1	Tr
Castilleja suksdorfii	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Hypochaeris radicata	.	.	20	2	.	.	.	.	.	.	.	.	.	.
Sanguisorba officinalis	60	41	.	.	.	.	.	.	.	.	.	.	6	0
Galium oreganum	.	.	.	.	.	.	.	.	.	.	.	.	1	Tr
Trientalis europaea ssp. arctica	.	.	.	.	.	.	.	.	.	.	.	.	1	Tr
Mertensia paniculata	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Trichophorum caespitosum	.	.	.	.	.	.	.	.	.	.	.	.	1	0
MOSS LAYER														
Moss	80	53	80	76	100	30	.	.	.	.	40	17	23	4

UNVEGETATED																				
Bare ground	.	.	.	.	.	.	.	.	.	.	.	.	23	11						
Litter	3	1	.	.	.	.	.	.	.	.	.	.	31	4						
Water	.	.	.	.	.	.	.	.	.	.	.	.	.	.						

	CARAQUD-COMPAL				CARCUS				CAREXS				CARLAS			
			CARBUX				CARDEW				CARFET					
	54 Plots		5 Plots		3 Plots		2 Plots		33 Plots		3 Plots		25 Plots			
Species	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE		
MATURE TREES																
Pseudotsuga menziesii	.	.	.	.	.	.	.	.	3	0	.	.	.	.		
Thuja plicata	.	.	.	.	.	.	.	.	3	0	.	.	.	.		
Pinus contorta var. contorta	2	0	.	.	.	.	.	.	.	.	.	.	.	.		
REPRODUCING TREES																
Thuja plicata	.	.	.	.	.	.	.	.	3	0	.	.	.	.		
Pseudotsuga menziesii	.	.	.	.	.	.	.	.	3	0	.	.	.	.		
Picea sitchensis	2	0	.	.	.	.	.	.	.	.	.	.	.	.		
SHRUB LAYER																
Mahonia aquifolium	.	.	.	.	33	0	.	.	.	.	.	.	.	.		
Alnus viridis ssp. sinuata	.	.	.	.	.	.	.	.	6	0	.	.	.	.		
Alnus incana	.	.	.	.	.	.	.	.	3	0	.	.	.	.		
Salix	.	.	.	.	.	.	.	.	6	0	.	.	.	.		
Betula nana	.	.	.	.	.	.	.	.	3	0	.	.	.	.		
Lonicera involucrata	19	1	.	.	.	.	.	.	.	.	.	.	.	.		
Crataegus douglasii	.	.	.	.	.	.	.	.	3	Tr	.	.	.	.		
Rosa pisocarpa	.	.	.	.	.	.	.	.	3	0	.	.	.	.		
Vaccinium uliginosum	33	6	40	0	.	.	.	.	6	1	.	.	4	0		
Spiraea douglasii	22	2	20	0	.	.	.	.	18	0	.	.	.	.		
Ledum glandulosum	37	6	.	.	.	.	.	.	.	.	.	.	.	.		
Salix hookeriana	2	0	.	.	.	.	.	.	3	Tr	.	.	.	.		
Salix sitchensis	.	.	.	.	.	.	.	.	3	Tr	.	.	.	.		
HERB LAYER																
Veronica anagallis-aquatica	.	.	.	.	.	.	.	.	.	.	.	.	.	.		
Hydrocotyle ranunculoides	2	0	.	.	.	.	.	.	.	.	.	.	.	.		
Lysimachia terrestris	15	2	.	.	.	.	.	.	.	.	.	.	.	.		
Pyrola asarifolia	.	.	.	.	.	.	.	.	3	0	.	.	.	.		
Angelica arguta	.	.	.	.	.	.	.	.	6	0	.	.	.	.		

Luzula parviflora	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Lathyrus	4	0	.	.	.	.	.	.	.	.	.	.	.	.
Lysimachia thyrsiflora	.	.	40	0	.	.	.	.	.	.	.	.	.	.
Lycopodium sitchense	.	.	20	Tr	.	.	.	.	.	.	.	.	.	.
Castilleja arachnoidea	.	.	20	Tr	.	.	.	.	.	.	.	.	.	.
Potentilla	.	.	.	.	33	2	.	.	.	.	.	.	.	.
Luzula	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Erigeron	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Carex comosa	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Pleuropogon	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Dodecatheon	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Cirsium tioganum	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Scheuchzeria palustris	.	.	.	.	.	.	.	.	.	.	.	.	4	0
Festuca saximontana	.	.	.	.	.	.	.	.	.	.	.	.	8	Tr
Lotus	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Artemisia ludoviciana	.	.	.	.	.	.	.	.	3	Tr	.	.	.	.
Hypericum formosum	.	.	.	.	.	.	.	.	12	0	.	.	.	.
Carex arcta	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Epilobium glaberrimum	.	.	.	.	.	.	.	.	6	0	.	.	.	.
Calamagrostis canadensis	.	.	.	.	.	.	.	.	6	0	.	.	.	.
Galium parisiense	.	.	.	.	.	.	100	0	.	.	100	0	.	.
Carex lenticularis	.	.	.	.	.	.	.	.	12	0	.	.	.	.
Caltha	.	.	.	.	.	.	.	.	3	Tr	.	.	.	.
Lycopus	11	0	.	.	.	.	.	.	.	.	.	.	.	.
Utricularia intermedia	.	.	20	2	.	.	.	.	.	.	.	.	12	0
Carex illota	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Carex buxbaumii	.	.	100	49	.	.	.	.	.	.	.	.	.	.
Lotus corniculatus	2	0	.	.	.	.	.	.	.	.	.	.	.	.
Beckmannia syzigachne	.	.	.	.	.	.	50	0	.	.	33	0	.	.
Viola	.	.	.	.	33	0	.	.	12	0	.	.	.	.
Carex tumulicola	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Saxifraga oregana	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Carex unilateralis	.	.	.	.	.	.	100	7	.	.	33	2	.	.
Poaceae	.	.	.	.	33	0	.	.	3	Tr	.	.	.	.
Ranunculus alismifolius	.	.	.	.	.	.	.	.	.	.	33	0	.	.
Carex aperta	.	.	.	.	.	.	.	.	6	0	.	.	.	.
Carex pellita	.	.	.	.	.	.	100	7	.	.	33	2	.	.
Carex lasiocarpa	.	.	.	.	.	.	.	.	.	.	.	.	100	49
Carex feta	.	.	.	.	.	.	50	8	.	.	100	42	.	.
Carex exsiccata	.	.	.	.	.	.	.	.	100	69	.	.	8	Tr
Lycopus uniflorus	.	.	80	6	33	0	.	.	.	.	.	.	4	Tr
Carex leporinella	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Equisetum	.	.	.	.	.	.	.	.	6	0	.	.	.	.
Angelica genuflexa	2	0	.	.	.	.	.	.	6	0	.	.	.	.
Fragaria virginiana	.	.	20	Tr	.	.	.	.	.	.	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Aster occidentalis	.	.	60	0	.	.	.	.	.	.	.	.	32	1
Juncus balticus	.	.	40	1	.	.	.	.	.	.	.	.	28	1
Eleocharis quinqueflora	.	.	40	0	.	.	.	.	.	.	.	.	.	.
Carex luzulina	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Juncus tenuis	.	.	.	.	.	.	100	4	.	.	33	0	.	.
Mimulus guttatus	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Carex simulata	.	.	.	.	.	.	.	.	.	.	.	.	8	1
Carex canescens	.	.	.	.	.	.	.	.	.	.	.	.	4	0
Polygonum bistortoides	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Glyceria striata	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Erigeron peregrinus	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Dulichium arundinaceum	.	.	.	.	33	1	.	.	.	.	.	.	.	.
Carex utriculata	.	.	.	.	33	0	.	.	.	.	.	.	24	3
Galium trifidum	7	0	.	.	.	.	.	.	9	Tr	.	.	24	0
Comarum palustre	83	17	40	Tr	.	.	.	.	.	.	.	.	4	Tr
Epilobium ciliatum	.	.	.	.	.	.	100	0	.	.	100	1	16	Tr
Achillea millefolium	.	.	.	.	.	.	.	.	3	Tr	.	.	.	.
Senecio jacobaea	.	.	.	.	.	.	.	.	3	Tr	.	.	.	.
Dodecatheon jeffreyi	.	.	40	Tr	.	.	.	.	3	0	.	.	8	0
Pedicularis groenlandica	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Carex echinata ssp. echinata	.	.	.	.	33	0	.	.	3	0	.	.	4	1
Senecio triangularis	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Boykinia major	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Deschampsia caespitosa	2	0	80	6	.	.	100	11	12	2	67	15	48	1
Danthonia californica	.	.	20	Tr	.	.	.	.	.	.	33	0	.	.
Hackelia diffusa	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Schoenoplectus acutus var. occidentalis	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Hypericum anagalloides	15	1	40	2	33	1	.	.	6	0	.	.	.	.
Platanthera dilatata	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Athyrium filix-femina	31	3	.	.	.	.	.	.	9	0	.	.	.	.
Spiranthes romanzoffiana	.	.	40	Tr	.	.	.	.	.	.	.	.	.	.
Aster	2	0	.	.	.	.	.	.	.	.	.	.	.	.
Castilleja miniata	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Calamagrostis stricta ssp. inexpansa	.	.	.	.	.	.	.	.	.	.	.	.	12	1
Carex deweyana ssp. leptopoda	.	.	.	.	.	.	100	73	.	.	100	24	.	.
Scirpus microcarpus	.	.	.	.	.	.	.	.	12	1	.	.	.	.
Epilobium ciliatum ssp. glandulosum	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Juncus patens	.	.	.	.	.	.	.	.	3	1	.	.	.	.
Aster foliaceus	.	.	.	.	.	.	.	.	6	0	.	.	.	.
Veronica americana	2	0	.	.	.	.	.	.	9	1	.	.	.	.
Carex aquatilis var. dives	100	47	.	.	.	.	.	.	3	0	.	.	12	1
Carex aquatilis	.	.	.	.	33	2	.	.	3	Tr	.	.	.	.
Polygonum	.	.	.	.	.	.	.	.	6	0	.	.	.	.
Callitriche heterophylla	.	.	.	.	.	.	50	1	.	.	33	0	.	.
Aster modestus	.	.	.	.	.	.	.	.	3	Tr	.	.	.	.

Lysichiton americanus	2	0	.	.	.	.	.	.	12	1	.	.	.	.
Epilobium ciliatum ssp. watsonii	2	0	.	.	.	.	.	.	3	0	.	.	.	.
Nuphar lutea ssp. polysepala	43	11	.	.	.	.	.	.	15	2	.	.	.	.
Gnaphalium palustre	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Juncus xiphoides var. triandrus	2	0	.	.	.	.	.	.	6	0	.	.	.	.
Caltha leptosepala ssp. howellii	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Viola adunca	.	.	20	Tr	.	.	.	.	.	.	.	.	.	.
Eleocharis palustris	.	.	40	2	.	.	50	0	6	0	67	7	4	0
Polypodium glycyrrhiza	2	0	.	.	.	.	.	.	.	.	.	.	.	.
Carex leptalea	.	.	.	.	33	0	.	.	.	.	.	.	.	.
Eleocharis acicularis	.	.	.	.	.	.	100	1	.	.	.	.	.	.
Carex hystericina	.	.	.	.	.	.	.	.	3	1	.	.	.	.
Calamagrostis stricta var. stricta	2	0	.	.	.	.	.	.	.	.	.	.	.	.
Plantago major	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Galium boreale	2	0	.	.	.	.	.	.	3	0	.	.	.	.
Luzula campestris	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Juncus effusus	2	0	.	.	.	.	.	.	3	0	.	.	.	.
Juncus nevadensis	.	.	40	2	.	.	.	.	.	.	.	.	8	0
Cicuta douglasii	9	1	.	.	.	.	.	.	6	0	.	.	.	.
Agrostis humilis	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Myosotis laxa	.	.	.	.	.	.	100	23	.	.	67	11	.	.
Oenanthe sarmentosa	6	1	.	.	.	.	.	.	.	.	67	12	.	.
Rumex crispus	.	.	.	.	.	.	50	0	.	.	33	1	.	.
Argentina egedii	6	1	.	.	.	.	.	.	.	.	.	.	.	.
Veronica scutellata	.	.	.	.	.	.	50	10	21	2	67	4	12	0
Carex cusickii	7	1	.	.	100	80	.	.	3	0	.	.	.	.
Drosera rotundifolia	.	.	.	.	33	0	.	.	.	.	.	.	.	.
Rudbeckia occidentalis	.	.	.	.	.	.	.	.	3	Tr	.	.	.	.
Mentha arvensis	.	.	.	.	.	.	.	.	6	0	33	0	.	.
Menyanthes trifoliata	2	0	.	.	.	.	.	.	.	.	.	.	.	.
Ranunculus uncinatus	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Potamogeton gramineus	.	.	.	.	.	.	.	.	.	.	.	.	16	0
Utricularia macrorhiza	.	.	.	.	.	.	.	.	.	.	.	.	4	2
Sagittaria latifolia	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Lemna minor	.	.	.	.	.	.	.	.	9	0	.	.	.	.
Galium aparine	26	2	.	.	.	.	.	.	.	.	.	.	.	.
Poa trivialis	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Glyceria borealis	.	.	.	.	.	.	.	.	6	0	.	.	.	.
Pteridium aquilinum	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Anthoxanthum odoratum	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ranunculus flammula	.	.	20	1	.	.	.	.	.	.	.	.	.	.
Agrostis thurberiana	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Carex obnupta	13	2	.	.	.	.	.	.	15	1	.	.	.	.
Tofieldia glutinosa	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Sium suave	.	.	.	.	.	.	.	.	3	0	.	.	.	.

Darlingtonia californica	2	0	.	.	.	.	.	.	.	.	.	.	.	.
Anaphalis margaritacea	.	.	.	.	.	.	.	.	3	Tr	.	.	.	.
Torreyochloa pallida var. pauciflora	.	.	.	.	.	.	.	.	12	1	.	.	.	.
Sparganium angustifolium	.	.	.	.	.	.	.	.	6	0	.	.	.	.
Juncus	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Callitriche	.	.	.	.	.	.	.	.	6	0	.	.	.	.
Glyceria grandis	.	.	.	.	.	.	.	.	9	0	.	.	.	.
Galium	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Potamogeton natans	.	.	.	.	.	.	.	.	3	0	.	.	.	.
Lycopus americanus	4	0	.	.	.	.	.	.	.	.	.	.	.	.
MOSS LAYER														
Moss	.	.	20	0	67	40	50	4	12	3	33	3	8	1
UNVEGETATED														
Bare ground	.	.	.	.	.	.	.	.	9	3	.	.	.	.
Litter	24	5	.	.	.	.	.	.	9	1	.	.	.	.
Water	7	1	.	.	.	.	.	.	.	.	.	.	.	.

	CARLEN		CARLIM		CARLUZ		CARNEB		CARNIG		CAROBN		CARPAC	
	14 Plots		9 Plots		8 Plots		3 Plots		14 Plots		57 Plots		3 Plots	
Species	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE
MATURE TREES														
Salix scouleriana	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Calocedrus decurrens	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Picea engelmannii	7	Tr	.	.	.	.	.	.	.	.	.	.	.	.
Alnus rubra	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Fraxinus latifolia	.	.	.	.	.	.	.	.	.	.	4	0	.	.
REPRODUCING TREES														
Picea engelmannii	7	0	.	.	.	.	33	0	.	.	.	.	.	.
Abies lasiocarpa	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Pinus contorta var. latifolia	.	.	.	.	.	.	33	0	.	.	.	.	.	.
Abies amabilis	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Tsuga heterophylla	7	0	11	0	.	.	.	.	.	.	.	.	.	.
Alnus rubra	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Pseudotsuga menziesii	7	0	.	.	.	.	.	.	.	.	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Acer macrophyllum	.	.	.	.	.	.	.	.	.	.	2	Tr	.	.
SHRUB LAYER														
Alnus incana	7	1	.	.	.	.	.	.	.	.	.	.	.	.
Salix	14	1	.	.	.	.	.	.	7	0	2	0	.	.
Spiraea densiflora	7	0	.	.	13	0	.	.	7	0	.	.	.	.
Betula nana	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Phyllodoce empetriformis	.	.	.	.	.	.	.	.	36	1	.	.	.	.
Lonicera involucrata	.	.	.	.	.	.	33	1	.	.	.	.	.	.
Sorbus scopulina	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Vaccinium membranaceum	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Gaultheria humifusa	.	.	.	.	.	.	.	.	36	1	.	.	.	.
Physocarpus capitatus	.	.	.	.	.	.	.	.	.	.	4	0	.	.
Rosa pisocarpa	.	.	.	.	13	0	.	.	.	.	2	2	.	.
Kalmia microphylla	.	.	.	.	13	1	.	.	43	3	.	.	.	.
Rosa gymnocarpa	.	.	.	.	.	.	.	.	.	.	2	1	.	.
Vaccinium uliginosum	7	0	.	.	63	6	33	5	7	0	.	.	.	.
Corylus cornuta	.	.	.	.	.	.	.	.	.	.	2	1	.	.
Salix commutata	.	.	.	.	.	.	.	.	100	10	.	.	.	.
Vaccinium ovalifolium	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Rubus ursinus	7	0	.	.	.	.	.	.	.	.	11	1	.	.
Cornus sericea	14	1	.	.	.	.	.	.	.	.	5	0	.	.
Salix planifolia	.	.	.	.	.	.	.	.	7	0	.	.	.	.
Spiraea douglasii	14	0	.	.	25	4	.	.	.	.	5	0	.	.
Rubus spectabilis	.	.	.	.	.	.	.	.	.	.	4	Tr	.	.
Oemleria cerasiformis	.	.	.	.	.	.	.	.	.	.	2	Tr	.	.
Ledum glandulosum	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Salix hookeriana	.	.	.	.	.	.	.	.	.	.	4	0	.	.
Salix sitchensis	7	4	.	.	13	0	33	0	.	.	9	0	.	.
Malus fusca	.	.	.	.	.	.	.	.	.	.	2	Tr	.	.
HERB LAYER														
Tiarella trifoliata	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Lysimachia terrestris	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Stachys	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Pyrola asarifolia	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Hydrophyllum tenuipes	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Luzula parviflora	.	.	.	.	.	.	.	.	7	0	2	Tr	.	.
Hieracium gracile	.	.	.	.	.	.	.	.	7	0	.	.	.	.
Aster ledophyllus	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Artemisia ludoviciana	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Dodecatheon pulchellum var. monanthum	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Bromus carinatus	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Sherardia arvensis	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Bromus inermis	7	0	.	.	.	.	.	.	.	.	.	.	.	.

Barbarea vulgaris	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Mimulus dentatus	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium luteum	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Polemonium carneum	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Thalictrum	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Polygonum phytolaccifolium	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Rumex salicifolius	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Taraxacum ceratophorum	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Lomatium triternatum	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Carex angustata	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Unknown herb	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Carex mertensii	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Scirpus	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Lycopodiella inundata	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Agoseris glauca	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Tolmiea menziesii	.	.	.	.	.	.	.	.	.	.	4	0	.	.
Hypericum formosum	7	0	.	.	13	0	.	.	.	.	4	0	.	.
Carex atrata var. atrosquama	.	.	.	.	.	.	33	1	.	.	.	.	.	.
Epilobium brachycarpum	.	.	.	.	.	.	33	0	.	.	.	.	.	.
Carex nebrascensis	.	.	.	.	.	.	100	29	.	.	.	.	.	.
Maianthemum stellatum	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Juncus drummondii	.	.	.	.	.	.	.	.	14	1	.	.	.	.
Polygonum newberryi	.	.	.	.	.	.	.	.	7	0	.	.	.	.
Mimulus lewisii	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Lomatium martindalei	.	.	.	.	.	.	.	.	7	0	.	.	.	.
Stellaria umbellata	.	.	.	.	.	.	.	.	7	0	.	.	.	.
Stellaria obtusa	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Luetkea pectinata	.	.	.	.	.	.	.	.	7	0	.	.	.	.
Juncus mertensianus	.	.	.	.	.	.	.	.	7	0	.	.	.	.
Juncus parryi	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Castilleja parviflora	.	.	.	.	.	.	.	.	7	0	.	.	.	.
Saxifraga ferruginea	7	0	.	.	.	.	.	.	7	0	.	.	.	.
Poa compressa	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Rorippa nasturtium-aquaticum	.	.	.	.	.	.	.	.	.	.	23	3	.	.
Elymus elymoides ssp. elymoides	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Agrostis hallii	.	.	.	.	25	1	.	.	.	.	.	.	.	.
Ligusticum apiifolium	7	0	.	.	13	1	.	.	.	.	.	.	.	.
Gentiana calycosa	.	.	.	.	.	.	.	.	7	0	.	.	.	.
Vicia tetrasperma	.	.	.	.	.	.	.	.	.	.	.	.	67	1
Epilobium glaberrimum	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Calamagrostis canadensis	14	1	.	.	.	.	.	.	.	.	.	.	.	.
Carex lenticularis	100	47	.	.	25	1	.	.	.	.	2	0	.	.
Muhlenbergia	7	1	.	.	.	.	.	.	.	.	.	.	.	.
Agoseris aurantiaca	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Agrostis stolonifera	.	.	.	.	.	.	.	.	.	.	.	.	100	38

Stachys ciliata	14	0	.	.	.	.	.	.	.	.	2	0	.	.
Carex illota	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Carex laeviculmis	7	1	.	.	.	.	.	.	.	.	.	.	.	.
Sisyrinchium idahoense	7	0	.	.	13	0	.	.	.	.	.	.	.	.
Carex spectabilis	.	.	.	.	.	.	.	.	14	1	.	.	.	.
Lupinus latifolius	7	0	.	.	.	.	.	.	7	1	.	.	.	.
Epilobium alpinum	7	0	.	.	.	.	.	.	14	0	.	.	.	.
Viola	29	4	.	.	.	.	.	.	.	.	2	0	.	.
Equisetum telmateia	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Ranunculus populago	.	.	.	.	.	.	33	0	.	.	.	.	.	.
Poaceae	7	0	.	.	.	.	.	.	7	0	4	Tr	.	.
Carex exsiccata	29	1	.	.	13	1	.	.	.	.	5	1	.	.
Microseris borealis	.	.	.	.	38	4	.	.	.	.	.	.	.	.
Scirpus congdonii	.	.	.	.	38	1	.	.	.	.	.	.	.	.
Ranunculus gormanii	7	0	.	.	38	4	.	.	.	.	.	.	.	.
Lycopus uniflorus	14	0	.	.	.	.	.	.	.	.	2	0	.	.
Claytonia sibirica	.	.	.	.	.	.	.	.	.	.	4	0	.	.
Viola macloskeyi	14	0	.	.	25	0	.	.	.	.	.	.	.	.
Hordeum brachyantherum	7	1	.	.	.	.	.	.	.	.	.	.	100	6
Poa pratensis	7	0	.	.	13	0	.	.	.	.	.	.	100	3
Rumex acetosella	.	.	.	.	.	.	.	.	.	.	.	.	33	0
Viola orbiculata	.	.	.	.	.	.	33	0	.	.	.	.	.	.
Delphinium menziesii	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Angelica genuflexa	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Circaea alpina	.	.	.	.	.	.	.	.	.	.	4	0	.	.
Juncus balticus	7	0	.	.	13	0	.	.	.	.	2	0	.	.
Eleocharis quinqueflora	7	0	.	.	63	3	33	3	36	4	.	.	.	.
Carex luzulina	29	2	.	.	100	34	.	.	.	.	.	.	.	.
Carex pachystachya	7	1	.	.	.	.	.	.	.	.	.	.	100	62
Stellaria crispa	7	1	.	.	.	.	.	.	.	.	.	.	.	.
Carex microptera	.	.	.	.	.	.	33	1	.	.	.	.	.	.
Mimulus guttatus	21	0	.	.	.	.	.	.	.	.	2	0	.	.
Carex simulata	.	.	.	.	25	2	.	.	.	.	.	.	.	.
Potentilla drummondii	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Carex canescens	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Trifolium longipes	14	0	.	.	38	2	.	.	.	.	.	.	.	.
Myosotis	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Viola palustris	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Dodecatheon alpinum	.	.	.	.	.	.	67	1	.	.	.	.	.	.
Danthonia intermedia	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Polygonum bistortoides	43	1	.	.	25	0	67	1	.	.	.	.	.	.
Veronica wormskjoldii	.	.	.	.	.	.	.	.	21	0	.	.	.	.
Drosera anglica	.	.	.	.	38	2	.	.	.	.	.	.	.	.
Glyceria striata	7	0	.	.	.	.	.	.	.	.	4	0	.	.
Erigeron peregrinus	.	.	.	.	13	0	.	.	7	0	.	.	.	.

Dulichium arundinaceum	.	.	33	1	.	.	.	.	.	.	4	0	.	.
Boykinia occidentalis	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cirsium callilepis	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex utriculata	21	3	22	1	13	0	.	.	.	.	.	.	.	.
Galium trifidum	.	.	.	.	.	.	.	.	.	.	11	0	.	.
Carex limosa	.	.	100	25	.	.	.	.	.	.	.	.	.	.
Comarum palustre	14	1	.	.	13	0	.	.	.	.	.	.	.	.
Aconitum columbianum	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Veratrum californicum	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Galium bifolium	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Achillea millefolium	7	0	.	.	.	.	.	.	.	.	2	Tr	.	.
Rorippa curvisiliqua	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Senecio jacobaea	.	.	.	.	.	.	.	.	.	.	2	Tr	.	.
Potentilla flabellifolia	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Dodecatheon jeffreyi	7	1	.	.	63	8	.	.	7	1	.	.	.	.
Pascopyrum smithii	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pedicularis groenlandica	7	1	.	.	63	1	.	.	7	0	.	.	.	.
Carex	7	1	.	.	.	.	.	.	.	.	.	.	.	.
Carex echinata ssp. echinata	7	0	.	.	38	1	.	.	.	.	.	.	.	.
Hypericum perforatum	.	.	.	.	.	.	.	.	.	.	4	0	.	.
Aster alpigenus	.	.	.	.	25	0	.	.	14	1	.	.	.	.
Senecio triangularis	50	1	.	.	.	.	.	.	.	.	.	.	.	.
Boykinia major	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Leucanthemum vulgare	.	.	.	.	.	.	.	.	.	.	4	Tr	.	.
Cirsium arvense	7	0	.	.	.	.	.	.	.	.	4	1	67	2
Deschampsia caespitosa	7	0	.	.	75	7	33	0	.	.	.	.	.	.
Danthonia californica	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Hackelia diffusa	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Urtica dioica ssp. gracilis	.	.	.	.	.	.	.	.	.	.	2	Tr	.	.
Clintonia uniflora	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Triantha occidentalis	.	.	.	.	25	0	.	.	29	1	.	.	.	.
Schoenoplectus acutus var. occidentalis	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Hypericum anagalloides	21	1	.	.	75	8	.	.	.	.	.	.	.	.
Platanthera dilatata	7	Tr	.	.	38	0	.	.	.	.	.	.	.	.
Penstemon procerus	.	.	.	.	.	.	.	.	7	0	.	.	.	.
Carex scopulorum	7	0	.	.	.	.	.	.	64	9	.	.	.	.
Athyrium filix-femina	.	.	.	.	.	.	.	.	.	.	28	4	.	.
Spiranthes romanzoffiana	.	.	11	0	.	.	.	.	.	.	.	.	.	.
Aster	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Castilleja miniata	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Carex deweyana ssp. leptopoda	.	.	.	.	13	0	.	.	.	.	2	0	.	.
Muhlenbergia filiformis	.	.	.	.	25	4	.	.	.	.	.	.	.	.
Scirpus microcarpus	7	0	.	.	13	1	.	.	.	.	5	0	.	.
Lamiaceae	.	.	.	.	.	.	.	.	.	.	2	Tr	.	.
Heracleum lanatum	21	1	.	.	.	.	.	.	.	.	2	Tr	.	.

Ligusticum grayi	7	1	.	.	13	0	.	.	29	2	.	.	.	.
Epilobium ciliatum ssp. glandulosum	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Viola glabella	.	.	.	.	.	.	.	.	.	.	2	Tr	.	.
Cirsium vulgare	.	.	.	.	.	.	.	.	.	.	4	0	.	.
Juncus patens	.	.	.	.	13	1	.	.	.	.	.	.	.	.
Aster foliaceus	7	0	.	.	13	0	.	.	.	.	.	.	.	.
Veronica americana	29	1	.	.	.	.	.	.	.	.	9	1	.	.
Geum macrophyllum	21	0	.	.	.	.	.	.	.	.	4	0	.	.
Phleum alpinum	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex aquatilis var. dives	21	3	.	.	63	3	.	.	.	.	.	.	.	.
Carex aquatilis	7	3	.	.	13	1	.	.	.	.	.	.	.	.
Polygonum	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Rumex obtusifolius	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Aster modestus	.	.	.	.	.	.	.	.	.	.	4	0	.	.
Carex nigricans	.	.	.	.	.	.	.	.	100	33	.	.	.	.
Carex brunnescens	.	.	.	.	.	.	33	0	.	.	.	.	.	.
Lysichiton americanus	14	0	.	.	.	.	.	.	.	.	9	2	.	.
Linnaea borealis	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium ciliatum ssp. watsonii	7	0	.	.	13	0	.	.	.	.	9	0	.	.
Agrostis	7	0	.	.	13	0	.	.	.	.	.	.	.	.
Juncus xiphoides var. triandrus	14	1	.	.	38	1	.	.	.	.	.	.	.	.
Caltha leptosepala ssp. howellii	7	1	.	.	63	4	.	.	7	1	.	.	.	.
Viola adunca	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Cinna latifolia	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Carex leptalea	7	3	.	.	.	.	.	.	.	.	.	.	.	.
Equisetum arvense	21	1	.	.	13	0	33	1	.	.	4	0	.	.
Carex hystericina	14	1	.	.	.	.	.	.	.	.	.	.	.	.
Plantago major	.	.	.	.	.	.	.	.	.	.	2	Tr	.	.
Galium boreale	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Luzula campestris	.	.	.	.	25	0	.	.	.	.	.	.	.	.
Juncus effusus	.	.	.	.	13	0	.	.	.	.	7	0	.	.
Tiarella trifoliata var. unifoliata	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Vicia americana	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Agrostis exarata	7	0	.	.	13	0	.	.	.	.	7	0	.	.
Cicuta douglasii	14	0	.	.	.	.	.	.	.	.	4	0	.	.
Myosotis laxa	.	.	.	.	.	.	.	.	.	.	4	1	.	.
Pedicularis attollens	.	.	.	.	.	.	.	.	50	1	.	.	.	.
Oenanthe sarmentosa	.	.	.	.	.	.	.	.	.	.	14	1	.	.
Eleocharis	.	.	.	.	13	1	.	.	.	.	.	.	.	.
Carex interrupta	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Antennaria media	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Veronica scutellata	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Packera cymbalarioides	.	.	.	.	.	.	.	.	29	1	.	.	.	.
Dryopteris austriaca	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Rumex	7	0	.	.	.	.	.	.	.	.	.	.	.	.

Carex cusickii	.	.	.	.	.	.	.	.	.	.	2	1	.	.
Drosera rotundifolia	.	.	44	2	25	0	.	.	.	.	2	0	.	.
Rudbeckia occidentalis	7	0	.	.	.	.	.	.	.	.	4	0	.	.
Mentha arvensis	.	.	.	.	.	.	.	.	.	.	9	0	.	.
Mitella breweri	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Menyanthes trifoliata	21	1	89	16	.	.	.	.	.	.	.	.	.	.
Polystichum munitum	.	.	.	.	.	.	.	.	.	.	4	0	.	.
Lemna minor	.	.	.	.	.	.	.	.	.	.	2	Tr	.	.
Galium aparine	.	.	.	.	.	.	.	.	.	.	7	0	.	.
Poa trivialis	.	.	.	.	.	.	.	.	.	.	4	0	.	.
Callitriche stagnalis	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Veratrum viride	7	3	.	.	.	.	.	.	.	.	.	.	.	.
Phalaris arundinacea	.	.	.	.	.	.	.	.	.	.	.	.	33	0
Pteridium aquilinum	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Ranunculus flammula	7	1	.	.	.	.	.	.	.	.	.	.	.	.
Agrostis thurberiana	29	1	.	.	13	0	.	.	7	1	.	.	.	.
Carex obnupta	14	0	.	.	.	.	.	.	.	.	100	66	.	.
Tofieldia glutinosa	.	.	.	.	38	0	.	.	7	0	.	.	.	.
Typha latifolia	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Maianthemum dilatatum	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Stellaria calycantha	.	.	.	.	.	.	.	.	.	.	5	Tr	.	.
Valeriana sitchensis	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Polygonum amphibium	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Lupinus polyphyllus	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Streptopus amplexifolius	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Gentiana sceptrum	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Anaphalis margaritacea	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Torreyochloa pallida var. pauciflora	.	.	.	.	.	.	.	.	.	.	2	Tr	.	.
Arnica mollis	14	0	.	.	.	.	.	.	.	.	.	.	.	.
Poa	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Arnica latifolia	.	.	.	.	.	.	.	.	7	0	.	.	.	.
Mimulus moschatus	7	0	.	.	.	.	.	.	.	.	2	0	.	.
Agrostis capillaris	.	.	.	.	.	.	.	.	.	.	.	.	33	1
Juncus	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Oxalis trilliifolia	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Digitalis purpurea	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Antennaria argentea	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Senecio pseudaureus	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Agrostis oregonensis	.	.	.	.	.	.	.	.	.	.	2	0	.	.
Glyceria grandis	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Carex stipata	.	.	.	.	13	0	.	.	.	.	2	0	.	.
Galium	7	Tr	.	.	.	.	.	.	.	.	2	Tr	.	.
Cirsium	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Dodecatheon hendersonii	7	0	.	.	.	.	.	.	.	.	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Ranunculus aquatilis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Trientalis europaea ssp. arctica	.	.	.	.	13	0	.	.	.	.	.	.	.	.	.	.	.	.
Erechtites minima	.	.	.	.	.	.	.	.	.	.	7	0	.	.	.	.	.	.
Lycopus americanus	.	.	.	.	.	.	.	.	.	.	2	0	.	.	.	.	.	.
MOSS LAYER																		
Moss	21	8	78	75	63	29	.	.	.	.	42	34	.	.	.	.	.	.
UNVEGETATED																		
Bare ground	.	.	22	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Litter	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Water	.	.	.	.	25	9	.	.	.	.	.	.	.	.	.	.	.	.

	CARSCO				CARUTR		DESCES (CALLEPH phase)						DESCES (CARBUX phase)			
			CARSIM				CORSER/LYSAME		DESCES (CARAQUD phase)							
	8 Plots		5 Plots		53 Plots		2 Plots		8 Plots		4 Plots		4 Plots			
Species	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE		
MATURE TREES																
Pinus contorta var. latifolia	.	.	.	.	2	1	.	.	.	.	.	.	.	.		
Abies lasiocarpa	.	.	.	.	.	.	.	.	13	5	.	.	.	.		
Frangula purshiana	.	.	.	.	.	.	50	2	.	.	.	.	.	.		
REPRODUCING TREES																
Picea engelmannii	.	.	.	.	.	.	.	.	38	1	.	.	.	.		
Abies lasiocarpa	.	.	.	.	.	.	.	.	25	1	.	.	.	.		
Tsuga heterophylla	.	.	.	.	2	Tr	.	.	13	5	.	.	.	.		
Fraxinus latifolia	.	.	.	.	.	.	50	3	.	.	.	.	.	.		
Tsuga mertensiana	.	.	.	.	.	.	.	.	13	0	.	.	.	.		
Thuja plicata	.	.	.	.	2	Tr	.	.	.	.	.	.	.	.		
SHRUB LAYER																
Alnus viridis ssp. sinuata	.	.	.	.	4	1	.	.	.	.	.	.	.	.		
Alnus incana	.	.	.	.	2	0	.	.	.	.	.	.	.	.		
Salix	.	.	.	.	2	Tr	.	.	13	0	.	.	.	.		
Salix myrtillifolia	13	0	.	.	.	.	.	.	.	.	.	.	.	.		
Spiraea densiflora	13	0	.	.	2	0	.	.	13	0	.	.	25	0		
Phyllodoce empetriformis	13	0	.	.	.	.	.	.	.	.	.	.	.	.		
Acer circinatum	.	.	.	.	.	.	100	4	.	.	.	.	.	.		
Kalmia microphylla	13	0	.	.	2	0	.	.	13	0	.	.	25	0		

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Vaccinium uliginosum	.	.	.	.	4	0	.	.	50	8	25	0	25	1
Salix commutata	25	1	.	.	2	0	.	.	.	.	.	.	.	.
Vaccinium ovalifolium	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Salix geyeriana	.	.	.	.	2	Tr	.	.	.	.	.	.	25	1
Rubus ursinus	.	.	.	.	.	.	100	1	.	.	.	.	.	.
Cornus sericea	.	.	.	.	.	.	100	80	.	.	.	.	.	.
Spiraea douglasii	.	.	.	.	6	0	.	.	13	0	.	.	.	.
Vaccinium oxycoccos	.	.	.	.	2	2	.	.	.	.	.	.	.	.
Rubus lasiococcus	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Salix hookeriana	.	.	.	.	2	Tr	.	.	.	.	.	.	.	.
Salix sitchensis	13	1	.	.	2	Tr	.	.	.	.	.	.	.	.
Lonicera caerulea	.	.	.	.	4	1	.	.	.	.	.	.	.	.
HERB LAYER														
Stenanthium occidentale	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Hypericum formosum	.	.	.	.	4	Tr	.	.	.	.	.	.	.	.
Carex jonesii	.	.	.	.	4	0	.	.	.	.	.	.	.	.
Saxifraga ferruginea	13	0	.	.	.	.	.	.	.	.	.	.	.	.
Gentiana calycosa	13	0	.	.	.	.	.	.	.	.	.	.	.	.
Platanthera leucostachys	13	0	.	.	.	.	.	.	.	.	.	.	.	.
Leptarrhena pyrolifolia	13	0	.	.	.	.	.	.	.	.	.	.	.	.
Erythronium grandiflorum	13	2	.	.	.	.	.	.	.	.	.	.	.	.
Calamagrostis canadensis	13	0	.	.	11	2	.	.	38	3	.	.	.	.
Carex lenticularis	.	.	.	.	4	0	.	.	.	.	.	.	.	.
Juncus filiformis	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Isoetes	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Arnica amplexicaulis	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Carex athrostachya	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Microseris borealis	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Agoseris aurantiaca	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Agrostis stolonifera	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Erigeron foliosus	.	.	.	.	.	.	.	.	13	1	.	.	.	.
Juncus howellii	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Utricularia intermedia	.	.	20	1	.	.	.	.	.	.	.	.	.	.
Carex illota	13	2	.	.	.	.	.	.	.	.	.	.	.	.
Carex laeviculmis	.	.	.	.	4	0	.	.	.	.	.	.	.	.
Carex spectabilis	13	2	.	.	.	.	.	.	.	.	.	.	.	.
Carex buxbaumii	.	.	.	.	.	.	.	.	.	.	.	.	100	26
Lupinus latifolius	13	0	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium alpinum	38	0	.	.	.	.	.	.	.	.	.	.	.	.
Viola	.	.	.	.	2	Tr	.	.	.	.	.	.	.	.
Saxifraga oregana	13	1	.	.	.	.	.	.	.	.	.	.	.	.
Equisetum telmateia	13	0	.	.	.	.	.	.	.	.	.	.	.	.
Ranunculus populago	13	0	.	.	.	.	.	.	.	.	.	.	.	.
Ranunculus alismifolius	25	1	.	.	2	0	.	.	38	1	25	0	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Carex lasiocarpa	.	.	.	.	2	Tr	.	.	.	.	.	.	50	9
Carex exsiccata	.	.	.	.	.	.	.	.	13	1	.	.	.	.
Microseris borealis	.	.	.	.	.	.	.	.	38	1	25	2	.	.
Scirpus congdonii	13	0	.	.	4	0	.	.	13	1	.	.	50	2
Ranunculus gormanii	.	.	.	.	.	.	.	.	.	.	.	.	50	1
Lycopus uniflorus	.	.	.	.	6	0	.	.	.	.	.	.	.	.
Viola macloskeyi	25	1	.	.	2	0	.	.	25	1	25	0	.	.
Carex leporinella	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Angelica genuflexa	.	.	.	.	2	Tr	.	.	.	.	.	.	.	.
Aster occidentalis	.	.	20	0	2	0	.	.	25	0	25	2	50	2
Juncus balticus	13	3	60	3	2	Tr	.	.	13	2	25	1	.	.
Eleocharis quinqueflora	13	1	20	2	2	0	.	.	.	.	.	.	25	0
Carex luzulina	25	1	.	.	2	Tr	.	.	63	2	25	0	25	0
Stellaria crispa	.	.	.	.	2	Tr	.	.	.	.	.	.	.	.
Carex microptera	25	0	.	.	.	.	.	.	.	.	.	.	.	.
Carex simulata	.	.	100	47	2	0	.	.	.	.	.	.	.	.
Potentilla drummondii	.	.	.	.	2	Tr	.	.	38	1	25	0	.	.
Carex canescens	13	0	.	.	4	Tr	.	.	.	.	.	.	.	.
Trifolium longipes	25	0	.	.	2	Tr	.	.	50	2	50	5	50	15
Viola palustris	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Dodecatheon alpinum	13	0	.	.	.	.	.	.	.	.	.	.	.	.
Danthonia intermedia	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Polygonum bistortoides	13	1	.	.	6	0	.	.	25	0	.	.	.	.
Veronica wormskjoldii	13	0	.	.	.	.	.	.	.	.	.	.	.	.
Glyceria striata	.	.	.	.	4	Tr	.	.	.	.	.	.	.	.
Boykinia occidentalis	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Cirsium callilepis	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex utriculata	13	2	40	6	100	52	.	.	.	.	25	1	75	1
Galium trifidum	.	.	.	.	6	0	50	Tr	.	.	.	.	.	.
Carex limosa	.	.	.	.	4	0	.	.	.	.	.	.	.	.
Comarum palustre	.	.	.	.	4	Tr	.	.	.	.	.	.	25	0
Aconitum columbianum	.	.	.	.	.	.	.	.	25	1	.	.	.	.
Galium bifolium	.	.	.	.	6	0	.	.	.	.	25	1	25	0
Epilobium ciliatum	.	.	.	.	2	Tr	.	.	.	.	.	.	.	.
Potentilla flabellifolia	25	1	.	.	.	.	.	.	.	.	.	.	.	.
Dodecatheon jeffreyi	50	1	.	.	9	0	.	.	75	11	50	3	25	0
Pedicularis groenlandica	13	0	.	.	2	0	.	.	.	.	.	.	.	.
Carex	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Carex echinata ssp. echinata	13	0	.	.	4	0	.	.	13	1	25	1	.	.
Aster alpigenus	38	2	.	.	.	.	.	.	38	1	.	.	25	0
Senecio triangularis	13	0	.	.	4	0	.	.	50	2	.	.	.	.
Boykinia major	.	.	.	.	4	0	.	.	.	.	.	.	.	.
Deschampsia caespitosa	50	9	60	0	21	3	.	.	100	45	100	39	100	54
Danthonia californica	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Triantha occidentalis	.	.	.	.	2	Tr	.	.	25	1	.	.	.	.

Mimulus primuloides	25	1	20	Tr	.	.	.	.	13	0	.	.	.	.
Hypericum anagalloides	13	0	.	.	13	3	.	.	50	2	50	0	.	.
Platanthera dilatata	.	.	.	.	2	Tr	.	.	50	0	25	0	.	.
Agrostis scabra	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Carex scopulorum	100	49	.	.	2	0	.	.	13	0	.	.	.	.
Athyrium filix-femina	.	.	.	.	4	Tr	.	.	.	.	.	.	.	.
Spiranthes romanzoffiana	25	0	.	.	2	0	.	.	.	.	.	.	25	0
Aster	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Calamagrostis stricta ssp. inexpansa	.	.	.	.	4	1	.	.	.	.	.	.	50	0
Luzula campestris var. multiflora	.	.	.	.	2	Tr	.	.	.	.	.	.	.	.
Muhlenbergia filiformis	38	4	.	.	.	.	.	.	.	.	.	.	50	4
Scirpus microcarpus	.	.	.	.	9	1	.	.	.	.	.	.	.	.
Ligusticum grayi	50	2	.	.	.	.	.	.	75	11	.	.	.	.
Epilobium ciliatum ssp. glandulosum	.	.	.	.	2	Tr	.	.	.	.	.	.	.	.
Veronica americana	.	.	.	.	6	Tr	.	.	.	.	25	0	.	.
Carex aquatilis var. dives	.	.	.	.	15	3	.	.	38	4	100	11	25	0
Carex aquatilis	.	.	.	.	8	1	.	.	.	.	.	.	50	16
Aster modestus	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Carex nigricans	38	2	.	.	.	.	.	.	.	.	.	.	.	.
Carex brunnescens	13	1	.	.	.	.	.	.	.	.	.	.	.	.
Lysichiton americanus	.	.	.	.	6	0	100	20	.	.	.	.	.	.
Epilobium ciliatum ssp. watsonii	.	.	.	.	2	Tr	.	.	13	0	.	.	.	.
Agrostis	.	.	.	.	6	0	.	.	.	.	.	.	.	.
Juncus xiphoides var. triandrus	.	.	.	.	8	0	.	.	.	.	.	.	.	.
Caltha leptosepala ssp. howellii	13	1	.	.	8	0	.	.	100	18	50	1	.	.
Eleocharis palustris	13	4	.	.	.	.	.	.	.	.	.	.	50	6
Polypodium glycyrrhiza	.	.	.	.	.	.	50	0	.	.	.	.	.	.
Galium triflorum	.	.	.	.	2	Tr	.	.	.	.	.	.	.	.
Juncus effusus	.	.	.	.	2	1	.	.	.	.	.	.	25	1
Cicuta douglasii	.	.	.	.	9	0	.	.	.	.	25	0	.	.
Veronica scutellata	.	.	40	0	.	.	.	.	.	.	.	.	25	1
Packera cymbalarioides	50	1	.	.	2	Tr	.	.	.	.	.	.	.	.
Camassia quamash	.	.	.	.	4	0	.	.	.	.	25	0	.	.
Carex cusickii	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Drosera rotundifolia	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Menyanthes trifoliata	.	.	.	.	8	0	.	.	.	.	.	.	.	.
Potamogeton gramineus	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Utricularia macrorhiza	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Polystichum munitum	.	.	.	.	.	.	50	0	.	.	.	.	.	.
Lemna minor	.	.	.	.	6	0	50	3	.	.	.	.	.	.
Veratrum viride	.	.	.	.	.	.	.	.	13	1	.	.	.	.
Fragaria vesca	.	.	.	.	2	Tr	.	.	.	.	.	.	.	.
Ranunculus flammula	.	.	40	0	2	0	.	.	.	.	25	0	.	.
Agrostis thurberiana	.	.	.	.	.	.	.	.	25	0	25	1	.	.
Carex obnupta	.	.	.	.	.	.	50	2	13	1	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Tofieldia glutinosa	38	3	.	.	4	0	.	.	13	0	.	.	.	.
Valeriana sitchensis	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Torreyochloa pallida var. pauciflora	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Mimulus moschatus	.	.	.	.	2	Tr	.	.	.	.	.	.	.	.
Myriophyllum sibiricum	.	.	.	.	2	Tr	.	.	.	.	.	.	.	.
Eriophorum gracile	25	1	.	.	.	.	.	.	.	.	.	.	.	.
Parnassia fimbriata	13	0	.	.	2	Tr	.	.	.	.	.	.	.	.
Agrostis oregonensis	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Potamogeton natans	.	.	.	.	4	0	.	.	.	.	.	.	.	.
MOSS LAYER														
Moss	25	6	60	1	45	9	50	30	38	19	50	8	50	4
UNVEGETATED														
Bare ground	.	.	.	.	34	18	50	3	.	.	.	.	.	.
Litter	.	.	.	.	51	10	50	10	.	.	50	1	.	.
Water	.	.	20	12	4	1	.	.	.	.	.	.	.	.

	DESCES (CAREXS phase)		DESCES (DODJEF phase) ELEQU phase)		DESCES (HYPANA phase)		DESCES (MICBOR phase)		DESCES (MUHFIL phase)		DESCES (RANGOR phase)	
	5 Plots		11 Plots		14 Plots		14 Plots		3 Plots		5 Plots		7 Plots	
Species	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE
MATURE TREES														
Pinus contorta var. latifolia	.	.	.	.	7	1	.	.	.	.	.	.	.	.
Abies lasiocarpa	.	.	9	1	.	.	.	.	.	.	.	.	.	.
REPRODUCING TREES														
Pinus contorta var. latifolia	.	.	.	.	14	2	14	0	.	.	20	1	.	.
Abies amabilis	.	.	9	0	.	.	.	.	.	.	.	.	.	.
SHRUB LAYER														
Salix	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Salix myrtillifolia	.	.	.	.	.	.	7	0	.	.	.	.	14	0
Betula nana	.	.	.	.	.	.	7	1	.	.	.	.	.	.
Vaccinium membranaceum	.	.	9	1	.	.	.	.	.	.	.	.	.	.
Gaultheria humifusa	.	.	9	0	.	.	.	.	.	.	.	.	.	.
Rosa pisocarpa	.	.	.	.	.	.	7	0	.	.	.	.	.	.
Kalmia microphylla	.	.	18	1	.	.	14	1	.	.	.	.	14	0
Vaccinium uliginosum	40	0	64	9	29	0	71	10	100	3	60	3	14	1
Salix commutata	.	.	.	.	7	0	.	.	.	.	.	.	.	.

Salix geyeriana	.	.	.	.	7	Tr	7	0	.	.	40	1	.	.
Spiraea douglasii	20	0	18	2	7	0	14	1	.	.	.	.	.	.
HERB LAYER														
Carex angustata	.	.	9	0	14	1	7	0	.	.	.	.	.	.
Hypericum formosum	.	.	.	.	7	Tr	.	.	.	.	.	.	.	.
Carex jonesii	.	.	.	.	7	0	.	.	.	.	.	.	14	1
Agrostis hallii	.	.	9	0	.	.	.	.	.	.	.	.	.	.
Ligusticum apiifolium	.	.	9	1	.	.	.	.	.	.	.	.	.	.
Epilobium glaberrimum	.	.	.	.	7	0	.	.	.	.	.	.	.	.
Calamagrostis canadensis	.	.	55	2	.	.	.	.	.	.	.	.	.	.
Microseris borealis	.	.	.	.	7	0	.	.	.	.	.	.	.	.
Caltha	.	.	9	0	.	.	.	.	.	.	.	.	.	.
Sisyrinchium idahoense	.	.	.	.	.	.	.	.	.	.	.	.	29	0
Carex buxbaumii	.	.	27	0	36	1	21	0	.	.	40	2	57	3
Epilobium alpinum	.	.	.	.	14	0	7	0	.	.	.	.	43	0
Viola	.	.	.	.	7	0	.	.	.	.	.	.	.	.
Saxifraga oregana	.	.	.	.	7	Tr	.	.	.	.	.	.	14	0
Carex siccata	20	0	.	.	.	.	.	.	.	.	.	.	.	.
Poa annua	20	0	.	.	.	.	.	.	.	.	.	.	.	.
Ranunculus alismifolius	.	.	27	2	7	0	21	1	67	1	20	2	.	.
Carex exsiccata	100	22	.	.	.	.	.	.	.	.	.	.	.	.
Microseris borealis	.	.	45	1	50	5	86	7	100	25	60	6	100	4
Scirpus congdonii	20	1	36	1	57	3	64	3	67	1	20	0	43	1
Ranunculus gormanii	.	.	27	1	57	5	50	4	33	0	40	4	100	18
Viola macloskeyi	.	.	36	1	14	1	57	3	100	1	20	1	.	.
Sisyrinchium douglasii	.	.	18	0	.	.	14	0	.	.	.	.	.	.
Viola orbiculata	20	0	.	.	.	.	.	.	.	.	.	.	.	.
Delphinium menziesii	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Camassia leichtlinii	.	.	.	.	7	1	.	.	.	.	.	.	.	.
Aster occidentalis	20	2	9	0	.	.	14	0	.	.	60	1	14	0
Circaea alpina	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Juncus balticus	80	3	36	1	50	2	14	0	.	.	40	2	43	2
Eleocharis quinqueflora	.	.	18	1	100	39	36	1	33	5	40	5	14	1
Carex luzulina	.	.	73	1	21	0	93	2	67	4	40	1	86	2
Mimulus guttatus	.	.	.	.	7	Tr	.	.	.	.	.	.	29	0
Carex simulata	.	.	.	.	14	1	.	.	.	.	.	.	.	.
Potentilla drummondii	.	.	27	1	7	0	29	0	67	1	20	0	29	1
Trifolium longipes	20	0	55	2	50	2	79	5	100	6	20	5	86	7
Danthonia unispicata	.	.	.	.	.	.	.	.	.	.	20	0	.	.
Danthonia intermedia	.	.	18	0	.	.	21	0	33	0	20	1	.	.
Polygonum bistortoides	.	.	.	.	.	.	.	.	33	1	.	.	29	2
Veronica wormskjoldii	.	.	.	.	.	.	7	Tr	.	.	.	.	14	0
Drosera anglica	.	.	.	.	7	0	.	.	.	.	.	.	.	.
Erigeron peregrinus	.	.	9	1	7	0	.	.	.	.	.	.	.	.

Cirsium callilepis	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Carex utriculata	.	.	9	1	14	3	43	3	100	6	20	1	14	0
Juncus orthophyllus	.	.	.	.	.	.	.	.	.	.	20	1	14	0
Bromus sitchensis	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Claytonia exigua ssp. exigua	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Veratrum californicum	.	.	9	0	.	.	.	.	.	.	.	.	.	.
Galium bifolium	20	0	.	.	7	Tr	7	0	33	0	.	.	.	.
Achillea millefolium	.	.	.	.	.	.	.	.	.	.	.	.	29	0
Potentilla flabellifolia	.	.	.	.	7	Tr	.	.	.	.	.	.	.	.
Koeleria macrantha	.	.	.	.	.	.	.	.	.	.	.	.	29	2
Dodecatheon jeffreyi	.	.	100	13	36	2	93	7	100	9	80	6	86	4
Pedicularis groenlandica	.	.	27	0	14	2	21	1	33	0	20	0	43	1
Carex echinata ssp. echinata	.	.	9	0	14	1	21	1	67	7	.	.	14	1
Aster alpigenus	40	1	36	1	36	1	43	2	67	1	20	0	14	1
Senecio triangularis	.	.	18	0	.	.	.	.	.	.	.	.	14	0
Deschampsia caespitosa	100	63	100	44	100	38	100	43	100	53	100	16	100	40
Danthonia californica	.	.	.	.	36	1	.	.	.	.	40	5	29	0
Triantha occidentalis	.	.	27	1	7	0	64	3	67	2	20	1	71	2
Schoenoplectus acutus var. occidentalis	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Mimulus primuloides	.	.	.	.	14	1	.	.	33	0	.	.	29	0
Hypericum anagalloides	.	.	45	2	57	2	100	27	100	3	80	10	71	3
Platanthera dilatata	.	.	9	0	7	Tr	.	.	.	.	.	.	14	0
Agrostis scabra	.	.	9	0	29	1	14	0	.	.	80	4	.	.
Carex scopulorum	.	.	.	.	7	1	.	.	.	.	.	.	.	.
Spiranthes romanzoffiana	.	.	9	Tr	43	0	21	0	67	1	20	0	29	0
Aster	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Castilleja miniata	.	.	9	0	.	.	14	0	.	.	.	.	.	.
Calamagrostis stricta ssp. inexpansa	.	.	.	.	.	.	7	0	.	.	.	.	.	.
Muhlenbergia filiformis	.	.	.	.	57	5	36	5	100	3	100	42	43	1
Ligusticum grayi	.	.	36	8	.	.	21	2	.	.	.	.	29	1
Aster foliaceus	20	0	.	.	7	Tr	.	.	.	.	.	.	29	1
Phleum alpinum	.	.	.	.	.	.	.	.	.	.	.	.	29	1
Carex aquatilis var. dives	.	.	55	2	21	2	50	3	67	3	60	8	43	2
Polygonum	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Aster modestus	.	.	.	.	7	1	.	.	.	.	.	.	.	.
Epilobium ciliatum ssp. watsonii	.	.	.	.	7	Tr	.	.	.	.	.	.	14	0
Juncus xiphoides var. triandrus	.	.	.	.	.	.	7	Tr	.	.	.	.	14	0
Caltha leptosepala ssp. howellii	.	.	55	5	7	Tr	29	2	33	0	.	.	14	2
Viola adunca	.	.	.	.	.	.	.	.	33	1	.	.	14	0
Gentiana prostrata	.	.	.	.	7	1	.	.	.	.	.	.	.	.
Deschampsia elongata	.	.	9	0	.	.	.	.	.	.	.	.	.	.
Equisetum arvense	.	.	.	.	.	.	.	.	.	.	.	.	14	2
Potentilla glandulosa	.	.	.	.	.	.	.	.	.	.	20	0	.	.
Calamagrostis stricta var. stricta	.	.	.	.	.	.	.	.	.	.	20	0	.	.
Luzula campestris	.	.	.	.	7	0	7	0	.	.	.	.	.	.

Juncus effusus	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Juncus nevadensis	.	.	.	.	7	2	.	.	.	.	.	.	.	.
Vicia americana	.	.	.	.	.	.	.	.	.	.	20	1	.	.
Agrostis humilis	.	.	.	.	7	1	.	.	.	.	.	.	.	.
Pedicularis attollens	.	.	.	.	.	.	7	0	.	.	.	.	14	0
Rumex crispus	.	.	9	0	.	.	.	.	.	.	.	.	.	.
Veronica scutellata	.	.	9	0	7	0	7	0	.	.	.	.	43	1
Packera cymbalarioides	.	.	9	0	14	2	.	.	.	.	.	.	.	.
Elymus glaucus	.	.	9	0	.	.	.	.	.	.	.	.	14	0
Castilleja	.	.	.	.	.	.	.	.	.	.	.	.	14	1
Drosera rotundifolia	.	.	.	.	7	0	14	0	33	0	.	.	.	.
Sanguisorba occidentalis	.	.	.	.	7	0	.	.	.	.	.	.	.	.
Menyanthes trifoliata	.	.	.	.	7	0	.	.	.	.	.	.	.	.
Tauschia stricklandii	.	.	9	1	.	.	.	.	.	.	.	.	.	.
Poa palustris	.	.	.	.	7	Tr	.	.	.	.	.	.	.	.
Ranunculus flammula	.	.	.	.	7	Tr	.	.	.	.	.	.	.	.
Agrostis thurberiana	.	.	.	.	.	.	.	.	.	.	.	.	14	0
Tofieldia glutinosa	.	.	9	1	.	.	.	.	.	.	.	.	.	.
Gentiana sceptrum	.	.	9	Tr	7	0	.	.	.	.	.	.	.	.
Agrostis capillaris	.	.	.	.	7	Tr	.	.	.	.	.	.	.	.
Danthonia spicata	.	.	9	0	.	.	.	.	.	.	.	.	.	.
Agrostis oregonensis	.	.	9	0	.	.	.	.	.	.	.	.	.	.
Sanguisorba officinalis	.	.	9	1	.	.	.	.	.	.	.	.	.	.
Trientalis europaea ssp. arctica	.	.	9	Tr	.	.	.	.	.	.	.	.	.	.
Xerophyllum tenax	.	.	9	0	.	.	.	.	.	.	.	.	.	.
MOSS LAYER														
Moss	.	.	18	5	21	13	14	8	.	.	20	2	14	1
UNVEGETATED														
Bare ground	.	.	9	1	.	.	.	.	.	.	.	.	.	.
Litter	.	.	9	2	.	.	.	.	.	.	.	.	.	.
Water	.	.	.	.	.	.	.	.	.	.	.	.	.	.

	DESCES (SCICON phase) DESCES (TRILON phase)				DESCES (monotypic phase)				DESCES-DANCAL DESCES-ARTLIN				DESCES-JUNBAL		DULARU	
	4 Plots		17 Plots		4 Plots		2 Plots		3 Plots		7 Plots		9 Plots			
Species	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE
MATURE TREES																
Picea engelmannii	.	.	6	1	.	.	.	.	.	.	.	.	.	.	.	.
Pinus contorta var. latifolia	.	.	6	1	.	.	.	.	.	.	.	.	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Salix lucida ssp. lasiandra	.	.	.	.	.	.	50	1	.	.	.	.	.	.
REPRODUCING TREES														
Picea engelmannii	.	.	6	0	.	.	.	.	.	.	.	.	.	.
Pinus contorta var. latifolia	.	.	18	0	.	.	.	.	.	.	.	.	.	.
Fraxinus latifolia	.	.	.	.	.	.	50	1	.	.	.	.	.	.
SHRUB LAYER.														
Spiraea densiflora	.	.	6	Tr	.	.	.	.	.	.	.	.	.	.
Lonicera involucrata	.	.	6	Tr	.	.	.	.	.	.	.	.	.	.
Amorpha fruticosa	.	.	.	.	.	.	50	1	.	.	.	.	.	.
Rosa eglanteria	.	.	.	.	.	.	.	.	33	0	.	.	.	.
Vaccinium uliginosum	25	3	18	3	.	.	.	.	.	.	.	.	.	.
Salix fluviatilis	.	.	.	.	.	.	100	4	.	.	.	.	.	.
Salix commutata	.	.	6	Tr	.	.	.	.	.	.	.	.	.	.
Salix geyeriana	.	.	.	.	.	.	.	.	.	.	14	0	.	.
Spiraea douglasii	25	3	.	.	.	.	.	.	.	.	.	.	.	.
Vaccinium caespitosum	.	.	6	0	.	.	.	.	.	.	.	.	.	.
HERB LAYER														
Carex jonesii	.	.	6	0	.	.	.	.	.	.	.	.	.	.
Calamagrostis canadensis	.	.	.	.	.	.	.	.	.	.	14	0	.	.
Galium parisiense	.	.	.	.	.	.	.	.	100	0	.	.	.	.
Carex lenticularis	.	.	6	0	.	.	.	.	.	.	.	.	.	.
Carex spectabilis	.	.	.	.	.	.	.	.	.	.	14	1	.	.
Epilobium alpinum	.	.	24	0	.	.	.	.	.	.	14	0	.	.
Potentilla gracilis	.	.	.	.	.	.	.	.	33	5	.	.	.	.
Carex tumulicola	.	.	6	0	.	.	.	.	.	.	.	.	.	.
Carex unilateralis	.	.	.	.	.	.	.	.	67	5	.	.	.	.
Ranunculus populago	.	.	18	0	25	0	.	.	.	.	.	.	.	.
Ranunculus alismifolius	25	0	24	1	.	.	.	.	.	.	29	1	.	.
Carex lasiocarpa	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Microseris borealis	50	1	29	3	.	.	.	.	.	.	.	.	.	.
Scirpus congdonii	100	19	24	0	.	.	.	.	.	.	14	0	.	.
Ranunculus gormanii	50	6	35	2	.	.	.	.	.	.	.	.	.	.
Viola macloskeyi	.	.	6	0	.	.	.	.	.	.	.	.	.	.
Hordeum brachyantherum	25	0	6	0	25	0	.	.	.	.	14	0	.	.
Carex leporinella	.	.	12	2	.	.	.	.	.	.	.	.	.	.
Rumex acetosella	.	.	.	.	.	.	.	.	33	0	.	.	.	.
Viola orbiculata	.	.	18	0	.	.	.	.	.	.	.	.	.	.
Delphinium menziesii	.	.	12	0	.	.	.	.	.	.	.	.	.	.
Fragaria virginiana	.	.	.	.	.	.	.	.	.	.	29	0	.	.
Aster occidentalis	.	.	29	1	25	0	.	.	.	.	.	.	.	.
Juncus balticus	75	6	18	0	.	.	.	.	.	.	100	26	.	.
Eleocharis quinqueflora	25	0	24	2	.	.	.	.	.	.	.	.	.	.

Carex luzulina	50	1	41	2	.	.	.	.	.	.	.	.	.	.
Carex pachystachya	.	.	24	1	.	.	.	.	.	.	29	0	.	.
Carex microptera	.	.	12	0	.	.	.	.	.	.	.	.	.	.
Mimulus guttatus	25	0	.	.	.	.	.	.	.	.	.	.	.	.
Potentilla drummondii	25	0	53	1	.	.	.	.	.	.	29	2	.	.
Trifolium longipes	75	5	100	26	.	.	.	.	.	.	57	2	.	.
Danthonia intermedia	.	.	35	2	25	0	.	.	.	.	.	.	.	.
Polygonum bistortoides	25	1	6	0	25	0	.	.	.	.	.	.	.	.
Dulichium arundinaceum	.	.	.	.	.	.	.	.	.	.	.	.	100	56
Carex utriculata	25	1	18	0	25	1	.	.	.	.	14	0	11	0
Bromus sitchensis	.	.	6	Tr	.	.	.	.	.	.	.	.	.	.
Claytonia exigua ssp. exigua	.	.	12	0	.	.	.	.	.	.	.	.	.	.
Microseris nutans	25	0	.	.	.	.	.	.	.	.	.	.	.	.
Galium bifolium	25	0	12	0	.	.	.	.	.	.	14	0	.	.
Epilobium ciliatum	.	.	.	.	.	.	.	.	67	5	.	.	.	.
Aira caryophyllea	.	.	.	.	.	.	.	.	33	0	.	.	.	.
Achillea millefolium	.	.	24	1	25	0	.	.	.	.	.	.	.	.
Rorippa curvisiliqua	.	.	.	.	.	.	50	1	.	.	.	.	.	.
Potentilla flabellifolia	.	.	6	0	.	.	.	.	.	.	.	.	.	.
Achnatherum nelsonii	.	.	6	0	.	.	.	.	.	.	.	.	.	.
Polygonum cascadense	.	.	6	0	.	.	.	.	.	.	.	.	.	.
Antennaria luzuloides ssp. aberrans	.	.	6	Tr	.	.	.	.	.	.	.	.	.	.
Elymus trachycaulus	.	.	6	0	.	.	.	.	.	.	.	.	.	.
Koeleria macrantha	.	.	12	0	.	.	.	.	.	.	14	0	.	.
Poa cusickii	.	.	6	0	.	.	.	.	.	.	.	.	.	.
Potentilla brevifolia	.	.	6	0	.	.	.	.	.	.	.	.	.	.
Dodecatheon jeffreyi	75	2	29	1	.	.	.	.	.	.	29	1	.	.
Pascopyrum smithii	.	.	.	.	25	0	.	.	.	.	.	.	.	.
Pedicularis groenlandica	25	0	.	.	.	.	.	.	.	.	14	0	.	.
Carex	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex echinata ssp. echinata	25	1	.	.	.	.	.	.	.	.	.	.	.	.
Hypericum perforatum	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Aster alpigenus	50	3	29	1	.	.	.	.	.	.	29	1	.	.
Melilotus officinalis	.	.	.	.	.	.	50	1	.	.	.	.	.	.
Trifolium arvense	.	.	.	.	.	.	100	2	.	.	.	.	.	.
Gaillardia aristata	.	.	.	.	.	.	50	2	.	.	.	.	.	.
Sonchus asper	.	.	.	.	.	.	50	1	.	.	.	.	.	.
Leucanthemum vulgare	.	.	.	.	.	.	.	.	67	11	.	.	.	.
Medicago lupulina	.	.	.	.	.	.	100	2	.	.	.	.	.	.
Artemisia lindleyana	.	.	.	.	.	.	100	23	.	.	.	.	.	.
Holcus lanatus	.	.	.	.	.	.	.	.	67	0	.	.	.	.
Deschampsia caespitosa	100	51	100	47	100	53	50	18	100	47	100	61	.	.
Danthonia californica	25	0	24	1	.	.	.	.	33	0	14	0	.	.
Hackelia diffusa	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Antennaria	.	.	6	Tr	.	.	.	.	.	.	14	0	.	.

Carex subfusca	.	.	6	Tr	.	.	.	.	.	.	14	0	.	.
Sisyrinchium	.	.	.	.	.	.	.	.	33	0	.	.	.	.
Lotus formosissimus	.	.	.	.	.	.	.	.	33	0	.	.	.	.
Veronica peregrina var. xalapensis	.	.	.	.	.	.	.	.	33	0	.	.	.	.
Triantha occidentalis	25	1	6	0	.	.	.	.	.	.	.	.	.	.
Schoenoplectus acutus var. occidentalis	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Mimulus primuloides	25	0	6	1	.	.	.	.	.	.	14	2	.	.
Hypericum anagalloides	50	3	18	3	.	.	.	.	.	.	14	0	.	.
Cardamine californica	.	.	.	.	.	.	.	.	.	.	14	0	.	.
Antennaria rosea	.	.	.	.	.	.	.	.	.	.	43	3	.	.
Sphenosciadium capitellatum	.	.	.	.	.	.	.	.	.	.	14	0	.	.
Gentiana newberryi	.	.	.	.	.	.	.	.	.	.	29	8	.	.
Agrostis scabra	.	.	6	0	.	.	.	.	.	.	.	.	.	.
Alopecurus saccatus	.	.	.	.	.	.	.	.	33	1	.	.	.	.
Penstemon procerus	.	.	29	0	.	.	.	.	.	.	14	1	.	.
Carex scopulorum	.	.	24	2	.	.	.	.	.	.	.	.	.	.
Spiranthes romanzoffiana	25	0	12	0	.	.	.	.	.	.	14	0	.	.
Aster	.	.	.	.	.	.	100	2	.	.	.	.	.	.
Calamagrostis stricta ssp. inexpansa	.	.	12	1	.	.	.	.	.	.	.	.	.	.
Carex deweyana ssp. leptopoda	.	.	.	.	.	.	.	.	33	0	.	.	.	.
Coreopsis tinctoria var. atkinsoniana	.	.	.	.	.	.	100	3	.	.	.	.	.	.
Xanthium strumarium	.	.	.	.	.	.	100	1	.	.	.	.	.	.
Muhlenbergia filiformis	.	.	35	3	25	0	.	.	.	.	71	4	.	.
Ligusticum grayi	.	.	6	Tr	.	.	.	.	.	.	.	.	.	.
Aster foliaceus	25	0	41	3	.	.	.	.	.	.	43	4	.	.
Veronica americana	.	.	.	.	.	.	.	.	.	.	14	0	.	.
Trifolium repens	.	.	.	.	.	.	50	1	.	.	.	.	.	.
Plantago lanceolata	.	.	.	.	.	.	50	1	67	3	.	.	.	.
Phleum alpinum	.	.	41	1	.	.	.	.	.	.	14	0	.	.
Carex aquatilis var. dives	25	0	18	1	.	.	.	.	.	.	.	.	.	.
Carex aquatilis	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Carex nigricans	.	.	6	1	.	.	.	.	.	.	.	.	.	.
Carex brunnescens	.	.	.	.	25	1	.	.	.	.	.	.	.	.
Lysichiton americanus	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Caltha leptosepala ssp. howellii	25	1	12	0	.	.	.	.	.	.	.	.	.	.
Achnatherum occidentalis	.	.	6	Tr	.	.	.	.	.	.	14	0	.	.
Viola adunca	.	.	18	0	.	.	.	.	.	.	14	0	.	.
Equisetum arvense	25	0	.	.	.	.	.	.	.	.	.	.	.	.
Veratrum	.	.	6	Tr	.	.	.	.	.	.	.	.	.	.
Potentilla glandulosa	.	.	12	0	.	.	.	.	.	.	.	.	.	.
Plantago major	.	.	.	.	.	.	50	1	.	.	.	.	.	.
Luzula campestris	.	.	6	Tr	.	.	.	.	.	.	.	.	.	.
Plagiobothrys figuratus	.	.	.	.	.	.	.	.	33	7	.	.	.	.
Juncus effusus	.	.	6	0	.	.	.	.	.	.	.	.	.	.
Agrostis exarata	.	.	6	0	.	.	.	.	.	.	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Agrostis humilis	.	.	6	0	25	0	.	.	.	.	.	.	.	.
Myosotis laxa	.	.	.	.	.	.	.	.	33	0	.	.	.	.
Pedicularis attollens	.	.	24	1	.	.	.	.	.	.	.	.	.	.
Veronica scutellata	50	2	6	0	.	.	.	.	.	.	.	.	.	.
Packera cymbalarioides	.	.	6	0	.	.	.	.	.	.	14	0	.	.
Camassia quamash	.	.	.	.	.	.	.	.	33	3	.	.	.	.
Elymus glaucus	.	.	12	0	.	.	.	.	.	.	.	.	.	.
Veronica serpyllifolia	.	.	18	0	.	.	.	.	.	.	14	0	.	.
Castilleja	.	.	6	1	.	.	.	.	.	.	.	.	.	.
Drosera rotundifolia	.	.	.	.	.	.	.	.	.	.	.	.	11	1
Mentha arvensis	.	.	.	.	.	.	.	.	33	3	.	.	.	.
Epilobium	.	.	6	0	.	.	50	1	.	.	14	0	.	.
Taraxacum officinale	.	.	.	.	.	.	.	.	33	0	.	.	.	.
Menyanthes trifoliata	.	.	.	.	.	.	.	.	.	.	.	.	67	7
Potamogeton gramineus	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Utricularia macrorhiza	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Mentha pulegium	.	.	.	.	.	.	50	1	.	.	.	.	.	.
Helenium autumnale	.	.	.	.	.	.	50	1	.	.	.	.	.	.
Carex hoodii	.	.	6	0	.	.	.	.	.	.	.	.	.	.
Lomatium grayi	.	.	6	0	.	.	.	.	.	.	.	.	.	.
Hypochaeris radicata	.	.	.	.	.	.	.	.	67	0	.	.	.	.
MOSS LAYER														
Moss	.	.	6	0	50	1	.	.	67	13	29	11	11	11
UNVEGETATED														
Bare ground	.	.	.	.	50	26	.	.	.	.	.	.	33	9
Litter	.	.	.	.	50	3	.	.	.	.	.	.	.	.
Water	.	.	.	.	.	.	.	.	.	.	.	.	33	9

	ELEACI		ELEOVA-LUDPAL		ELEPAL		ELEQUI		ERAHYP-GNAPAL				EUTOCC	
	1 Plots		5 Plots		8 Plots		34 Plots		EQUARV 2 Plots		4 Plots		2 Plots	
Species	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE
MATURE TREES														
Acer macrophyllum	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pinus ponderosa	.	.	.	.	.	.	.	.	50	5	.	.	.	.
Pseudotsuga menziesii	.	.	.	.	.	.	.	.	50	6	.	.	.	.
Salix lucida ssp. lasiandra	.	.	.	.	.	.	.	.	.	.	50	Tr	.	.
REPRODUCING TREES														

Picea engelmannii	.	.	.	.	.	.	3	0	.	.	.	.	.	.		
Abies lasiocarpa	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.		
Pinus contorta var. latifolia	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.		
Tsuga mertensiana	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.		
Salix fluviatilis	.	.	.	.	.	.	.	.	.	.	.	.	50	2		
Quercus garryana	.	.	.	.	.	.	.	.	50	0	.	.	.	.		
SHRUB LAYER																
Alnus incana	.	.	.	.	.	.	.	.	50	1	.	.	.	.		
Salix	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.		
Salix myrtillifolia	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.		
Spiraea densiflora	.	.	.	.	.	.	6	0	.	.	.	.	.	.		
Betula nana	.	.	.	.	.	.	3	0	.	.	.	.	.	.		
Lonicera involucrata	.	.	.	.	.	.	3	0	.	.	.	.	.	.		
Rosa nutkana	.	.	.	.	.	.	.	.	50	3	.	.	.	.		
Kalmia microphylla	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.		
Rosa gymnocarpa	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.		
Vaccinium uliginosum	.	.	.	.	.	.	18	1	.	.	.	.	.	.		
Salix commutata	.	.	.	.	.	.	3	0	.	.	.	.	.	.		
Salix geyeriana	.	.	.	.	.	.	6	0	.	.	.	.	.	.		
Rubus ursinus	.	.	.	.	.	.	.	.	50	0	.	.	.	.		
Symphoricarpos albus	.	.	.	.	.	.	.	.	50	0	.	.	.	.		
Spiraea douglasii	.	.	.	.	13	0	.	.	.	.	.	.	.	.		
Vaccinium oxycoccos	.	.	.	.	.	.	15	1	.	.	.	.	.	.		
Salix hookeriana	.	.	.	.	25	1	.	.	.	.	.	.	.	.		
HERB LAYER																
Maianthemum stellatum	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.		
Carex jonesii	.	.	.	.	.	.	9	0	.	.	.	.	.	.		
Carex lenticularis	.	.	.	.	13	1	.	.	.	.	.	.	.	.		
Muhlenbergia	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.		
Utricularia intermedia	.	.	.	.	.	.	29	10	.	.	.	.	.	.		
Carex illota	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.		
Aquilegia formosa	.	.	.	.	.	.	.	.	50	0	.	.	.	.		
Lythrum salicaria	.	.	.	.	13	1	.	.	.	.	.	.	.	.		
Carex buxbaumii	.	.	.	.	.	.	3	0	.	.	.	.	.	.		
Bidens frondosa	.	.	.	.	.	.	.	.	.	.	50	2	.	.		
Lupinus latifolius	.	.	.	.	.	.	3	0	.	.	.	.	.	.		
Epilobium alpinum	.	.	.	.	.	.	15	0	.	.	.	.	.	.		
Potentilla gracilis	.	.	.	.	13	0	.	.	.	.	.	.	.	.		
Saxifraga oregana	.	.	.	.	.	.	12	0	.	.	.	.	.	.		
Microseris borealis	.	.	.	.	.	.	12	0	.	.	.	.	.	.		
Scirpus congdonii	.	.	.	.	.	.	9	0	.	.	.	.	.	.		
Ranunculus gormanii	.	.	.	.	.	.	15	1	.	.	.	.	.	.		
Viola macloskeyi	.	.	.	.	.	.	3	0	.	.	.	.	.	.		

Rumex acetosella	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.		
Panicum capillare	.	.	.	.	.	.	.	.	.	.	25	Tr	.	.		
Camassia leichtlinii	.	.	.	.	.	.	3	0	.	.	.	.	.	.		
Aster occidentalis	.	.	.	.	13	2	3	Tr	.	.	.	.	.	.		
Juncus balticus	.	.	.	.	13	0	3	0	.	.	.	.	.	.		
Eleocharis quinqueflora	.	.	.	.	.	.	100	27	.	.	.	.	.	.		
Carex luzulina	.	.	.	.	.	.	15	1	.	.	.	.	.	.		
Juncus tenuis	.	.	.	.	13	1	.	.	.	.	.	.	.	.		
Carex pachystachya	.	.	.	.	.	.	.	.	50	1	.	.	.	.		
Mimulus guttatus	.	.	.	.	.	.	3	0	50	5	.	.	.	.		
Carex simulata	.	.	.	.	.	.	44	5	.	.	.	.	.	.		
Potentilla drummondii	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.		
Carex canescens	.	.	.	.	.	.	3	0	.	.	.	.	.	.		
Trifolium longipes	.	.	.	.	.	.	3	0	.	.	.	.	.	.		
Danthonia intermedia	.	.	.	.	13	0	3	Tr	.	.	.	.	.	.		
Polygonum bistortoides	.	.	.	.	.	.	12	0	.	.	.	.	.	.		
Veronica wormskjoldii	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.		
Drosera anglica	.	.	.	.	.	.	59	7	.	.	.	.	.	.		
Glyceria striata	.	.	.	.	13	0	.	.	.	.	.	.	.	.		
Carex utriculata	.	.	.	.	.	.	18	0	.	.	.	.	.	.		
Galium trifidum	.	.	.	.	13	0	.	.	.	.	.	.	.	.		
Juncus orthophyllus	.	.	.	.	.	.	3	0	.	.	.	.	.	.		
Carex limosa	.	.	.	.	.	.	24	1	.	.	.	.	.	.		
Comarum palustre	.	.	.	.	.	.	6	Tr	.	.	.	.	.	.		
Epilobium ciliatum	.	.	.	.	.	.	.	.	.	.	25	Tr	.	.		
Achillea millefolium	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.		
Rorippa curvisiliqua	.	.	.	.	.	.	.	.	.	.	75	1	50	1		
Senecio jacobaea	.	.	.	.	13	0	.	.	.	.	.	.	.	..		
Dodecatheon jeffreyi	.	.	.	.	.	.	32	2	.	.	.	.	.	.		
Pedicularis groenlandica	.	.	.	.	.	.	18	0	.	.	.	.	.	.		
Carex	.	.	.	.	.	.	3	1	.	.	.	.	.	.		
Carex echinata ssp. echinata	.	.	.	.	.	.	15	1	.	.	.	.	.	.		
Aster alpigenus	.	.	.	.	.	.	15	0	.	.	.	.	.	.		
Senecio triangularis	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.		
Cirsium arvense	.	.	.	.	.	.	.	.	.	.	50	0	.	.		
Deschampsia caespitosa	.	.	.	.	38	3	18	0	.	.	.	.	.	.		
Danthonia californica	.	.	.	.	.	.	6	Tr	.	.	.	.	.	.		
Triantha occidentalis	.	.	.	.	.	.	12	0	.	.	.	.	.	.		
Schoenoplectus acutus var. occidentalis	.	.	.	.	.	.	.	.	.	.	.	.	.	.		
Mimulus primuloides	.	.	.	.	13	1	32	2	.	.	.	.	.	.		
Hypericum anagalloides	.	.	.	.	13	1	32	1	50	8	.	.	.	.		
Platanthera dilatata	.	.	.	.	.	.	18	0	.	.	.	.	.	.		
Alopecurus saccatus	.	.	.	.	13	0	.	.	.	.	.	.	.	.		
Carex scopulorum	.	.	.	.	.	.	3	0	.	.	.	.	.	.		
Spiranthes romanzoffiana	.	.	.	.	.	.	9	Tr	.	.	.	.	.	.		

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Luzula campestris var. multiflora	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Coreopsis tinctoria var. atkinsoniana	.	.	.	.	.	.	.	.	.	.	.	.	50	3
Xanthium strumarium	.	.	.	.	.	.	.	.	.	.	.	.	50	2
Bidens cernua	.	.	20	6	.	.	.	.	.	.	50	1	.	.
Muhlenbergia filiformis	.	.	.	.	.	.	15	1	.	.	.	.	.	.
Lamiaceae	.	.	40	4	.	.	.	.	.	.	.	.	.	.
Ligusticum grayi	.	.	.	.	.	.	3	0	.	.	.	.	.	.
Epilobium ciliatum ssp. glandulosum	.	.	.	.	.	.	.	.	50	1	.	.	.	.
Cirsium vulgare	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Aster foliaceus	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.
Veronica americana	.	.	.	.	.	.	.	.	50	0	.	.	50	1
Trifolium repens	.	.	.	.	.	.	.	.	.	.	.	.	50	1
Carex aquatilis var. dives	.	.	.	.	.	.	35	4	.	.	.	.	.	.
Carex aquatilis	.	.	.	.	.	.	6	1	.	.	.	.	.	.
Callitriche heterophylla	100	10	.	.	13	0	.	.	.	.	.	.	.	.
Aster modestus	.	.	.	.	.	.	3	0	.	.	.	.	.	.
Carex brunnescens	.	.	.	.	.	.	.	.	50	2	.	.	.	.
Lysichiton americanus	.	.	.	.	.	.	.	.	50	1	.	.	.	.
Muhlenbergia richardsonis	.	.	.	.	.	.	3	0	.	.	.	.	.	.
Epilobium ciliatum ssp. watsonii	.	.	20	0	.	.	.	.	.	.	.	.	50	1
Agrostis	.	.	.	.	.	.	3	0	.	.	.	.	.	.
Gnaphalium palustre	.	.	.	.	.	.	.	.	.	.	75	27	50	1
Cerastium	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Carex fracta	.	.	.	.	.	.	.	.	50	3	.	.	.	.
Juncus xiphoides var. triandrus	.	.	.	.	.	.	9	0	50	1	.	.	.	.
Caltha leptosepala ssp. howellii	.	.	.	.	.	.	15	1	.	.	.	.	.	.
Viola adunca	.	.	.	.	13	1	.	.	.	.	.	.	.	.
Senecio vulgaris	.	.	.	.	.	.	.	.	.	.	25	Tr	.	.
Schoenoplectus americanus	.	.	.	.	25	1	.	.	.	.	.	.	.	.
Elodea canadensis	100	15	.	.	.	.	.	.	.	.	.	.	.	.
Eleocharis palustris	.	.	.	.	100	59	.	.	.	.	.	.	.	.
Portulaca oleracea	.	.	.	.	.	.	.	.	.	.	.	.	50	1
Eragrostis	.	.	.	.	.	.	.	.	.	.	.	.	50	3
Cyperus erythrorhizos	.	.	.	.	.	.	.	.	.	.	.	.	50	10
Mollugo verticillata	.	.	.	.	.	.	.	.	.	.	.	.	50	2
Chenopodium ambrosioides	.	.	.	.	.	.	.	.	.	.	.	.	50	1
Artemisia vulgaris	.	.	.	.	.	.	.	.	.	.	.	.	100	1
Cyperus acuminatus	.	.	.	.	.	.	.	.	.	.	.	.	50	1
Cyperus esculentus	.	.	.	.	.	.	.	.	.	.	.	.	50	1
Carex leptalea	.	.	.	.	.	.	3	0	.	.	.	.	.	.
Eleocharis acicularis	100	60	.	.	.	.	.	.	.	.	.	.	.	.
Equisetum arvense	.	.	.	.	13	0	12	0	100	88	.	.	50	2
Veratrum	.	.	.	.	.	.	6	Tr	.	.	.	.	.	.
Eleocharis ovata	.	.	100	54	.	.	.	.	.	.	25	1	.	.
Plantago major	.	.	.	.	.	.	.	.	.	.	.	.	50	1

Galium boreale	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Eragrostis hypnoides	.	.	.	.	13	0	.	.	.	.	100	37	.	.
Luzula campestris	.	.	.	.	.	.	6	0	.	.	.	.	.	.
Ludwigia palustris	.	.	80	34	.	.	.	.	.	.	25	1	.	.
Plagiobothrys figuratus	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Adenocaulon bicolor	.	.	.	.	.	.	.	.	50	3	.	.	.	.
Juncus effusus	.	.	.	.	13	0	6	Tr	.	.	.	.	.	.
Juncus nevadensis	.	.	.	.	25	4	6	1	.	.	.	.	.	.
Echinochloa crusgalli	.	.	.	.	.	.	.	.	.	.	25	0	.	.
Equisetum fluviatile	.	.	.	.	.	.	3	0	.	.	.	.	.	.
Agrostis exarata	.	.	20	0	.	.	.	.	.	.	.	.	.	.
Myosotis laxa	.	.	.	.	25	0	.	.	.	.	.	.	50	1
Anemone oregana	.	.	.	.	.	.	.	.	50	2	.	.	.	.
Pedicularis attollens	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.
Oenanthe sarmentosa	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.
Carex interrupta	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Rumex crispus	.	.	.	.	.	.	.	.	.	.	25	Tr	.	.
Argentina egedii	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Veronica scutellata	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Euthamia occidentalis	.	.	.	.	13	0	.	.	.	.	.	.	100	38
Veronica serpyllifolia	.	.	.	.	.	.	.	.	50	1	.	.	.	.
Osmorhiza berteroi	.	.	.	.	.	.	.	.	50	1	.	.	.	.
Mentha arvensis	.	.	.	.	.	.	.	.	.	.	.	.	50	1
Epilobium	.	.	.	.	.	.	6	Tr	.	.	.	.	.	.
Menyanthes trifoliata	.	.	.	.	.	.	18	0	.	.	.	.	.	.
Ranunculus uncinatus	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Utricularia macrorhiza	.	.	.	.	.	.	6	0	.	.	.	.	.	.
Polystichum munitum	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.
Leersia oryzoides	.	.	.	.	13	1	.	.	.	.	.	.	.	.
Trisetum canescens	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Sagittaria latifolia	.	.	.	.	13	1	.	.	.	.	.	.	.	.
Myriophyllum aquaticum	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Poa palustris	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.
Poa trivialis	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.
Juncus acuminatus	.	.	.	.	13	3	.	.	.	.	.	.	.	.
Polygonum hydropiperoides	.	.	.	.	13	4	.	.	.	.	50	1	.	.
Mentha pulegium	.	.	.	.	.	.	.	.	.	.	.	.	50	1
Helenium autumnale	.	.	.	.	.	.	.	.	.	.	.	.	50	1
Phalaris arundinacea	.	.	.	.	38	1	.	.	.	.	.	.	.	.
Fragaria vesca	.	.	.	.	.	.	3	Tr	50	1	.	.	.	.
Pteridium aquilinum	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Juncus oxymeris	.	.	.	.	13	1	.	.	.	.	.	.	.	.
Ranunculus flammula	.	.	.	.	13	0	.	.	.	.	.	.	.	.
Agrostis thurberiana	.	.	.	.	.	.	6	Tr	.	.	.	.	.	.
Carex obnupta	.	.	.	.	38	1	.	.	.	.	.	.	.	.

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Tofieldia glutinosa	.	.	.	.	.	.	18	1	.	.	.	.	.	.
Limosella aquatica	.	.	.	.	.	.	.	.	.	.	25	0	.	.
Lilaeopsis occidentalis	.	.	.	.	13	1	.	.	.	.	.	.	.	.
Polygonum amphibium	.	.	.	.	13	0	.	.	.	.	25	Tr	.	.
Hieracium albiflorum	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Paspalum distichum	.	.	.	.	13	1	.	.	.	.	.	.	50	1
Gentiana sceptrum	.	.	.	.	.	.	3	0	.	.	.	.	.	.
Arnica mollis	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.
Sparganium angustifolium	100	1	.	.	.	.	.	.	.	.	.	.	.	.
Lindernia dubia	.	.	.	.	13	0	.	.	.	.	25	10	.	.
Carex hoodii	.	.	.	.	.	.	3	0	.	.	.	.	.	.
Eriophorum gracile	.	.	.	.	.	.	21	1	.	.	.	.	.	.
Scutellaria lateriflora	.	.	.	.	.	.	.	.	.	.	25	Tr	.	.
Solanum dulcamara	.	.	.	.	.	.	.	.	.	.	50	0	.	.
Antennaria argentea	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.
Senecio pseudaureus	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Utricularia minor	.	.	.	.	.	.	3	0	.	.	.	.	.	.
Agrostis oregonensis	.	.	.	.	.	.	3	Tr	.	.	.	.	.	.
Triteleia hyacinthina	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Prunella vulgaris	.	.	.	.	.	.	.	.	50	3	.	.	.	.
Epilobium angustifolium	.	.	.	.	.	.	3	0	.	.	.	.	.	.
MOSS LAYER														
Moss	100	10	.	.	.	.	62	33	.	.	25	3	.	.
UNVEGETATED														
Bare ground	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Litter	.	.	.	.	.	.	6	2	.	.	.	.	.	.
Water	.	.	.	.	.	.	32	11	.	.	.	.	.	.

	FONANT		FRALAT/CARDEW				FRALAT/SPIDOU				GLYSTR	
			FRALAT/CARAQUA				FRALAT/CAROBN				FRALAT/SYMALB	
	1 Plots		2 Plots		2 Plots		18 Plots		4 Plots		2 Plots		5 Plots	
Species	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE
MATURE TREES														
Picea engelmannii	.	.	.	.	.	.	.	.	.	.	.	.	20	4
Tsuga mertensiana	.	.	.	.	.	.	.	.	.	.	.	.	20	0
Fraxinus latifolia	.	.	100	75	100	78	100	64	100	74	100	80	.	.
Frangula purshiana	.	.	.	.	.	.	11	0	.	.	.	.	.	.
Abies grandis	.	.	.	.	.	.	6	Tr	.	.	.	.	.	.
Populus balsamifera ssp. trichocarpa	.	.	.	.	.	.	11	1	.	.	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

REPRODUCING TREES														
Abies lasiocarpa	.	.	.	.	.	.	.	.	.	.	.	.	20	1
Fraxinus latifolia	.	.	.	.	.	.	11	0	.	.	.	.	.	.
Alnus rubra	.	.	.	.	.	.	6	Tr	.	.	.	.	.	.
SHRUB LAYER														
Ribes divaricatum	.	.	.	.	.	.	6	0	.	.	.	.	.	.
Alnus viridis ssp. sinuata	.	.	.	.	.	.	.	.	.	.	.	.	20	1
Vaccinium	.	.	.	.	.	.	.	.	.	.	.	.	20	0
Amelanchier alnifolia	.	.	50	1	.	.	.	.	.	.	50	5	.	.
Lonicera involucrata	.	.	100	3	.	.	.	.	.	.	.	.	.	.
Amorpha fruticosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Acer circinatum	.	.	.	.	.	.	11	4	.	.	50	0	.	.
Sambucus racemosa	.	.	.	.	.	.	6	1	.	.	.	.	.	.
Rubus armeniacus	.	.	.	.	.	.	6	0	.	.	.	.	.	.
Crataegus douglasii	.	.	50	0	.	.	.	.	.	.	.	.	.	.
Physocarpus capitatus	.	.	.	.	.	.	22	0	.	.	.	.	.	.
Rosa nutkana	.	.	50	0	.	.	33	0	.	.	.	.	.	.
Rosa gymnocarpa	.	.	.	.	.	.	6	Tr	.	.	.	.	.	.
Crataegus monogyna	.	.	50	0	.	.	6	0	.	.	.	.	.	.
Hedera helix	.	.	.	.	.	.	6	0	.	.	.	.	.	.
Toxicodendron diversilobum	.	.	.	.	.	.	6	Tr	.	.	.	.	.	.
Corylus cornuta	.	.	.	.	.	.	22	0	.	.	50	20	.	.
Rubus ursinus	.	.	100	4	50	9	67	6	.	.	100	33	.	.
Cornus sericea	.	.	.	.	.	.	17	4	25	0	50	6	.	.
Symphoricarpos albus	.	.	50	2	.	.	28	3	.	.	100	55	.	.
Spiraea douglasii	.	.	100	7	50	5	22	1	100	85	.	.	20	0
Rubus spectabilis	.	.	.	.	.	.	6	Tr	.	.	.	.	.	.
Oemleria cerasiformis	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Ribes	.	.	.	.	.	.	.	.	.	.	.	.	20	3
Malus fusca	.	.	.	.	.	.	6	0	.	.	.	.	.	.
HERB LAYER														
Hydrophyllum tenuipes	.	.	.	.	.	.	6	0	.	.	.	.	.	.
Angelica arguta	.	.	.	.	.	.	.	.	.	.	.	.	20	Tr
Stellaria longipes	.	.	.	.	.	.	6	Tr	.	.	.	.	.	.
Maianthemum stellatum	.	.	.	.	.	.	.	.	.	.	.	.	20	1
Tellima grandiflora	.	.	.	.	.	.	22	0	.	.	.	.	.	.
Stachys ciliata	.	.	.	.	.	.	28	2	.	.	.	.	20	0
Carex laeviculmis	.	.	.	.	.	.	.	.	.	.	.	.	20	0
Viola	.	.	.	.	.	.	.	.	.	.	.	.	60	10
Aster occidentalis	.	.	.	.	.	.	.	.	.	.	.	.	20	0
Circaea alpina	.	.	.	.	.	.	6	1	.	.	.	.	.	.

Juncus tenuis	.	.	.	.	50	1	.	.	.	.	.	.	.	.
Carex microptera	.	.	.	.	.	.	.	.	.	.	.	.	40	0
Mimulus guttatus	.	.	50	13	.	.	22	2	.	.	.	.	40	1
Mitella	.	.	.	.	.	.	6	Tr	.	.	.	.	.	.
Polygonum bistortoides	.	.	.	.	.	.	.	.	.	.	.	.	20	4
Glyceria striata	.	.	.	.	.	.	6	Tr	.	.	.	.	100	48
Galium trifidum	.	.	.	.	.	.	6	Tr	.	.	.	.	40	1
Aconitum columbianum	.	.	.	.	.	.	.	.	.	.	.	.	20	0
Veratrum californicum	.	.	100	14	.	.	6	Tr	.	.	.	.	.	.
Epilobium ciliatum	.	.	100	2	.	.	17	0	25	Tr	.	.	.	.
Carex	.	.	50	2	.	.	.	.	.	.	.	.	.	.
Hypericum perforatum	.	.	.	.	.	.	6	Tr	.	.	.	.	.	.
Senecio triangularis	.	.	.	.	.	.	.	.	.	.	.	.	40	1
Holcus lanatus	.	.	.	.	.	.	6	Tr	.	.	.	.	.	.
Deschampsia caespitosa	.	.	.	.	.	.	.	.	.	.	.	.	40	5
Urtica dioica ssp. gracilis	.	.	.	.	.	.	17	1	.	.	.	.	.	.
Hypericum anagalloides	.	.	.	.	.	.	.	.	.	.	.	.	20	1
Athyrium filix-femina	.	.	.	.	.	.	17	0	.	.	50	1	20	1
Carex deweyana ssp. leptopoda	.	.	100	4	100	31	33	2	.	.	100	1	.	.
Scirpus microcarpus	.	.	.	.	.	.	.	.	.	.	.	.	20	0
Epilobium ciliatum ssp. glandulosum	.	.	.	.	.	.	.	.	.	.	.	.	40	0
Cornus canadensis	.	.	.	.	.	.	.	.	.	.	.	.	20	4
Viola glabella	.	.	.	.	.	.	11	1	.	.	.	.	20	0
Cirsium vulgare	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Juncus patens	.	.	.	.	50	13	.	.	.	.	.	.	.	.
Aster foliaceus	.	.	.	.	.	.	.	.	.	.	.	.	20	1
Platanthera stricta	.	.	.	.	.	.	.	.	.	.	.	.	20	Tr
Veronica americana	.	.	.	.	.	.	.	.	.	.	.	.	40	4
Geum macrophyllum	.	.	100	2	50	1	11	0	.	.	.	.	.	.
Carex aquatilis var. dives	.	.	.	.	.	.	.	.	.	.	.	.	20	0
Carex aquatilis	.	.	100	50	.	.	.	.	.	.	.	.	.	.
Rumex obtusifolius	.	.	.	.	.	.	6	Tr	.	.	.	.	.	.
Lysichiton americanus	.	.	.	.	.	.	11	1	.	.	.	.	20	1
Epilobium ciliatum ssp. watsonii	.	.	.	.	.	.	.	.	.	.	.	.	40	3
Caltha leptosepala ssp. howellii	.	.	.	.	.	.	.	.	.	.	.	.	40	4
Cinna latifolia	.	.	.	.	.	.	6	Tr	.	.	.	.	20	0
Polypodium glycyrrhiza	.	.	50	1	.	.	50	0	.	.	.	.	.	.
Equisetum arvense	.	.	.	.	.	.	11	0	.	.	.	.	.	.
Botrychium virginianum	.	.	.	.	.	.	.	.	.	.	50	0	.	.
Lolium arundinaceum	.	.	50	Tr	.	.	.	.	.	.	.	.	.	.
Galium triflorum	.	.	100	0	.	.	6	Tr	.	.	50	1	20	0
Juncus effusus	.	.	.	.	50	0	6	0	.	.	.	.	.	.
Agrostis exarata	.	.	.	.	50	0	.	.	.	.	.	.	40	0
Equisetum hyemale	.	.	.	.	.	.	6	0	.	.	.	.	.	.
Festuca subulata	.	.	.	.	.	.	6	Tr	.	.	.	.	.	.

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Fragaria	.	.	.	.	.	.	6	Tr	.	.	.	.	.	.
Oenanthe sarmentosa	.	.	50	4	.	.	28	1	.	.	.	.	.	.
Rumex crispus	.	.	50	0	.	.	.	.	25	0	.	.	.	.
Veronica scutellata	.	.	.	.	50	1	.	.	.	.	.	.	.	.
Apiaceae	.	.	.	.	.	.	.	.	25	0	.	.	.	.
Camassia quamash	.	.	50	0	.	.	.	.	.	.	.	.	.	.
Elymus glaucus	.	.	.	.	50	Tr	.	.	.	.	.	.	.	.
Rudbeckia occidentalis	.	.	.	.	.	.	6	1	.	.	.	.	20	1
Achlys triphylla	.	.	.	.	.	.	.	.	.	.	.	.	20	1
Perideridia gairdneri	.	.	.	.	50	0	.	.	.	.	.	.	.	.
Epilobium	.	.	.	.	.	.	6	Tr	.	.	.	.	.	.
Ranunculus uncinatus	.	.	50	0	.	.	22	0	25	0	.	.	.	.
Polystichum munitum	.	.	.	.	.	.	33	1	.	.	.	.	.	.
Galium aparine	.	.	50	0	.	.	28	0	.	.	50	0	.	.
Poa palustris	.	.	50	1	.	.	6	Tr	.	.	.	.	.	.
Poa trivialis	.	.	50	1	.	.	11	0	25	0	.	.	.	.
Veratrum viride	.	.	.	.	.	.	11	4	.	.	.	.	40	15
Phalaris arundinacea	.	.	100	2	50	3	.	.	.	.	.	.	.	.
Veronica	.	.	.	.	.	.	.	.	.	.	.	.	20	Tr.
Carex obnupta	.	.	100	3	.	.	100	76	25	10	100	60	.	.
Stellaria calycantha	.	.	50	0	50	0	17	0	.	.	.	.	.	.
Streptopus amplexifolius	.	.	.	.	.	.	.	.	.	.	.	.	20	0
Glyceria grandis	.	.	.	.	.	.	.	.	.	.	.	.	20	0
Sanguisorba officinalis	.	.	.	.	.	.	.	.	.	.	.	.	20	1
MOSS LAYER														
Moss	100	10	.	.	100	6	83	12	50	1	100	3	.	.
UNVEGETATED														
Bare ground	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Litter	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Water	.	.	.	.	.	.	.	.	.	.	.	.	.	.

	HIPVUL		ISONUT		JUNBAL		JUNEFF		JUNNEV		KALMIC/SPHAGN		LEDGLA-GAUSHA/CAROBN	
	5 Plots		5 Plots		6 Plots		6 Plots		2 Plots		6 Plots		33 Plots	
Species	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE
MATURE TREES														
Picea engelmannii	.	.	.	.	33	2	.	.	.	.	.	.	.	.
Pinus contorta var. latifolia	.	.	.	.	17	0	.	.	.	.	17	3	.	.
Alnus rubra	.	.	.	.	.	.	17	0	.	.	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Tsuga mertensiana	.	.	.	.	17	0	.	.	.	.	.	.	.	.
Abies lasiocarpa	.	.	.	.	33	1	.	.	.	.	.	.	.	.
Abies amabilis	.	.	.	.	17	1	.	.	.	.	.	.	.	.
Pinus contorta var. contorta	.	.	.	.	.	.	.	.	.	.	.	.	21	4
REPRODUCING TREES														
Picea engelmannii	.	.	.	.	17	0	.	.	50	0	17	0	.	.
Abies lasiocarpa	.	.	.	.	17	1	.	.	.	.	.	.	.	.
Pinus contorta var. latifolia	.	.	.	.	.	.	.	.	50	0	17	0	.	.
Tsuga heterophylla	.	.	.	.	.	.	.	.	.	.	17	0	15	0
Tsuga mertensiana	.	.	.	.	17	0	.	.	.	.	17	0	.	.
Thuja plicata	.	.	.	.	.	.	.	.	.	.	.	.	12	0
Alnus rubra	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Abies grandis	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Pseudotsuga menziesii	.	.	.	.	.	.	17	1	.	.	.	.	.	.
Quercus garryana	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Picea sitchensis	.	.	.	.	.	.	.	.	.	.	.	.	12	0
Pinus ponderosa	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Larix occidentalis	.	.	.	.	17	0	.	.	.	.	.	.	.	.
Pinus monticola	.	.	.	.	17	0	.	.	.	.	17	0	.	.
Frangula purshiana	.	.	.	.	.	.	.	.	.	.	.	.	15	0
SHRUB LAYER														
Alnus incana	.	.	.	.	17	0	.	.	50	0	.	.	.	.
Vaccinium	.	.	.	.	.	.	.	.	.	.	17	6	.	.
Salix	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Ribes lacustre	.	.	.	.	17	0	.	.	.	.	.	.	.	.
Lonicera involucrata	.	.	.	.	17	0	.	.	.	.	.	.	3	0
Vaccinium membranaceum	.	.	.	.	33	0	.	.	.	.	.	.	.	.
Sambucus racemosa	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Rosa pisocarpa	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Kalmia microphylla	.	.	.	.	.	.	.	.	.	.	100	24	18	0
Vaccinium uliginosum	.	.	.	.	17	0	.	.	50	2	33	2	.	.
Salix geyeriana	.	.	.	.	17	0	.	.	50	0	.	.	.	.
Rubus ursinus	.	.	.	.	.	.	17	0	.	.	.	.	6	0
Vaccinium scoparium	.	.	.	.	33	0	.	.	.	.	.	.	.	.
Spiraea douglasii	.	.	.	.	.	.	17	0	.	.	.	.	52	4
Holodiscus discolor	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Gaultheria	.	.	.	.	.	.	.	.	.	.	17	0	.	.
Vaccinium oxycoccos	.	.	.	.	.	.	.	.	.	.	.	.	21	0
Rubus spectabilis	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Rubus lasiococcus	.	.	.	.	33	0	.	.	.	.	.	.	.	.
Ledum glandulosum	.	.	.	.	.	.	.	.	.	.	.	.	100	37
Salix hookeriana	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Salix sitchensis	.	.	.	.	.	.	33	0	.	.	.	.	.	.

Malus fusca	.	.	.	.	.	.	.	.	.	.	.	.	18	1		
Vaccinium parvifolium	.	.	.	.	.	.	.	.	.	.	.	.	3	0		
Menziesia ferruginea	.	.	.	.	.	.	.	.	.	.	.	.	3	0		
Gaultheria shallon	.	.	.	.	.	.	17	0	.	.	.	.	100	18		
Myrica californica	.	.	.	.	.	.	.	.	.	.	.	.	9	1		
HERB LAYER																
Angelica	.	.	.	.	.	.	17	0	.	.	.	.	.	.		
Solidago	.	.	.	.	.	.	17	1	.	.	.	.	.	.		
Orthilia secunda	.	.	.	.	17	0	.	.	.	.	.	.	.	.		
Lotus	.	.	.	.	.	.	17	0	.	.	.	.	.	.		
Tolmiea menziesii	.	.	.	.	.	.	17	0	.	.	.	.	.	.		
Hypericum formosum	.	.	.	.	.	.	17	0	.	.	.	.	.	.		
Carex jonesii	.	.	.	.	.	.	17	0	.	.	.	.	.	.		
Allium validum	.	.	.	.	17	1	.	.	.	.	.	.	.	.		
Carex amplifolia	.	.	.	.	.	.	17	0	.	.	.	.	.	.		
Carex lenticularis	.	.	.	.	17	3	.	.	.	.	17	0	.	.		
Agoseris aurantiaca	.	.	.	.	17	0	.	.	.	.	.	.	.	.		
Mitella pentandra	.	.	.	.	17	0	.	.	.	.	.	.	.	.		
Carex illota	.	.	.	.	17	0	.	.	.	.	.	.	.	.		
Lupinus latifolius	.	.	.	.	17	0	.	.	.	.	.	.	.	.		
Lotus corniculatus	.	.	.	.	.	.	33	4	.	.	.	.	.	.		
Ranunculus occidentalis	.	.	.	.	17	2	.	.	.	.	.	.	.	.		
Epilobium alpinum	.	.	.	.	17	0	.	.	.	.	.	.	.	.		
Viola	.	.	.	.	.	.	.	.	.	.	17	0	.	.		
Saxifraga oregana	.	.	.	.	17	1	.	.	.	.	.	.	.	.		
Ranunculus populago	.	.	.	.	17	1	.	.	.	.	.	.	.	.		
Poaceae	.	.	60	7	.	.	.	.	.	.	.	.	.	.		
Ranunculus alismifolius	.	.	.	.	17	1	.	.	.	.	.	.	.	.		
Carex lasiocarpa	.	.	.	.	.	.	.	.	50	1	.	.	.	.		
Carex feta	.	.	.	.	.	.	17	0	.	.	.	.	.	.		
Anemone deltoidea	.	.	.	.	17	0	.	.	.	.	.	.	.	.		
Poa pratensis	.	.	.	.	.	.	17	0	.	.	.	.	.	.		
Aster occidentalis	.	.	.	.	17	3	.	.	.	.	.	.	.	.		
Juncus balticus	.	.	.	.	100	48	.	.	.	.	.	.	.	.		
Eleocharis quinqueflora	.	.	.	.	.	.	.	.	50	0	.	.	.	.		
Carex luzulina	.	.	.	.	17	2	.	.	.	.	.	.	.	.		
Juncus tenuis	.	.	20	0	.	.	.	.	.	.	.	.	.	.		
Stellaria crispa	.	.	.	.	17	0	.	.	.	.	.	.	.	.		
Mimulus guttatus	.	.	40	2	33	2	33	0	.	.	.	.	.	.		
Carex simulata	.	.	.	.	.	.	.	.	50	3	.	.	.	.		
Carex aurea	.	.	.	.	.	.	.	.	.	.	17	0	.	.		
Trifolium longipes	.	.	.	.	17	3	.	.	.	.	.	.	.	.		
Myosotis	.	.	.	.	.	.	.	.	.	.	.	.	.	.		
Ranunculus orthorhynchus	.	.	.	.	.	.	.	.	.	.	.	.	.	.		

Viola palustris	.	.	.	.	17	0	17	0	.	.	.	.	.	.
Dodecatheon alpinum	.	.	.	.	17	0	.	.	.	.	.	.	.	.
Polygonum bistortoides	.	.	.	.	50	10	.	.	.	.	.	.	.	.
Veronica wormskjoldii	.	.	.	.	17	0	.	.	.	.	.	.	.	.
Glyceria striata	.	.	.	.	.	.	33	0	.	.	.	.	.	.
Erigeron peregrinus	.	.	.	.	33	0	.	.	.	.	.	.	.	.
Carex utriculata	.	.	.	.	17	0	.	.	50	5	.	.	.	.
Galium trifidum	.	.	.	.	.	.	67	0	.	.	.	.	.	.
Carex limosa	.	.	.	.	.	.	.	.	.	.	17	0	.	.
Comarum palustre	.	.	.	.	.	.	.	.	.	.	.	.	6	0
Trautvetteria caroliniensis	.	.	.	.	17	0	.	.	.	.	.	.	.	.
Veratrum californicum	.	.	.	.	33	0	.	.	.	.	.	.	.	.
Epilobium ciliatum	.	.	20	0	.	.	17	0	.	.	.	.	.	.
Achillea millefolium	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Rorippa curvisiliqua	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Dodecatheon jeffreyi	.	.	.	.	33	0	.	.	.	.	.	.	.	.
Pedicularis groenlandica	.	.	.	.	50	1	.	.	.	.	.	.	.	.
Carex	.	.	.	.	.	.	.	.	.	.	17	3	.	.
Carex echinata ssp. echinata	.	.	.	.	.	.	33	0	.	.	33	3	.	.
Aster alpigenus	.	.	.	.	17	0	.	.	.	.	.	.	.	.
Senecio triangularis	.	.	.	.	33	2	.	.	.	.	.	.	.	.
Holcus lanatus	.	.	.	.	.	.	33	0	.	.	.	.	.	.
Deschampsia caespitosa	.	.	.	.	33	2	.	.	50	2	.	.	.	.
Clintonia uniflora	.	.	.	.	17	0	.	.	.	.	.	.	.	.
Triantha occidentalis	.	.	.	.	.	.	.	.	50	4	.	.	.	.
Mimulus primuloides	.	.	.	.	17	0	.	.	50	10	.	.	.	.
Hypericum anagalloides	.	.	.	.	33	1	83	43	50	5	17	0	.	.
Platanthera dilatata	.	.	.	.	17	0	33	2	.	.	.	.	.	.
Penstemon procerus	.	.	.	.	17	1	.	.	.	.	.	.	.	.
Carex scopulorum	.	.	.	.	50	4	.	.	.	.	.	.	.	.
Athyrium filix-femina	.	.	.	.	.	.	33	4	.	.	.	.	3	0
Spiranthes romanzoffiana	.	.	.	.	.	.	.	.	50	0	17	0	.	.
Aster	.	.	.	.	17	1	.	.	.	.	.	.	.	.
Muhlenbergia filiformis	.	.	.	.	.	.	.	.	50	1	.	.	.	.
Scirpus microcarpus	.	.	.	.	.	.	50	5	.	.	.	.	.	.
Ligusticum grayi	.	.	.	.	33	0	.	.	.	.	.	.	.	.
Epilobium ciliatum ssp. glandulosum	.	.	.	.	33	0	.	.	.	.	.	.	.	.
Cornus canadensis	.	.	.	.	.	.	.	.	.	.	17	0	39	2
Viola glabella	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Cirsium vulgare	.	.	.	.	.	.	33	0	.	.	.	.	.	.
Aster foliaceus	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Platanthera stricta	.	.	.	.	17	0	.	.	.	.	17	0	.	.
Veronica americana	.	.	.	.	17	0	33	1	.	.	.	.	3	0
Geum macrophyllum	.	.	.	.	.	.	33	0	.	.	.	.	.	.
Carex aquatilis var. dives	.	.	.	.	.	.	.	.	50	2	33	1	64	19

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Callitriche heterophylla	.	.	.	.	.	.	17	0	.	.	.	.	6	0
Carex brunnescens	.	.	.	.	17	1	17	0	.	.	.	.	.	.
Lysichiton americanus	.	.	.	.	.	.	17	0	50	1	33	0	24	2
Linnaea borealis	.	.	.	.	.	.	17	0	.	.	17	0	.	.
Epilobium ciliatum ssp. watsonii	.	.	.	.	.	.	17	0	.	.	.	.	9	0
Juncus xiphoides var. triandrus	.	.	.	.	.	.	100	2	.	.	.	.	.	.
Caltha leptosepala ssp. howellii	.	.	.	.	33	2	.	.	.	.	17	1	.	.
Gentiana prostrata	.	.	.	.	17	0	.	.	.	.	.	.	.	.
Deschampsia elongata	.	.	.	.	17	0	.	.	.	.	.	.	.	.
Eleocharis acicularis	.	.	.	.	.	.	.	.	.	.	17	0	.	.
Equisetum arvense	.	.	.	.	33	0	50	3	.	.	.	.	6	Tr
Galium boreale	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Luzula campestris	.	.	.	.	17	0	.	.	.	.	.	.	.	.
Juncus effusus	.	.	.	.	.	.	100	52	.	.	17	0	9	1
Juncus nevadensis	.	.	.	.	.	.	.	.	100	38	.	.	.	.
Agrostis exarata	.	.	.	.	.	.	.	.	.	.	.	.	45	3
Cicuta douglasii	20	1	.	.	.	.	.	.	.	.	.	.	.	.
Agrostis humilis	.	.	.	.	17	0	.	.	.	.	.	.	.	.
Myosotis laxa	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Anemone oregana	.	.	.	.	.	.	.	.	.	.	17	0	.	.
Oenanthe sarmentosa	.	.	.	.	.	.	50	3	.	.	.	.	3	0
Veronica scutellata	.	.	40	4	.	.	33	0	.	.	.	.	.	.
Cardamine	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Packera cymbalarioides	.	.	.	.	33	1	.	.	.	.	.	.	.	.
Camassia quamash	.	.	20	0	.	.	.	.	.	.	.	.	.	.
Drosera rotundifolia	.	.	.	.	.	.	.	.	.	.	33	3	.	.
Achlys triphylla	.	.	.	.	17	0	.	.	.	.	.	.	.	.
Mentha arvensis	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Mitella breweri	.	.	.	.	17	0	.	.	.	.	.	.	.	.
Hippuris vulgaris	100	37	.	.	.	.	.	.	.	.	.	.	.	.
Sanguisorba occidentalis	.	.	.	.	.	.	.	.	50	1	.	.	.	.
Menyanthes trifoliata	.	.	.	.	.	.	.	.	50	3	17	1	.	.
Ranunculus uncinatus	.	.	.	.	17	0	17	0	.	.	.	.	.	.
Potamogeton gramineus	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Utricularia macrorhiza	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Gratiola	.	.	20	0	.	.	.	.	.	.	.	.	.	.
Isoetes nuttallii	.	.	100	57	.	.	.	.	.	.	.	.	.	.
Polystichum munitum	.	.	.	.	.	.	17	0	.	.	.	.	3	0
Trisetum canescens	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Galium aparine	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Trifolium	.	.	.	.	17	1	.	.	.	.	.	.	.	.
Streptopus roseus	.	.	.	.	17	0	.	.	.	.	.	.	.	.
Poa palustris	.	.	.	.	.	.	.	.	50	3	17	1	.	.
Callitriche stagnalis	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Phalaris arundinacea	.	.	.	.	.	.	17	0	.	.	.	.	.	.

Fragaria vesca	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Pteridium aquilinum	.	.	.	.	.	.	17	2	.	.	.	.	9	2
Anthoxanthum odoratum	.	.	.	.	.	.	33	1	.	.	.	.	.	.
Dodecatheon conjugens	.	.	.	.	.	.	.	.	.	.	17	1	.	.
Agrostis thurberiana	.	.	.	.	.	.	.	.	.	.	17	0	.	.
Carex obnupta	.	.	.	.	.	.	50	1	.	.	17	0	52	11
Tofieldia glutinosa	.	.	.	.	.	.	.	.	.	.	17	0	.	.
Maianthemum dilatatum	.	.	.	.	.	.	.	.	.	.	.	.	12	0
Valeriana sitchensis	.	.	.	.	17	1	.	.	.	.	.	.	.	..
Festuca idahoensis	.	.	.	.	17	0	.	.	.	.	.	.	.	.
Montia linearis	.	.	.	.	17	0	.	.	.	.	.	.	.	.
Torreyochloa pallida var. pauciflora	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Arnica mollis	.	.	.	.	17	0	.	.	.	.	.	.	.	.
Poa	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Mimulus moschatus	.	.	.	.	.	.	50	0	.	.	.	.	.	.
Sparganium angustifolium	.	.	.	.	.	.	33	3	.	.	.	.	.	.
Blechnum spicant	.	.	.	.	.	.	17	0	.	.	.	.	30	1
Juncus	.	.	.	.	.	.	17	0	.	.	17	0	9	0
Eriophorum gracile	.	.	.	.	17	1	.	.	.	.	.	.	.	.
Digitalis purpurea	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Callitriche	.	.	.	.	.	.	17	0	.	.	.	.	.	.
Carex stipata	.	.	.	.	.	.	33	0	.	.	.	.	.	.
Lotus pinnatus	.	.	60	12	.	.	.	.	.	.	.	.	.	.
Triteleia hyacinthina	.	.	20	0	.	.	.	.	.	.	.	.	.	.
Prunella vulgaris	.	.	.	.	.	.	33	2	.	.	.	.	.	.
Castilleja suksdorfii	.	.	.	.	17	0	.	.	.	.	.	.	.	.
Epilobium angustifolium	.	.	.	.	17	0	17	0	.	.	.	.	.	.
Calamagrostis nutkaensis	.	.	.	.	.	.	.	.	.	.	.	.	15	1
Trientalis europaea ssp. arctica	.	.	.	.	.	.	.	.	.	.	.	.	15	0
Xerophyllum tenax	.	.	.	.	.	.	.	.	.	.	17	0	.	.
MOSS LAYER														
Moss	.	.	.	.	17	0	83	11	50	50	100	81	48	10
UNVEGETATED														
Bare ground	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Litter	.	.	.	.	.	.	.	.	.	.	50	5	15	2
Water	100	62	.	.	.	.	.	.	.	.	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Species	LEDGLA/CAROBN/SPHAGN LEDGLA/DARCAL/SPHAGN 92 Plots CON	AVE	60 Plots CON	AVE	LEDGLA/SANOFF 45 Plots CON	AVE	LEMMIN 2 Plots CON	AVE	LILOCC 3 Plots CON	AVE	MALFUS/CAROBN LUDPAL-POLHYD 16 Plots CON	AVE	1 Plots CON	AVE
MATURE TREES														
Salix lucida ssp. lasiandra	.	.	.	.	.	.	.	.	.	.	6	0	.	.
Pinus contorta var. contorta	23	2	25	0	.	.	.	.	.	.	.	.	.	.
REPRODUCING TREES														
Tsuga heterophylla	1	0	17	0	.	.	.	.	.	.	.	.	.	.
Thuja plicata	27	3	.	.	.	.	.	.	.	.	.	.	.	.
Picea sitchensis	.	.	10	0	.	.	.	.	.	.	.	.	.	.
Frangula purshiana	1	0	2	0	2	0	.	.	.	.	.	.	.	.
SHRUB LAYER														
Lonicera involucrata	10	1	17	1	.	.	.	.	.	.	.	.	.	.
Kalmia microphylla	17	2	.	.	.	.	.	.	.	.	.	.	.	.
Vaccinium uliginosum	21	2	63	18	4	1	.	.	.	.	.	.	.	.
Salix geyeriana	.	.	.	.	.	.	.	.	.	.	.	.	100	10
Rubus ursinus	1	0	3	0	9	0	.	.	.	.	.	.	.	.
Spiraea douglasii	33	4	25	2	.	.	.	.	.	.	.	.	100	3
Vaccinium oxycoccos	48	4	67	9	.	.	.	.	.	.	.	.	.	.
Ledum glandulosum	100	25	100	31	100	27	.	.	.	.	.	.	.	.
Salix hookeriana	11	2	.	.	.	.	.	.	.	.	.	.	.	.
Malus fusca	.	.	.	.	.	.	.	.	.	.	.	.	100	60
Gaultheria shallon	14	1	7	0	27	1	.	.	.	.	.	.	.	.
Vaccinium macrocarpon	17	2	2	0	.	.	.	.	.	.	.	.	.	.
Myrica californica	1	0	2	0	.	.	.	.	.	.	.	.	.	.
HERB LAYER														
Lysimachia terrestris	5	1	.	.	.	.	.	.	.	.	.	.	.	.
Unknown herb	.	.	.	.	.	.	.	.	.	.	6	1	.	.
Lycopus	.	.	5	0	.	.	.	.	.	.	.	.	.	.
Carex buxbaumii	.	.	.	.	11	0	.	.	.	.	.	.	.	.
Viola	1	0	.	.	.	.	.	.	.	.	.	.	.	.
Equisetum telmateia	3	0	.	.	.	.	.	.	.	.	.	.	.	.
Juncus balticus	1	0	.	.	.	.	.	.	.	.	.	.	.	.
Comarum palustre	12	1	37	5	.	.	.	.	.	.	.	.	.	.
Veratrum californicum	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Rorippa curvisiliqua	.	.	.	.	.	.	.	.	.	.	6	0	.	.
Deschampsia caespitosa	.	.	2	0	24	3	.	.	.	.	.	.	.	.
Hypericum anagalloides	7	0	8	0	27	1	.	.	.	.	.	.	.	..
Athyrium filix-femina	1	0	5	1	.	.	.	.	.	.	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Calamagrostis stricta ssp. inexpansa	18	1	2	0	.	.	.	.	.	.	.	.	.	.
Bidens cernua	.	.	.	.	.	.	.	.	33	1	38	5	.	.
Cornus canadensis	16	1	.	.	.	.	.	.	.	.	.	.	.	.
Carex aquatilis var. dives	2	0	53	2	7	1	.	.	.	.	.	.	.	.
Callitriche heterophylla	.	.	.	.	.	.	50	1	.	.	.	.	.	.
Lysichiton americanus	28	4	3	0	20	4	50	5	.	.	.	.	.	.
Linnaea borealis	4	0	.	.	.	.	.	.	.	.	.	.	.	.
Alisma triviale	.	.	.	.	.	.	.	.	33	0	6	Tr	.	.
Agrostis	5	0	18	1	.	.	.	.	.	.	.	.	.	.
Juncus xiphoides var. triandrus	1	0	18	0	.	.	.	.	.	.	.	.	.	.
Schoenoplectus americanus	.	.	.	.	.	.	.	.	33	3	.	.	.	.
Elodea canadensis	.	.	.	.	.	.	.	.	33	0	.	.	.	.
Eleocharis palustris	.	.	.	.	.	.	.	.	67	15	25	1	.	.
Carex leptalea	1	0	28	2	.	.	.	.	.	.	.	.	.	.
Trillium ovatum	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Eleocharis acicularis	.	.	.	.	.	.	.	.	67	7	.	.	.	.
Myriophyllum spicatum	.	.	.	.	.	.	.	.	33	0	.	.	.	.
Equisetum arvense	.	.	.	.	.	.	.	.	33	0	.	.	.	.
Eleocharis ovata	.	.	.	.	.	.	.	.	.	.	13	1	.	.
Eragrostis hypnoides	.	.	.	.	.	.	.	.	.	.	6	0	.	.
Ludwigia palustris	.	.	.	.	.	.	.	.	.	.	63	34	.	.
Juncus effusus	15	1	.	.	18	1	.	.	.	.	.	.	.	.
Juncus nevadensis	.	.	.	.	.	.	.	.	33	0	.	.	.	.
Echinochloa crusgalli	.	.	.	.	.	.	.	.	.	.	6	0	.	.
Agrostis exarata	4	0	.	.	53	2	.	.	.	.	.	.	.	.
Argentina egedii	.	.	.	.	.	.	.	.	.	.	6	0	.	.
Veronica scutellata	.	.	.	.	.	.	.	.	.	.	.	.	100	0
Apiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex cusickii	1	0	30	3	.	.	.	.	.	.	.	.	.	.
Drosera rotundifolia	51	2	87	1	38	1	.	.	.	.	.	.	.	.
Menyanthes trifoliata	1	0	.	.	.	.	.	.	.	.	.	.	.	.
Carex echinata ssp. phyllomanica	41	4	.	.	67	3	.	.	.	.	.	.	.	.
Leersia oryzoides	.	.	.	.	.	.	.	.	.	.	6	1	.	.
Sagittaria latifolia	.	.	.	.	.	.	.	.	33	0	13	2	.	.
Lemna minor	.	.	.	.	.	.	100	90	.	.	.	.	.	.
Myriophyllum aquaticum	.	.	.	.	.	.	.	.	.	.	19	0	.	.
Callitriche stagnalis	.	.	.	.	.	.	.	.	.	.	6	0	.	.
Polygonum hydropiperoides	.	.	.	.	.	.	.	.	33	1	94	57	.	.
Phalaris arundinacea	.	.	.	.	.	.	.	.	.	.	13	2	.	.
Pteridium aquilinum	9	1	.	.	9	1	.	.	.	.	.	.	.	.
Anthoxanthum odoratum	.	.	.	.	9	0	.	.	.	.	.	.	.	.
Juncus oxymeris	.	.	.	.	.	.	.	.	33	1	.	.	.	.
Carex obnupta	74	12	.	.	13	1	50	35	.	.	.	.	100	97
Sium suave	.	.	.	.	.	.	.	.	33	1	.	.	.	.
Darlingtonia californica	.	.	100	18	.	.	.	.	.	.	.	.	.	.

Limosella aquatica	.	.	.	.	.	.	.	.	100	7	.	.	.	.
Carex pluriflora	11	0	.	.	.	.	.	.	.	.	.	.	.	.
Maianthemum dilatatum	10	0	.	.	.	.	.	.	.	.	.	.	.	.
Eriophorum chamissonis	24	1	65	10	.	.	.	.	.	.	.	.	.	.
Rhynchospora alba	.	.	10	0	.	.	.	.	.	.	.	.	.	.
Lilaeopsis occidentalis	.	.	.	.	.	.	.	.	100	28	.	.	.	.
Polygonum amphibium	.	.	.	.	.	.	.	.	.	.	6	0	.	.
Equisetum telmateia var. braunii	.	.	.	.	18	0	.	.	.	.	.	.	.	.
Helenium bolanderi	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Senecio triangularis var. angustifolius	.	.	.	.	9	0	.	.	.	.	.	.	.	.
Rhynchospora capitellata	.	.	.	.	20	1	.	.	.	.	.	.	.	.
Lilium occidentale	.	.	.	.	4	0	.	.	.	.	.	.	.	.
Paspalum distichum	.	.	.	.	.	.	.	.	.	.	13	0	.	.
Gentiana sceptrum	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Polygonum punctatum	.	.	.	.	.	.	.	.	.	.	6	0	.	.
Myriophyllum ussuriense	.	.	.	.	.	.	.	.	33	0	.	.	.	.
Crassula aquatica	.	.	.	.	.	.	.	.	100	13	.	.	.	.
Blechnum spicant	24	3	5	0	64	15	.	.	.	.	.	.	.	.
Schoenoplectus tabernaemontani	.	.	.	.	.	.	.	.	.	.	6	0	.	.
Ceratophyllum demersum	.	.	.	.	.	.	.	.	33	0	.	.	.	.
Gratiola neglecta	.	.	.	.	.	.	.	.	33	0	.	.	.	.
Callitriche	.	.	.	.	.	.	.	.	67	2	.	.	.	.
Sisyrinchium californicum	.	.	.	.	33	4	.	.	.	.	.	.	.	.
Sanguisorba officinalis	.	.	.	.	100	21	.	.	.	.	.	.	.	.
Calamagrostis nutkaensis	7	1	.	.	.	.	.	.	.	.	.	.	.	.
Trientalis europaea ssp. arctica	13	1	2	0	.	.	.	.	.	.	.	.	.	.
Lycopus americanus	1	0	.	.	.	.	.	.	.	.	.	.	.	.
MOSS LAYER														
Moss	92	55	100	59	73	28	.	.	.	.	.	.	.	.
UNVEGETATED														
Bare ground	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Litter	3	0	.	.	.	.	.	.	.	.	.	.	.	.
Water	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

	MYRGAL/CARAQUD						NUPLUTP				PASDIS			
	MENTRI				NEPCRI				OENSAR				PICSIT/CAROBN-LYSAME	
	5 Plots		1 Plots		2 Plots		5 Plots		7 Plots		3 Plots		27 Plots	
Species	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE
MATURE TREES														
Alnus rubra	.	.	.	.	.	.	.	.	29	3	.	.	19	2
Fraxinus latifolia	.	.	.	.	.	.	.	.	14	11	.	.	.	.
Frangula purshiana	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Salix lucida ssp. lasiandra	.	.	.	.	.	.	.	.	.	.	67	1	.	.
Tsuga heterophylla	.	.	.	.	.	.	.	.	.	.	.	.	4	1
Thuja plicata	.	.	.	.	.	.	.	.	14	0	.	.	7	1
Picea sitchensis	.	.	.	.	.	.	.	.	.	.	.	.	100	66
REPRODUCING TREES														
Malus fusca	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Tsuga heterophylla	.	.	.	.	.	.	.	.	.	.	.	.	4	0
Salix lucida ssp. lasiandra	.	.	.	.	.	.	.	.	.	.	33	2	.	.
SHRUB LAYER														
Betula nana	.	.	100	1	.	.	.	.	.	.	.	.	.	.
Lonicera involucrata	.	.	.	.	.	.	.	.	.	.	.	.	15	1
Sambucus racemosa	.	.	.	.	.	.	.	.	.	.	.	.	4	0
Crataegus douglasii	.	.	.	.	.	.	.	.	14	2	.	.	.	.
Rosa eglanteria	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Crataegus monogyna	.	.	.	.	.	.	.	.	.	.	.	.	4	1
Salix fluviatilis	.	.	.	.	.	.	.	.	.	.	33	1	.	.
Rubus ursinus	.	.	.	.	.	.	.	.	14	0	.	.	4	Tr
Spiraea douglasii	.	.	100	2	.	.	20	0	.	.	.	.	4	0
Rubus spectabilis	.	.	.	.	.	.	.	.	.	.	.	.	30	3
Ledum glandulosum	.	.	.	.	.	.	.	.	.	.	.	.	4	0
Salix hookeriana	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Myrica gale	.	.	100	60	.	.	.	.	.	.	.	.	.	.
Salix sitchensis	.	.	.	.	.	.	.	.	29	1	33	0	.	.
Ribes	.	.	.	.	.	.	.	.	.	.	.	.	4	0
Malus fusca	.	.	.	.	.	.	.	.	.	.	.	.	15	2
Vaccinium parvifolium	.	.	.	.	.	.	.	.	.	.	.	.	30	3
Menziesia ferruginea	.	.	.	.	.	.	.	.	.	.	.	.	4	0
Gaultheria shallon	.	.	.	.	.	.	.	.	.	.	.	.	37	4
Vaccinium ovatum	.	.	.	.	.	.	.	.	.	.	.	.	7	0
HERB LAYER														
Unknown herb	.	.	.	.	.	.	.	.	14	1	.	.	.	.
Tolmiea menziesii	.	.	.	.	.	.	.	.	14	0	.	.	.	.

Carex arcta	20	2	.	.	.	.	.	.	.	.	.	.	.	.
Galium parisiense	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Carex laeviculmis	.	.	.	.	50	3	.	.	.	.	.	.	.	.
Beckmannia syzigachne	.	.	.	.	.	.	.	.	29	0	.	.	.	.
Carex unilateralis	.	.	.	.	.	.	.	.	14	2	.	.	.	.
Poaceae	.	.	.	.	50	0	.	.	.	.	.	.	.	.
Carex aperta	.	.	.	.	.	.	.	.	.	.	33	2	.	.
Carex pellita	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Carex feta	.	.	.	.	.	.	.	.	.	.	33	3	.	.
Carex exsiccata	.	.	.	.	.	.	20	0	.	.	.	.	.	.
Claytonia sibirica	.	.	.	.	.	.	.	.	14	3	.	.	.	.
Hordeum brachyantherum	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Poa pratensis	.	.	.	.	.	.	.	.	.	.	33	0	.	..
Ranunculus orthorhynchus	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Polygonum bistortoides	.	.	.	.	100	3	.	.	.	.	.	.	.	.
Glyceria striata	.	.	.	.	.	.	20	1	14	0	.	.	.	.
Dulichium arundinaceum	.	.	.	.	.	.	20	0	.	.	.	.	.	.
Carex utriculata	20	2	.	.	.	.	20	1	.	.	.	.	.	.
Carex limosa	40	1	.	.	.	.	.	.	.	.	.	.	.	.
Comarum palustre	.	.	.	.	.	.	20	0	.	.	.	.	.	.
Epilobium ciliatum	.	.	.	.	.	.	.	.	14	0	.	.	.	..
Carex	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Carex echinata ssp. echinata	40	0	.	.	.	.	.	.	.	.	.	.	.	.
Senecio triangularis	.	.	.	.	100	0	.	.	.	.	.	.	.	.
Boykinia major	.	.	.	.	100	9	.	.	.	.	.	.	4	Tr
Hypericum anagalloides	.	.	.	.	50	0	.	.	.	.	.	.	.	.
Platanthera dilatata	.	.	.	.	50	0	.	.	.	.	.	.	.	.
Athyrium filix-femina	.	.	.	.	.	.	.	.	29	1	.	.	11	0
Carex deweyana ssp. leptopoda	.	.	.	.	.	.	.	.	43	0	.	.	.	.
Scirpus microcarpus	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Platanthera stricta	.	.	.	.	50	0	.	.	.	.	.	.	.	.
Veronica americana	.	.	.	.	.	.	20	2	14	0	.	.	.	.
Carex aquatilis var. dives	20	1	100	25	.	.	.	.	.	.	.	.	.	.
Carex aquatilis	20	1	.	.	100	12	.	.	.	.	.	.	.	.
Callitriche heterophylla	.	.	.	.	.	.	.	.	29	10	.	.	.	.
Lysichiton americanus	40	1	.	.	.	.	.	.	14	4	.	.	74	20
Epilobium ciliatum ssp. watsonii	.	.	.	.	50	0	.	.	14	0	.	.	.	.
Nuphar lutea ssp. polysepala	.	.	.	.	.	.	100	34	.	.	.	.	.	.
Juncus xiphoides var. triandrus	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Cinna latifolia	20	1	.	.	.	.	.	.	.	.	.	.	.	.
Eleocharis palustris	.	.	.	.	.	.	20	0	29	5	67	7	.	.
Equisetum arvense	.	.	.	.	.	.	.	.	.	.	67	14	4	0
Plantago major	.	.	.	.	.	.	.	.	.	.	33	0	.	.
Luzula campestris	.	.	.	.	50	0	.	.	.	.	.	.	.	.
Juncus effusus	.	.	.	.	.	.	.	.	14	1	67	3	.	.

Cicuta douglasii	40	1	.	.	.	.	.	.	.	.	.	.	.	.
Myosotis laxa	.	.	.	.	.	.	.	.	29	0	.	.	.	.
Oenanthe sarmentosa	.	.	.	.	.	.	.	.	100	68	.	.	22	1
Carex interrupta	.	.	.	.	.	.	.	.	.	.	33	3	.	.
Rumex crispus	.	.	.	.	.	.	.	.	29	0	33	0	.	.
Veronica scutellata	.	.	.	.	.	.	20	0	14	0	.	.	.	.
Cardamine	.	.	.	.	.	.	.	.	14	2	.	.	.	.
Euthamia occidentalis	.	.	.	.	.	.	.	.	.	.	33	0	.	.
Rumex	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Camassia quamash	.	.	.	.	.	.	.	.	14	Tr	.	.	.	.
Drosera rotundifolia	20	1	.	.	.	.	.	.	.	.	.	.	.	.
Mentha arvensis	.	.	.	.	.	.	20	Tr	14	0	.	.	.	.
Menyanthes trifoliata	100	32	.	.	.	.	20	0	.	.	.	.	.	.
Ranunculus uncinatus	.	.	.	.	.	.	.	.	14	4	.	.	.	.
Polystichum munitum	.	.	.	.	.	.	.	.	.	.	.	.	15	0
Lemna minor	.	.	.	.	.	.	20	3	.	.	.	.	.	.
Galium aparine	.	.	.	.	.	.	.	.	29	0	.	.	.	.
Poa trivialis	.	.	.	.	.	.	.	.	29	3	.	.	.	.
Glyceria borealis	.	.	.	.	.	.	20	0	.	.	.	.	.	.
Polygonum hydropiperoides	.	.	.	.	.	.	.	.	.	.	67	2	.	.
Mentha pulegium	.	.	.	.	.	.	.	.	.	.	67	2	.	.
Helenium autumnale	.	.	.	.	.	.	.	.	.	.	67	4	.	.
Phalaris arundinacea	.	.	.	.	.	.	.	.	.	.	67	6	.	.
Pteridium aquilinum	.	.	.	.	.	.	.	.	.	.	.	.	4	0
Agrostis thurberiana	.	.	100	0	100	0	.	.	.	.	.	.	.	.
Stachys ajugoides var. rigida	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Carex obnupta	.	.	.	.	.	.	20	0	14	1	.	.	96	66
Tofieldia glutinosa	.	.	.	.	100	4	.	.	.	.	.	.	.	.
Typha latifolia	.	.	.	.	.	.	.	.	29	6	.	.	.	.
Maianthemum dilatatum	.	.	.	.	.	.	.	.	14	0	.	.	22	1
Stellaria calycantha	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Paspalum distichum	.	.	.	.	.	.	.	.	.	.	100	57	.	.
Oxalis oregana	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Mimulus moschatus	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Sparganium angustifolium	.	.	.	.	.	.	20	6	.	.	.	.	.	.
Lindernia dubia	.	.	.	.	.	.	.	.	.	.	33	2	.	.
Myriophyllum sibiricum	.	.	.	.	.	.	20	4	.	.	.	.	.	.
Blechnum spicant	.	.	.	.	.	.	.	.	.	.	.	.	4	0
Schoenoplectus tabernaemontani	.	.	.	.	.	.	.	.	.	.	67	1	.	.
Callitriche	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Nephrophyllidium crista-galli	.	.	.	.	100	75	.	.	.	.	.	.	.	.
Parnassia fimbriata	.	.	.	.	100	1	.	.	.	.	.	.	.	.
Utricularia minor	.	.	.	.	.	.	20	0	.	.	.	.	.	.
Glyceria	.	.	.	.	.	.	.	.	14	0	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Carex vulpinoidea	.	.	.	.	.	.	.	.	.	.	67	5	.	.
Galium	.	.	.	.	.	.	.	.	14	0	.	.	.	.
Polypodium scouleri	.	.	.	.	.	.	.	.	.	.	.	.	15	0
Sanguisorba officinalis	.	.	100	25	.	.	.	.	.	.	.	.	.	.
Calamagrostis nutkaensis	.	.	.	.	.	.	.	.	.	.	.	.	15	0
MOSS LAYER														
Moss	80	70	.	.	50	45	.	.	29	4	.	.	11	3
UNVEGETATED														
Bare ground	.	.	.	.	.	.	.	.	.	.	33	5	.	.
Litter	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Water	.	.	.	.	.	.	.	.	.	.	.	.	.	.

	PICSIT/CORER/LYSAME				POLCOM				POPTRE/CAROBN				RANAQU	
			PINCONC/CAROBN				POPBALT/CORER/IMPCAP				POTNAT			
	15 Plots		93 Plots		5 Plots		3 Plots		1 Plots		3 Plots		3 Plots	
Species	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE
MATURE TREES														
Alnus rubra	73	7	2	0	.	.	.	.	.	.	.	.	.	.
Fraxinus latifolia	27	4	.	.	.	.	33	12	.	.	.	.	.	.
Frangula purshiana	67	4	.	.	.	.	.	.	.	.	.	.	.	.
Salix lucida ssp. lasiandra	20	1	.	.	.	.	67	8	.	.	.	.	.	.
Tsuga heterophylla	13	0	.	.	.	.	.	.	.	.	.	.	.	.
Prunus emarginata	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Populus balsamifera ssp. trichocarpa	60	19	.	.	.	.	100	48	.	.	.	.	.	.
Thuja plicata	67	8	.	.	.	.	.	.	.	.	.	.	.	.
Picea sitchensis	100	24	3	0	.	.	.	.	.	.	.	.	.	.
Populus tremuloides	.	.	.	.	.	.	.	.	100	50	.	.	.	.
Pinus contorta var. contorta	.	.	99	30	.	.	.	.	.	.	.	.	.	.
REPRODUCING TREES														
Tsuga heterophylla	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Thuja plicata	13	0	.	.	.	.	.	.	.	.	.	.	.	.
Picea sitchensis	13	0	.	.	.	.	.	.	.	.	.	.	.	.
Populus balsamifera ssp. trichocarpa	7	0	.	.	.	.	.	.	.	.	.	.	.	.
SHRUB LAYER														
Amelanchier alnifolia	13	0	.	.	.	.	.	.	.	.	.	.	.	.
Lonicera involucrata	20	0	4	0	.	.	.	.	.	.	.	.	.	.
Acer circinatum	60	5	.	.	.	.	.	.	.	.	.	.	.	.

Rubus armeniacus	.	.	.	.	.	.	33	1	.	.	.	.	.	.
Physocarpus capitatus	20	1	.	.	.	.	33	2	.	.	.	.	.	.
Rosa nutkana	80	3	.	.	.	.	33	1	.	.	.	.	.	.
Vaccinium uliginosum	.	.	12	2	.	.	.	.	.	.	.	.	.	.
Rubus ursinus	80	1	1	0	.	.	67	2	.	.	.	.	.	.
Cornus sericea	100	22	.	.	.	.	100	47	.	.	.	.	.	.
Salix planifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Vaccinium scoparium	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Symphoricarpos albus	67	1	.	.	.	.	.	.	.	.	.	.	.	.
Spiraea douglasii	27	1	9	0	.	.	.	.	100	80	.	.	.	.
Rubus spectabilis	87	6	.	.	.	.	67	2	.	.	.	.	.	.
Rubus lasiococcus	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oemleria cerasiformis	67	1	.	.	.	.	.	.	.	.	.	.	.	.
Salix hookeriana	.	.	4	0	.	.	.	.	100	10	.	.	.	.
Salix sitchensis	40	5	.	.	.	.	33	3	.	.	.	.	.	.
Ribes	27	0	.	.	.	.	.	.	.	.	.	.	.	.
Aruncus dioicus var. acuminatus	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Arctostaphylos columbiana	.	.	2	0	.	.	.	.	.	.	.	.	.	.
Malus fusca	60	3	1	0	.	.	33	2	.	.	.	.	.	.
Rubus parviflorus	73	3	.	.	.	.	.	.	.	.	.	.	.	.
Vaccinium parvifolium	73	1	.	.	.	.	.	.	.	.	.	.	.	.
Gaultheria shallon	67	4	10	1	.	.	.	.	.	.	.	.	.	.
Vaccinium macrocarpon	.	.	1	0	.	.	.	.	.	.	.	.	.	.
Myrica californica	.	.	6	1	.	.	.	.	.	.	.	.	.	.
Vaccinium ovatum	.	.	16	1	.	.	.	.	.	.	.	.	.	.
HERB LAYER														
Angelica arguta	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Carex lenticularis	.	.	1	0	.	.	.	.	.	.	.	.	.	.
Agrostis stolonifera	.	.	1	0	.	.	.	.	.	.	.	.	.	.
Carex pellita	.	.	.	.	.	.	.	.	.	.	.	.	33	1
Carex exsiccata	.	.	.	.	.	.	.	.	.	.	.	.	33	1
Lycopus uniflorus	.	.	2	0	.	.	.	.	.	.	.	.	.	.
Angelica genuflexa	47	1	.	.	.	.	.	.	.	.	.	.	.	.
Carex utriculata	.	.	1	0	20	0	.	.	.	.	.	.	.	.
Galium trifidum	.	.	1	0	.	.	.	.	.	.	.	.	.	.
Deschampsia caespitosa	.	.	6	1	.	.	.	.	.	.	.	.	.	.
Athyrium filix-femina	93	2	.	.	.	.	67	1	.	.	.	.	.	.
Spiranthes romanzoffiana	.	.	2	0	.	.	.	.	.	.	.	.	.	.
Iris pseudacorus	.	.	.	.	.	.	33	1	.	.	.	.	.	.
Carex deweyana ssp. leptopoda	13	0	.	.	.	.	100	1	.	.	.	.	.	.
Heracleum lanatum	40	0	.	.	.	.	.	.	.	.	.	.	.	.
Polygonum	.	.	.	.	.	.	.	.	.	.	33	2	.	.
Callitriche heterophylla	.	.	.	.	.	.	.	.	.	.	.	.	33	2
Lysichiton americanus	100	10	.	.	.	.	67	1	.	.	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Agrostis	.	.	5	0	.	.	33	1	.	.	.	.	.	.
Viola adunca	.	.	2	0	.	.	.	.	.	.	.	.	.	.
Eleocharis palustris	.	.	2	0	.	.	.	.	.	.	33	2	.	.
Polypodium glycyrrhiza	47	0	1	0	.	.	.	.	.	.	.	.	.	.
Eleocharis acicularis	.	.	.	.	.	.	.	.	.	.	.	.	33	10
Equisetum arvense	20	0	.	.	.	.	.	.	.	.	.	.	.	.
Juncus nevadensis	.	.	1	0	.	.	.	.	.	.	.	.	.	.
Myosotis laxa	.	.	.	.	.	.	.	.	.	.	33	0	.	.
Oenanthe sarmentosa	60	2	.	.	.	.	33	0	.	.	.	.	33	2
Rumex crispus	.	.	.	.	.	.	.	.	.	.	.	.	33	0
Argentina egedii	.	.	3	0	.	.	.	.	.	.	33	0	.	.
Veronica scutellata	.	.	3	0	.	.	.	.	.	.	33	0	67	3
Apiaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cardamine	20	0	.	.	.	.	.	.	.	.	.	.	.	.
Mentha arvensis	.	.	.	.	.	.	.	.	.	.	.	.	33	4
Polystichum munitum	60	1	.	.	.	.	.	.	.	.	.	.	.	.
Polygonum hydropiperoides	.	.	.	.	.	.	.	.	.	.	33	0	.	.
Phalaris arundinacea	.	.	.	.	.	.	33	3	.	.	.	.	.	.
Ranunculus flammula	.	.	2	0	.	.	.	.	.	.	.	.	.	.
Carex obnupta	73	6	100	27	.	.	33	1	100	0	.	.	.	.
Sium suave	.	.	1	0	.	.	.	.	.	.	.	.	.	.
Streptopus amplexifolius	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Gentiana sceptrum	.	.	1	0	.	.	.	.	.	.	.	.	.	.
Sparganium angustifolium	.	.	.	.	.	.	.	.	.	.	33	12	.	.
Blechnum spicant	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Scutellaria lateriflora	.	.	.	.	.	.	67	1	.	.	.	.	.	.
Solanum dulcamara	7	0	.	.	.	.	33	0	.	.	.	.	.	.
Callitriche	.	.	.	.	.	.	33	0	.	.	.	.	33	18
Glyceria grandis	.	.	.	.	.	.	.	.	.	.	.	.	33	2
Sisyrinchium californicum	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Glyceria	13	0	.	.	.	.	.	.	.	.	.	.	.	.
Carex stipata	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Galium	53	1	.	.	.	.	33	0	.	.	.	.	.	.
Prunella vulgaris	.	.	.	.	.	.	33	0	.	.	.	.	.	.
Selaginella oregana	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Festuca occidentalis	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Potamogeton natans	.	.	.	.	.	.	.	.	.	.	100	70	.	.
Hypochaeris radicata	.	.	3	0	.	.	.	.	.	.	.	.	.	.
Aira elegans	.	.	1	0	.	.	.	.	.	.	.	.	.	.
Adiantum pedatum	93	1	.	.	.	.	.	.	.	.	.	.	.	.
Ranunculus repens	7	0	.	.	.	.	33	1	.	.	.	.	.	.
Galium oreganum	20	0	.	.	.	.	.	.	.	.	.	.	.	.
Spirodela polyrrhiza	.	.	.	.	.	.	.	.	.	.	33	7	.	.
Ranunculus aquatilis	.	.	.	.	.	.	.	.	.	.	.	.	100	88
Impatiens capensis	80	10	.	.	.	.	100	33	.	.	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Alopecurus aequalis	.	.	.	.	.	.	.	.	.	.	.	.	67	4
Utricularia	.	.	.	.	.	.	.	.	.	.	33	20	.	.
Vicia gigantea	7	0	.	.	.	.	.	.	.	.	.	.	.	.
Dichanthelium acuminatum var. fasciculare	.	.	9	1	.	.	.	.	.	.	.	.	.	.
Aster chilensis	.	.	2	0	.	.	.	.	.	.	.	.	.	.
Juncus lesueurii	.	.	3	0	.	.	.	.	.	.	.	.	.	.
MOSS LAYER														
Moss	.	.	76	30	100	64	.	.	100	98	.	.	33	1
UNVEGETATED														
Bare ground	.	.	14	7	20	17	.	.	.	.	.	.	.	.
Litter	.	.	1	0	100	21	.	.	.	.	.	.	.	.
Water	.	.	.	.	.	.	.	.	.	.	.	.	.	.

	RANFLA		SAGLAT		SALCOM		SALGEY		SALHOO-MALFUS/CAROBN-LYSAME					
									SALHOO		SALLUCL/SALSIT/LYSAME			
	8 Plots		14 Plots		4 Plots		7 Plots		2 Plots		16 Plots		9 Plots	
Species	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE
MATURE TREES														
Alnus rubra	.	.	.	.	.	.	.	.	.	.	31	2	11	0
Frangula purshiana	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Salix lucida ssp. lasiandra	.	.	.	.	.	.	.	.	.	.	.	.	89	20
Picea sitchensis	.	.	.	.	.	.	.	.	.	.	19	3	22	1
Pinus contorta var. contorta	.	.	.	.	.	.	.	.	.	.	6	0	.	.
REPRODUCING TREES														
Salix lucida ssp. lasiandra	.	.	7	1	.	.	.	.	.	.	.	.	.	.
Populus balsamifera ssp. trichocarpa	.	.	.	.	.	.	.	.	.	.	.	.	11	1
SHRUB LAYER														
Alnus viridis ssp. sinuata	.	.	.	.	.	.	14	2	.	.	.	.	.	.
Ribes bracteosum	.	.	.	.	.	.	14	0	.	.	.	.	11	0
Salix myrtillifolia	.	.	.	.	.	.	29	3	.	.	.	.	.	.
Spiraea densiflora	.	.	.	.	25	2	.	.	.	.	.	.	.	.
Phyllodoce empetriformis	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Lonicera involucrata	.	.	.	.	.	.	.	.	.	.	38	1	56	1
Vaccinium membranaceum	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Rhododendron macrophyllum	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Sambucus racemosa	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Gaultheria humifusa	.	.	.	.	25	0	.	.	.	.	.	.	.	.

Physocarpus capitatus	.	.	.	.	.	.	.	.	.	.	.	.	22	2
Rosa nutkana	.	.	.	.	.	.	.	.	.	.	.	.	44	2
Kalmia microphylla	.	.	.	.	25	2	14	0	.	.	.	.	.	.
Vaccinium uliginosum	.	.	.	.	25	0	14	1	.	.	.	.	.	.
Salix commutata	.	.	.	.	100	26	29	1	.	.	.	.	.	.
Salix geyeriana	.	.	.	.	.	.	100	56	.	.	.	.	.	.
Rubus ursinus	.	.	.	.	.	.	.	.	.	.	.	.	67	1
Cornus sericea	.	.	.	.	.	.	.	.	.	.	.	.	67	13
Symphoricarpos albus	.	.	.	.	.	.	.	.	.	.	.	.	22	0
Spiraea douglasii	.	.	.	.	.	.	43	8	50	3	88	13	78	11
Rubus spectabilis	.	.	.	.	.	.	.	.	.	.	.	.	44	2
Rubus lasiococcus	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Ledum glandulosum	.	.	.	.	.	.	.	.	.	.	31	1	.	.
Salix hookeriana	.	.	.	.	.	.	.	.	100	78	88	30	11	1
Salix sitchensis	.	.	.	.	.	.	.	.	50	8	6	1	89	28
Ribes	.	.	.	.	.	.	.	.	.	.	.	.	22	0
Malus fusca	.	.	.	.	.	.	.	.	.	.	81	45	11	0
Rubus parviflorus	.	.	.	.	.	.	.	.	.	.	.	.	22	0
Vaccinium parvifolium	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Gaultheria shallon	.	.	.	.	.	.	.	.	.	.	13	0	22	0
Cassiope mertensiana	.	.	.	.	25	2	.	.	.	.	.	.	.	.
Myrica californica	.	.	.	.	.	.	.	.	.	.	6	0	.	.
Vaccinium ovatum	.	.	.	.	.	.	.	.	.	.	13	0	.	.
HERB LAYER														
Pyrola asarifolia	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Carex lenticularis	13	0	.	.	.	.	.	.	.	.	.	.	.	.
Viola	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Claytonia sibirica	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Viola macloskeyi	.	.	.	.	.	.	14	1	.	.	.	.	.	.
Juncus balticus	.	.	.	.	25	4	.	.	.	.	.	.	.	.
Eleocharis quinqueflora	.	.	.	.	25	1	14	1	.	.	.	.	.	.
Mimulus guttatus	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Carex canescens	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Viola palustris	.	.	.	.	.	.	14	1	.	.	.	.	.	.
Polygonum bistortoides	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Boykinia occidentalis	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Carex utriculata	13	3	.	.	.	.	29	5	.	.	.	.	.	.
Comarum palustre	.	.	.	.	.	.	.	.	.	.	6	0	11	0
Veratrum californicum	.	.	.	.	.	.	.	.	.	.	.	.	33	0
Galium bifolium	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Potentilla flabellifolia	.	.	.	.	25	2	.	.	.	.	.	.	.	.
Dodecatheon jeffreyi	13	0	.	.	25	1	43	1	.	.	.	.	.	.
Pedicularis groenlandica	.	.	.	.	.	.	14	1	.	.	.	.	.	.
Carex	.	.	.	.	25	2	.	.	.	.	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Aster alpigenus	.	.	.	.	50	1	.	.	.	.	.	.	.	.
Deschampsia caespitosa	.	.	.	.	25	1	.	.	.	.	.	.	.	.
Triantha occidentalis	.	.	.	.	50	0	.	.	.	.	.	.	.	.
Hypericum anagalloides	.	.	.	.	25	1	29	3	.	.	6	0	.	.
Platanthera dilatata	.	.	.	.	25	0	29	0	.	.	.	.	.	.
Agrostis scabra	.	.	.	.	.	.	14	1	.	.	.	.	.	.
Carex scopulorum	.	.	.	.	75	13	14	6	.	.	.	.	.	.
Athyrium filix-femina	.	.	.	.	.	.	.	.	50	0	31	0	78	10
Spiranthes romanzoffiana	.	.	.	.	25	0	.	.	.	.	.	.	.	.
Calamagrostis stricta ssp. inexpansa	.	.	.	.	.	.	29	1	.	.	.	.	.	.
Iris pseudacorus	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Bidens cernua	.	.	36	7	.	.	.	.	.	.	.	.	.	.
Muhlenbergia filiformis	.	.	.	.	25	0	29	1	.	.	.	.	.	.
Scirpus microcarpus	.	.	.	.	.	.	14	3	50	1	.	.	67	3
Heracleum lanatum	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Ligusticum grayi	.	.	.	.	50	1	.	.	.	.	.	.	.	.
Cornus canadensis	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Veronica americana	.	.	.	.	.	.	57	0	50	0	.	.	.	.
Geum macrophyllum	.	.	.	.	.	.	29	0	.	.	.	.	.	.
Phleum alpinum	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Carex aquatilis var. dives	25	3	.	.	.	.	43	21	.	.	6	3	22	8
Carex aquatilis	.	.	.	.	.	.	29	6	.	.	.	.	.	.
Callitriche heterophylla	.	.	7	1	.	.	.	.	.	.	.	.	.	.
Aster modestus	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Carex nigricans	.	.	.	.	75	31	14	6	.	.	.	.	.	.
Lysichiton americanus	.	.	.	.	.	.	29	1	.	.	63	18	100	19
Epilobium ciliatum ssp. watsonii	.	.	.	.	.	.	29	0	.	.	.	.	.	.
Alisma triviale	.	.	7	0	.	.	.	.	.	.	.	.	.	.
Nuphar lutea ssp. polysepala	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Juncus xiphoides var. triandrus	.	.	.	.	.	.	.	.	50	1	.	.	.	.
Caltha leptosepala ssp. howellii	.	.	.	.	25	1	.	.	.	.	.	.	.	.
Elodea canadensis	.	.	14	0	.	.	.	.	.	.	.	.	.	.
Eleocharis palustris	.	.	64	4	.	.	.	.	.	.	.	.	.	.
Polypodium glycyrrhiza	.	.	.	.	.	.	.	.	.	.	13	0	22	0
Eleocharis acicularis	.	.	14	0	.	.	.	.	.	.	.	.	.	.
Equisetum arvense	.	.	.	.	.	.	29	1	.	.	.	.	22	1
Veratrum	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Eleocharis ovata	.	.	29	4	.	.	.	.	.	.	.	.	.	.
Potentilla glandulosa	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Calamagrostis stricta var. stricta	.	.	.	.	.	.	14	1	.	.	.	.	.	.
Eragrostis hypnoides	.	.	7	1	.	.	.	.	.	.	.	.	.	.
Ludwigia palustris	.	.	21	0	.	.	.	.	.	.	.	.	.	.
Juncus effusus	.	.	.	.	.	.	.	.	.	.	.	.	11	1
Equisetum fluviatile	.	.	7	1	.	.	.	.	.	.	.	.	33	1
Asarum caudatum	.	.	.	.	.	.	14	0	.	.	.	.	.	.

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Agrostis exarata	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Cicuta douglasii	.	.	7	0	.	.	.	.	.	.	.	.	11	0
Agrostis humilis	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Myosotis laxa	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Pedicularis attollens	.	.	.	.	75	1	.	.	.	.	.	.	.	.
Oenanthe sarmentosa	.	.	.	.	.	.	.	.	.	.	31	0	67	4
Antennaria media	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Veronica scutellata	.	.	14	1	.	.	14	0	.	.	.	.	.	.
Cardamine	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Packera cymbalarioides	.	.	.	.	25	1	14	0	.	.	.	.	.	.
Carex cusickii	.	.	.	.	.	.	.	.	.	.	6	0	.	.
Veronica serpyllifolia	.	.	.	.	.	.	29	0	.	.	.	.	.	.
Rudbeckia occidentalis	.	.	.	.	.	.	14	Tr	.	.	.	.	.	.
Mitella breweri	.	.	.	.	.	.	14	Tr	.	.	.	.	.	.
Epilobium	.	.	.	.	.	.	14	0	50	0	.	.	.	.
Polystichum munitum	.	.	.	.	.	.	.	.	.	.	13	0	.	.
Leersia oryzoides	.	.	14	2	.	.	.	.	.	.	.	.	.	.
Sagittaria latifolia	.	.	100	52	.	.	.	.	.	.	.	.	.	.
Lemna minor	.	.	14	0	.	.	.	.	50	0	.	.	.	.
Galium aparine	.	.	.	.	.	.	14	0	50	0	.	.	11	0
Poa palustris	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Juncus acuminatus	.	.	7	0	.	.	.	.	.	.	.	.	.	.
Polygonum hydropiperoides	.	.	14	1	.	.	.	.	.	.	.	.	.	.
Phalaris arundinacea	.	.	.	.	.	.	.	.	.	.	.	.	11	2
Ranunculus flammula	100	51	.	.	.	.	.	.	.	.	.	.	.	.
Carex obnupta	.	.	7	0	.	.	14	1	50	40	100	40	33	7
Tofieldia glutinosa	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Typha latifolia	.	.	.	.	.	.	.	.	.	.	6	0	11	0
Maianthemum dilatatum	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Paspalum distichum	.	.	7	0	.	.	.	.	.	.	.	.	.	.
Sparganium angustifolium	.	.	14	4	.	.	.	.	.	.	.	.	.	.
Lindernia dubia	.	.	36	2	.	.	.	.	.	.	.	.	.	.
Blechnum spicant	.	.	.	.	.	.	.	.	.	.	25	0	.	.
Juncus	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Schoenoplectus tabernaemontani	.	.	36	3	.	.	.	.	.	.	.	.	.	.
Ceratophyllum demersum	.	.	7	0	.	.	.	.	.	.	.	.	.	.
Gratiola neglecta	.	.	7	0	.	.	.	.	.	.	.	.	.	.
Eriophorum gracile	.	.	.	.	25	0	.	.	.	.	.	.	.	.
Solanum dulcamara	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Antennaria argentea	.	.	.	.	.	.	29	0	.	.	.	.	.	.
Lomatium grayi	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Utricularia minor	.	.	7	0	.	.	.	.	.	.	.	.	.	.
Agrostis oregonensis	.	.	.	.	25	1	14	1	.	.	.	.	.	.
Glyceria grandis	.	.	.	.	.	.	.	.	50	1	.	.	.	.
Adiantum pedatum	.	.	.	.	.	.	.	.	.	.	.	.	11	0

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Impatiens capensis	.	.	.	.	.	.	.	.	.	.	.	.	78	8
Trientalis europaea ssp. arctica	.	.	.	.	.	.	14	1	.	.	.	.	.	.
Erechtites minima	.	.	.	.	.	.	.	.	.	.	6	0	.	.
Potamogeton	13	6	14	3	.	.	.	.	.	.	.	.	.	.
Elatine	.	.	21	2	.	.	.	.	.	.	.	.	.	.
Potamogeton crispus	.	.	7	0	.	.	.	.	.	.	.	.	.	.
Agrostis variabilis	.	.	.	.	25	0	.	.	.	.	.	.	.	.
Lupinus lepidus	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Chrysosplenium	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Stenanthium	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Vicia gigantea	.	.	.	.	.	.	.	.	.	.	.	.	44	0
Oxalis	.	.	.	.	.	.	.	.	50	0	.	.	.	.
Aira praecox	.	.	.	.	.	.	.	.	.	.	6	0	.	.
Phragmites australis	.	.	.	.	.	.	.	.	.	.	.	.	33	0
Festuca	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Erigeron philadelphicus	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Cardamine occidentalis	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Stellaria media	.	.	.	.	.	.	14	Tr	.	.	.	.	.	.
MOSS LAYER														
Moss	25	1	.	.	.	.	29	9	100	41	25	2	.	.
UNVEGETATED														
Bare ground	63	29	7	1	.	.	.	.	.	.	50	22	.	.
Litter	38	2	.	.	.	.	.	.	.	.	.	.	.	.
Water	.	.	43	20	.	.	.	.	.	.	.	.	.	.

	SALLUCL/URTDIOG		SALSIT		SANOFF-CARAQUD		SCHACU		SCIMIC		SENTRI		SPAANG	
	6 Plots		7 Plots		13 Plots		7 Plots		20 Plots		21 Plots		11 Plots	
Species	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE
MATURE TREES														
Picea engelmannii	.	.	.	.	.	.	.	.	.	.	24	8	.	.
Pinus monticola	.	.	.	.	.	.	.	.	.	.	10	0	.	.
Pinus contorta var. latifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alnus rubra	.	.	14	0	.	.	.	.	.	.	.	.	.	.
Abies lasiocarpa	.	.	.	.	.	.	.	.	.	.	10	1	.	.
Abies amabilis	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Fraxinus latifolia	17	1	.	.	.	.	.	.	.	.	.	.	.	.
Abies grandis	.	.	.	.	.	.	.	.	.	.	5	1	.	.
Salix lucida ssp. lasiandra	100	67	.	.	.	.	.	.	.	.	.	.	.	.

REPRODUCING TREES														
Picea engelmannii	.	.	14	1	.	.	.	.	.	.	33	1	.	.
Abies lasiocarpa	.	.	.	.	.	.	.	.	.	.	14	0	.	.
Abies amabilis	.	.	14	0	.	.	.	.	.	.	10	1	.	.
Tsuga heterophylla	.	.	.	.	.	.	.	.	.	.	24	0	.	.
Tsuga mertensiana	.	.	.	.	.	.	.	.	.	.	10	Tr	.	.
Thuja plicata	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Abies grandis	.	.	.	.	.	.	.	.	.	.	10	0	.	.
Pseudotsuga menziesii	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Larix occidentalis	.	.	.	.	.	.	.	.	.	.	5	Tr	.	.
Pinus monticola	.	.	.	.	.	.	.	.	.	.	5	Tr	.	.
Taxus brevifolia	.	.	.	.	.	.	.	.	.	.	5	0	.	.
SHRUB LAYER														
Alnus viridis ssp. sinuata	.	.	29	1	.	.	.	.	.	.	.	.	.	.
Alnus incana	.	.	.	.	.	.	.	.	.	.	24	1	.	.
Ribes bracteosum	.	.	14	0	.	.	.	.	.	.	5	0	.	.
Viburnum edule	.	.	14	0	.	.	.	.	.	.	5	0	.	.
Ribes lacustre	.	.	14	0	.	.	.	.	.	.	24	0	.	.
Rhododendron albiflorum	.	.	.	.	.	.	.	.	.	.	5	Tr	.	.
Vaccinium membranaceum	.	.	.	.	.	.	.	.	.	.	10	0	.	.
Sambucus racemosa	17	7	.	.	.	.	.	.	.	.	.	.	.	.
Physocarpus capitatus	.	.	.	.	.	.	.	.	.	.	14	1	.	.
Rosa nutkana	.	.	.	.	.	.	.	.	.	.	10	0	.	.
Rosa pisocarpa	.	.	14	0	.	.	.	.	.	.	.	.	.	.
Kalmia microphylla	.	.	.	.	8	0	.	.	.	.	.	.	.	.
Rosa gymnocarpa	.	.	.	.	.	.	.	.	.	.	14	0	.	.
Vaccinium uliginosum	.	.	14	4	23	5	14	0	.	.	.	.	.	.
Salix fluviatilis	17	1	.	.	.	.	.	.	.	.	.	.	.	.
Salix commutata	.	.	.	.	23	1	.	.	5	Tr	.	.	.	.
Vaccinium ovalifolium	.	.	.	.	.	.	.	.	.	.	29	1	.	.
Salix geyeriana	.	.	14	4	.	.	.	.	.	.	.	.	.	.
Rubus ursinus	.	.	14	0	.	.	.	.	5	Tr	5	0	.	.
Cornus sericea	33	1	14	0	.	.	.	.	.	.	.	.	.	.
Vaccinium scoparium	.	.	.	.	.	.	.	.	.	.	10	0	.	.
Symphoricarpos albus	.	.	.	.	.	.	.	.	.	.	10	0	.	.
Spiraea douglasii	.	.	29	4	15	0	14	0	5	Tr	24	1	9	1
Rubus spectabilis	.	.	14	0	.	.	.	.	5	Tr	5	0	.	.
Rubus lasiococcus	.	.	.	.	.	.	.	.	.	.	10	0	.	.
Oemleria cerasiformis	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Salix hookeriana	.	.	14	1	.	.	.	.	.	.	.	.	.	.
Salix sitchensis	17	5	100	70	.	.	.	.	.	.	.	.	.	.
Rubus parviflorus	.	.	.	.	.	.	.	.	.	.	10	0	.	.
Oplopanax horridum	.	.	14	0	.	.	.	.	.	.	.	.	.	.

Gaultheria ovatifolia	.	.	.	.	8	0	.	.	.	.	.	.	.	.
Lonicera caerulea	.	.	14	1	.	.	.	.	.	.	.	.	.	.
Rubus leucodermis	.	.	14	0	.	.	.	.	.	.	.	.	.	.
Mahonia	.	.	14	0	.	.	.	.	.	.	.	.	.	.
Rubus laciniatus	.	.	.	.	.	.	.	.	5	Tr	.	.	.	.
Acer glabrum var. douglasii	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Mahonia nervosa	.	.	.	.	.	.	.	.	.	.	5	Tr	.	.
HERB LAYER														
Luzula parviflora	.	.	.	.	8	0	.	.	.	.	5	0	.	.
Stellaria longipes	.	.	.	.	.	.	.	.	5	Tr	.	.	.	.
Solidago canadensis	.	.	.	.	.	.	.	.	.	.	5	2	.	.
Angelica	.	.	.	.	.	.	.	.	5	Tr	.	.	.	.
Solidago	.	.	.	.	.	.	.	.	5	0	.	.	.	.
Orthilia secunda	.	.	.	.	.	.	.	.	.	.	24	0	.	.
Gymnocarpium dryopteris	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Lotus	.	.	.	.	.	.	.	.	5	1	.	.	.	.
Aster subspicatus	.	.	.	.	.	.	29	1	.	.	.	.	.	.
Carex angustata	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Stenanthium occidentale	.	.	14	0	.	.	.	.	.	.	.	.	.	.
Unknown herb	.	.	.	.	.	.	.	.	5	3	.	.	.	.
Hypericum formosum	.	.	.	.	.	.	14	0	5	Tr	.	.	.	.
Maianthemum stellatum	.	.	.	.	.	.	.	.	.	.	14	1	.	.
Carex jonesii	.	.	.	.	.	.	.	.	.	.	5	Tr	.	.
Polemonium occidentale	.	.	.	.	.	.	.	.	.	.	5	1	.	.
Epilobium glaberrimum	.	.	.	.	.	.	.	.	5	Tr	10	0	.	.
Allium validum	.	.	.	.	.	.	.	.	.	.	10	0	.	.
Calamagrostis canadensis	.	.	.	.	.	.	.	.	10	Tr	10	1	.	.
Carex amplifolia	.	.	14	0	.	.	.	.	5	Tr	.	.	.	.
Galium parisiense	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex lenticularis	.	.	14	0	.	.	.	.	.	.	5	0	.	.
Mitella pentandra	.	.	.	.	.	.	.	.	.	.	14	0	.	.
Agrostis stolonifera	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Stachys ciliata	.	.	.	.	.	.	.	.	5	1	43	1	.	.
Carex laeviculmis	.	.	.	.	.	.	.	.	5	Tr	10	0	.	.
Aquilegia formosa	.	.	.	.	.	.	.	.	.	.	10	0	.	. .
Carex buxbaumii	.	.	14	0	.	.	.	.	.	.	.	.	.	.
Bidens frondosa	33	9	.	.	.	.	.	.	.	.	.	.	.	.
Lupinus latifolius	.	.	.	.	.	.	.	.	.	.	5	1	.	.
Lotus corniculatus	.	.	.	.	.	.	29	0	.	.	.	.	.	.
Epilobium alpinum	.	.	.	.	.	.	.	.	.	.	33	1	.	.
Viola	.	.	.	.	.	.	.	.	5	0	24	4	.	.
Saxifraga oregana	.	.	.	.	15	1	.	.	.	.	10	1	.	.
Equisetum telmateia	.	.	14	2	.	.	.	.	.	.	.	.	.	.
Carex unilateralis	.	.	14	0	.	.	.	.	.	.	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Poaceae	.	.	.	.	.	.	.	.	5	Tr	10	0	.	.
Ranunculus alismifolius	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex aperta	17	1	.	.	.	.	.	.	.	.	.	.	.	.
Carex feta	17	1	.	.	.	.	.	.	.	.	.	.	.	.
Carex exsiccata	.	.	14	1	.	.	.	.	.	.	.	.	.	.
Lycopus uniflorus	.	.	.	.	.	.	.	.	.	.	.	.	9	0
Claytonia sibirica	.	.	.	.	.	.	.	.	5	Tr	.	.	.	.
Anemone deltoidea	.	.	.	.	.	.	.	.	.	.	5	Tr	.	.
Equisetum	.	.	.	.	8	0	.	.	.	.	.	.	.	.
Aster occidentalis	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Circaea alpina	.	.	14	0	.	.	.	.	5	Tr	5	Tr	.	.
Juncus balticus	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Eleocharis quinqueflora	.	.	14	3	8	Tr	.	.	.	.	.	.	.	.
Carex luzulina	.	.	.	.	15	1	.	.	.	.	10	0	.	.
Carex pachystachya	.	.	.	.	.	.	.	.	5	1	.	.	.	.
Stellaria crispa	.	.	14	0	.	.	.	.	.	.	5	Tr	.	.
Carex microptera	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Mimulus guttatus	.	.	.	.	.	.	.	.	30	1	33	1	.	.
Mitella	.	.	14	3	.	.	.	.	.	.	.	.	.	.
Trifolium longipes	.	.	.	.	.	.	.	.	.	.	19	3	.	.
Myosotis	.	.	.	.	.	.	.	.	5	0	.	.	.	.
Ranunculus orthorhynchus	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Viola palustris	.	.	29	0	.	.	.	.	.	.	19	1	.	.
Danthonia intermedia	.	.	.	.	8	1	.	.	.	.	.	.	.	.
Polygonum bistortoides	.	.	.	.	15	0	.	.	5	0	24	2	.	.
Veronica wormskjoldii	.	.	.	.	.	.	.	.	.	.	10	Tr	.	.
Glyceria striata	.	.	14	0	.	.	.	.	40	2	29	3	.	.
Erigeron peregrinus	.	.	.	.	.	.	.	.	.	.	14	0	.	.
Carex utriculata	.	.	.	.	15	2	14	1	10	0	.	.	.	.
Galium trifidum	.	.	.	.	.	.	.	.	15	0	14	1	.	.
Comarum palustre	.	.	14	0	8	0	.	.	.	.	.	.	9	0
Trautvetteria caroliniensis	.	.	.	.	.	.	.	.	.	.	43	6	.	.
Aconitum columbianum	.	.	.	.	.	.	.	.	.	.	52	4	.	.
Veratrum californicum	.	.	.	.	.	.	.	.	.	.	14	2	.	.
Galium bifolium	.	.	14	0	.	.	.	.	5	0	.	.	.	.
Achillea millefolium	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Dodecatheon jeffreyi	.	.	.	.	23	1	.	.	.	.	10	Tr	.	.
Pedicularis groenlandica	.	.	14	0	23	0	.	.	.	.	.	.	.	.
Carex	.	.	.	.	15	1	.	.	.	.	.	.	.	.
Carex echinata ssp. echinata	.	.	29	1	15	0	.	.	.	.	5	0	.	.
Hypericum perforatum	.	.	.	.	.	.	.	.	.	.	14	0	.	.
Saxifraga punctata	.	.	.	.	.	.	.	.	.	.	10	1	.	.
Senecio triangularis	.	.	29	1	8	0	.	.	15	2	90	13	.	.
Boykinia major	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Cirsium arvense	.	.	.	.	.	.	.	.	5	Tr	.	.	.	.

Holcus lanatus	.	.	.	.	.	.	.	.	5	0	.	.	.	.
Deschampsia caespitosa	.	.	.	.	15	0	14	1	.	.	19	2	.	.
Urtica dioica ssp. gracilis	33	13	.	.	.	.	.	.	.	.	.	.	.	.
Clintonia uniflora	.	.	.	.	.	.	.	.	.	.	10	0	.	.
Schoenoplectus acutus var. occidentalis	.	.	.	.	.	.	100	43	.	.	.	.	.	.
Hypericum anagalloides	.	.	.	.	31	2	.	.	.	.	10	1	.	.
Platanthera dilatata	.	.	.	.	31	0	.	.	10	Tr	10	0	.	.
Carex scopulorum	.	.	.	.	.	.	.	.	.	.	10	0	.	.
Athyrium filix-femina	.	.	14	0	.	.	29	4	30	1	19	0	.	.
Spiranthes romanzoffiana	.	.	14	0	8	Tr	.	.	.	.	.	.	.	.
Aster	.	.	.	.	.	.	.	.	5	Tr	5	Tr	.	.
Castilleja miniata	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Iris pseudacorus	33	1	.	.	.	.	29	4	.	.	.	.	.	.
Carex deweyana ssp. leptopoda	.	.	14	0	.	.	.	.	.	.	.	.	.	.
Muhlenbergia filiformis	.	.	29	0	.	.	.	.	.	.	.	.	.	.
Scirpus microcarpus	.	.	.	.	.	.	14	2	100	82	.	.	.	.
Heracleum lanatum	.	.	.	.	.	.	.	.	.	.	29	1	.	.
Ligusticum grayi	.	.	.	.	.	.	.	.	.	.	14	0	.	.
Epilobium ciliatum ssp. glandulosum	.	.	14	0	8	Tr	.	.	10	0	19	0	.	.
Cornus canadensis	.	.	14	0	.	.	.	.	.	.	10	0	.	.
Viola glabella	.	.	.	.	.	.	.	.	15	0	19	0	.	.
Aster foliaceus	.	.	.	.	.	.	.	.	.	.	19	1	.	.
Platanthera stricta	.	.	14	0	.	.	.	.	5	Tr	48	0	.	.
Veronica americana	.	.	.	.	.	.	.	.	25	0	29	0	9	Tr
Geum macrophyllum	.	.	.	.	.	.	.	.	5	Tr	5	Tr	.	.
Carex aquatilis var. dives	.	.	43	18	77	20	.	.	15	3	10	1	.	.
Carex aquatilis	.	.	14	0	15	11	.	.	5	0	.	.	.	.
Callitriche heterophylla	.	.	.	.	.	.	.	.	.	.	.	.	55	6
Aster modestus	.	.	.	.	8	0	.	.	5	0	29	3	.	.
Carex brunnescens	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Lysichiton americanus	.	.	71	16	.	.	14	0	30	3	5	1	9	0
Linnaea borealis	.	.	.	.	.	.	.	.	.	.	19	1	.	.
Epilobium ciliatum ssp. watsonii	.	.	14	0	8	0	.	.	20	0	19	1	9	Tr
Agrostis	.	.	.	.	.	.	.	.	5	0	.	.	.	.
Nuphar lutea ssp. polysepala	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Juncus xiphoides var. triandrus	.	.	29	0	15	1	.	.	.	.	19	0	.	.
Caltha leptosepala ssp. howellii	.	.	14	0	38	8	.	.	.	.	33	5	.	.
Viola adunca	.	.	.	.	15	1	.	.	.	.	.	.	.	.
Cinna latifolia	.	.	.	.	.	.	.	.	.	.	10	0	.	.
Eleocharis palustris	.	.	.	.	.	.	.	.	.	.	.	.	9	0
Polypodium glycyrrhiza	17	0	.	.	.	.	.	.	.	.	.	.	.	.
Carex leptalea	.	.	.	.	8	0	.	.	.	.	.	.	.	.
Trillium ovatum	.	.	.	.	.	.	.	.	.	.	5	Tr	.	.
Equisetum arvense	17	1	14	0	31	0	.	.	5	1	14	0	9	Tr
Veratrum	.	.	.	.	.	.	.	.	5	0	5	Tr	.	.

Carex hystericina	.	.	14	1	.	.	.	.	.	.	.	.	.	.
Luzula campestris	.	.	.	.	.	.	.	.	.	.	5	Tr	.	.
Ludwigia palustris	17	1	.	.	.	.	.	.	.	.	.	.	.	.
Adenocaulon bicolor	.	.	.	.	.	.	.	.	.	.	5	Tr	.	.
Galium triflorum	.	.	.	.	.	.	.	.	5	Tr	24	0	.	.
Juncus effusus	.	.	.	.	.	.	14	0	5	0	.	.	18	1
Equisetum fluviatile	.	.	14	0	23	0	.	.	5	0	.	.	.	.
Tiarella trifoliata var. unifoliata	.	.	.	.	.	.	.	.	5	Tr	38	0	.	.
Vicia americana	.	.	.	.	.	.	.	.	.	.	14	0	.	.
Asarum caudatum	.	.	14	0	.	.	.	.	.	.	5	Tr	.	.
Agrostis exarata	.	.	.	.	.	.	.	.	.	.	10	1	.	.
Cicuta douglasii	17	0	14	0	.	.	14	0	5	0	.	.	.	.
Myosotis laxa	33	1	.	.	.	.	.	.	.	.	.	.	.	.
Anemone oregana	.	.	.	.	.	.	.	.	.	.	14	0	.	.
Oenanthe sarmentosa	.	.	14	1	.	.	29	1	30	7	5	0	18	4
Eleocharis	.	.	.	.	8	0	.	.	.	.	.	.	.	.
Argentina egedii	.	.	.	.	.	.	14	1	.	.	.	.	9	0
Veronica scutellata	.	.	.	.	.	.	.	.	.	.	.	.	45	1
Cardamine	.	.	14	0	.	.	.	.	.	.	5	0	.	.
Packera cymbalarioides	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Camassia quamash	.	.	.	.	15	0	.	.	.	.	.	.	.	.
Carex cusickii	.	.	.	.	8	1	.	.	.	.	.	.	.	.
Elymus glaucus	.	.	.	.	.	.	.	.	.	.	5	1	.	.
Castilleja	.	.	.	.	.	.	.	.	.	.	10	0	.	.
Drosera rotundifolia	.	.	.	.	23	1	.	.	.	.	.	.	.	.
Rudbeckia occidentalis	.	.	.	.	.	.	.	.	.	.	10	0	.	.
Achlys triphylla	.	.	14	0	.	.	.	.	.	.	19	0	.	.
Osmorhiza berteroi	.	.	.	.	.	.	.	.	.	.	24	0	.	.
Perideridia gairdneri	.	.	.	.	.	.	.	.	5	Tr	.	.	.	.
Mentha arvensis	17	1	.	.	.	.	14	0	.	.	.	.	.	.
Pleuropogon refractus	.	.	.	.	8	0	.	.	5	Tr	14	1	.	.
Mitella breweri	.	.	.	.	.	.	.	.	.	.	19	0	.	.
Menyanthes trifoliata	.	.	.	.	8	0	.	.	.	.	.	.	.	.
Ranunculus uncinatus	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Heuchera micrantha	.	.	.	.	.	.	.	.	5	0	.	.	.	.
Polystichum munitum	.	.	14	0	.	.	.	.	.	.	.	.	.	.
Leersia oryzoides	33	7	.	.	.	.	.	.	.	.	.	.	.	.
Lemna minor	.	.	.	.	.	.	.	.	5	2	.	.	9	0
Galium aparine	.	.	14	0	.	.	.	.	5	Tr	.	.	9	Tr
Streptopus roseus	.	.	.	.	.	.	.	.	5	Tr	5	1	.	.
Tauschia stricklandii	.	.	.	.	8	0	.	.	.	.	.	.	.	.
Poa trivialis	.	.	.	.	.	.	.	.	5	1	.	.	.	.
Veratrum viride	.	.	.	.	.	.	.	.	.	.	33	8	.	.
Polygonum hydropiperoides	33	1	.	.	.	.	.	.	.	.	.	.	.	.
Mentha pulegium	17	1	.	.	.	.	.	.	.	.	.	.	.	.

Helenium autumnale	17	0	.	.	.	.	.	.	.	.	.	.	.	.
Phalaris arundinacea	83	19	.	.	.	.	14	1	.	.	5	0	.	.
Fragaria vesca	.	.	.	.	.	.	.	.	.	.	5	Tr	.	.
Veronica	.	.	.	.	.	.	.	.	.	.	5	Tr	.	.
Pteridium aquilinum	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Agrostis thurberiana	.	.	.	.	8	0	.	.	.	.	5	0	.	.
Stachys ajugoides var. rigida	.	.	14	0	.	.	.	.	25	4	.	.	.	.
Carex obnupta	.	.	14	1	.	.	.	.	5	Tr	.	.	9	1
Tofieldia glutinosa	.	.	14	0	31	1	.	.	.	.	.	.	.	.
Mitella ovalis	.	.	.	.	.	.	.	.	5	Tr	.	.	.	.
Maianthemum dilatatum	.	.	.	.	.	.	.	.	5	0	.	.	.	.
Stellaria calycantha	.	.	.	.	.	.	.	.	.	.	.	.	9	Tr
Valeriana sitchensis	.	.	.	.	.	.	.	.	.	.	43	0	.	.
Polygonum amphibium	.	.	.	.	.	.	14	2	.	.	.	.	.	.
Hieracium albiflorum	.	.	.	.	.	.	.	.	.	.	5	Tr	.	.
Lupinus polyphyllus	.	.	.	.	.	.	.	.	15	1	.	.	.	.
Streptopus amplexifolius	.	.	.	.	.	.	.	.	5	Tr	24	1	.	.
Gentiana sceptrum	.	.	.	.	23	0	.	.	.	.	.	.	.	.
Festuca idahoensis	.	.	.	.	.	.	.	.	.	.	5	Tr	.	.
Montia linearis	.	.	.	.	.	.	.	.	.	.	5	Tr	.	.
Torreyochloa pallida var. pauciflora	.	.	14	0	.	.	.	.	15	1	.	.	18	0
Arnica mollis	.	.	.	.	.	.	.	.	.	.	19	1	.	.
Poa	.	.	.	.	.	.	.	.	5	Tr	.	.	.	.
Arnica latifolia	.	.	14	0	.	.	.	.	.	.	.	.	.	.
Mimulus moschatus	.	.	14	0	.	.	.	.	5	Tr	.	.	9	0
Sparganium angustifolium	.	.	.	.	.	.	.	.	.	.	.	.	100	60
Carex hoodii	.	.	.	.	.	.	.	.	.	.	10	0	.	.
Blechnum spicant	.	.	14	0	.	.	.	.	.	.	.	.	.	.
Juncus	.	.	14	0	.	.	.	.	.	.	10	Tr	9	0
Eriophorum gracile	.	.	.	.	15	0	.	.	.	.	.	.	.	.
Scutellaria lateriflora	17	1	.	.	.	.	.	.	.	.	.	.	.	.
Solanum dulcamara	33	0	.	.	.	.	.	.	.	.	.	.	.	.
Digitalis purpurea	.	.	14	0	.	.	.	.	.	.	.	.	.	.
Antennaria argentea	.	.	14	1	.	.	.	.	.	.	5	0	.	.
Callitriche	17	0	.	.	.	.	.	.	5	Tr	.	.	18	1
Senecio pseudaureus	.	.	.	.	.	.	.	.	.	.	24	3	.	.
Parnassia fimbriata	.	.	.	.	31	2	.	.	.	.	.	.	.	.
Glyceria grandis	.	.	14	1	.	.	.	.	.	.	5	0	.	.
Galium	33	1	.	.	.	.	14	0	5	Tr	.	.	.	.
Cirsium	.	.	14	0	.	.	.	.	5	Tr	5	Tr	.	.
Pyrola uniflora	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Castilleja suksdorfii	.	.	.	.	8	0	.	.	.	.	5	0	.	.
Epilobium angustifolium	.	.	.	.	.	.	.	.	.	.	10	0	.	
Potamogeton natans	.	.	.	.	.	.	.	.	.	.	.	.	9	5
Sanguisorba officinalis	.	.	.	.	100	48	.	.	5	0	.	.	.	.

Galium oreganum	.	.	.	.	.	.	.	.	10	Tr	.	.	.	.
Impatiens capensis	50	12	.	.	.	.	.	.	.	.	.	.	.	.
Alopecurus aequalis	.	.	.	.	.	.	.	.	5	Tr	.	.	.	.
Trientalis europaea ssp. arctica	.	.	.	.	31	1	.	.	.	.	.	.	.	.
Utricularia	.	.	14	0	.	.	.	.	.	.	.	.	.	.
Petasites frigidus	.	.	.	.	.	.	.	.	5	1	.	.	.	.
Oxalis	.	.	.	.	.	.	.	.	5	Tr	.	.	.	.
Lysimachia nummularia	17	1	.	.	.	.	.	.	.	.	.	.	.	.
Carex retrorsa	33	1	.	.	.	.	.	.	.	.	.	.	.	.
Senecio crassulus	.	.	14	0	.	.	.	.	.	.	.	.	.	.
Arenaria	.	.	14	0	.	.	.	.	.	.	.	.	.	.
Chrysosplenium glechomifolium	.	.	14	1	.	.	.	.	.	.	.	.	.	.
Mertensia paniculata	.	.	.	.	.	.	.	.	.	.	33	1	.	.
Equisetum palustre	.	.	.	.	8	Tr	.	.	.	.	.	.	.	.
Fritillaria affinis	.	.	.	.	15	0	.	.	.	.	.	.	.	.
Stellaria media	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Stellaria longifolia	.	.	.	.	.	.	.	.	5	Tr	.	.	.	.
Lotus oblongifolius	.	.	.	.	.	.	.	.	5	1	.	.	.	.
Mertensia	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Delphinium glareosum	.	.	.	.	.	.	.	.	.	.	14	1	.	.
Bromus vulgaris	.	.	.	.	.	.	.	.	.	.	10	1	.	.
Pyrola minor	.	.	.	.	.	.	.	.	.	.	10	Tr	.	.
Trifolium howellii	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Thalictrum occidentale	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Corydalis aquae-gelidae	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Corallorhiza maculata	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Lilium columbianum	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Saxifraga odontoloma	.	.	.	.	.	.	.	.	.	.	10	3	.	.
Glyceria occidentalis	.	.	.	.	.	.	.	.	.	.	.	.	9	Tr
Cardamine breweri	.	.	14	0	.	.	.	.	.	.	.	.	.	.
Vancouveria hexandra	.	.	.	.	.	.	.	.	.	.	24	1	.	.
Geranium dissectum	.	.	.	.	.	.	.	.	5	Tr	.	.	.	.
Carex saxatilis	.	.	.	.	.	.	.	.	.	.	5	0	.	.
Trichophorum caespitosum	.	.	.	.	8	0	.	.	.	.	.	.	.	.
MOSS LAYER														
Moss	17	0	14	0	54	12	.	.	30	2	.	.	.	.
UNVEGETATED														
Bare ground	.	.	.	.	.	.	14	1	.	.	.	.	.	.
Litter	.	.	.	.	38	2	57	32	.	.	.	.	.	.
Water	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

	SPAEUR		SPIDOU		SPIDOU/SPHAGN		TORPALP					
			SPIDOU-VACULI/CAROBN-DESCES				THUPLI/LYSAME				TRICAE	
	5 Plots		4 Plots		57 Plots		7 Plots		8 Plots		6 Plots		9 Plots	
Species	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE
MATURE TREES														
Pinus monticola	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Abies amabilis	.	.	.	.	.	.	.	.	50	10	.	.	.	.
Pseudotsuga menziesii	.	.	.	.	.	.	.	.	50	3	.	.	.	.
Tsuga heterophylla	.	.	.	.	.	.	.	.	50	8	.	.	.	.
Thuja plicata	.	.	.	.	.	.	.	.	100	36	.	.	.	.
REPRODUCING TREES														
Abies amabilis	.	.	.	.	.	.	.	.	38	1	.	.	11	0
Tsuga heterophylla	.	.	.	.	.	.	.	.	50	1	.	.	11	0
Fraxinus latifolia	.	.	.	.	.	.	14	0	.	.	.	.	.	.
Thuja plicata	.	.	.	.	.	.	.	.	63	2	.	.	33	3
Alnus rubra	.	.	.	.	.	.	.	.	13	1	17	0	.	.
Abies grandis	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Pseudotsuga menziesii	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Quercus garryana	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Pinus monticola	.	.	.	.	.	.	.	.	.	.	.	.	22	0
Acer macrophyllum	.	.	.	.	.	.	.	.	13	0	.	.	.	.
SHRUB LAYER														
Alnus viridis ssp. sinuata	.	.	.	.	.	.	.	.	25	0	.	.	22	0
Ribes bracteosum	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Viburnum edule	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Lonicera involucrata	.	.	.	.	9	1	.	.	.	.	.	.	.	.
Rhododendron macrophyllum	.	.	.	.	.	.	.	.	25	0	.	.	11	0
Acer circinatum	.	.	.	.	.	.	.	.	38	0	.	.	.	.
Sambucus racemosa	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Crataegus douglasii	.	.	25	1	.	.	.	.	.	.	.	.	.	.
Vaccinium deliciosum	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Rosa pisocarpa	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Kalmia microphylla	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Rosa gymnocarpa	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Vaccinium uliginosum	.	.	.	.	77	34	.	.	.	.	.	.	67	3
Corylus cornuta	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Vaccinium ovalifolium	.	.	.	.	.	.	.	.	50	3	.	.	11	0
Rubus ursinus	.	.	.	.	.	.	29	2	13	0	17	0	.	.
Spiraea douglasii	.	.	100	95	89	46	100	51	.	.	.	.	.	.
Rubus spectabilis	.	.	.	.	.	.	.	.	63	1	.	.	.	.
Rubus lasiococcus	.	.	.	.	.	.	.	.	25	0	.	.	.	.

Ledum glandulosum	.	.	.	.	9	2	.	.	.	.	.	.	.	.
Salix hookeriana	.	.	25	3	18	2	.	.	.	.	.	.	.	.
Salix sitchensis	.	.	.	.	.	.	.	.	.	.	33	0	.	.
Menziesia ferruginea	.	.	.	.	.	.	.	.	13	0	.	.	22	0
Oplopanax horridum	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Gaultheria shallon	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Gaultheria ovatifolia	.	.	.	.	.	.	.	.	25	1	.	.	33	0
Vaccinium ovatum	.	.	.	.	5	1	.	.	.	.	.	.	.	.
Mahonia nervosa	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Rubus pedatus	.	.	.	.	.	.	.	.	13	0	.	.	.	.
HERB LAYER														
Maianthemum stellatum	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Calamagrostis canadensis	.	.	.	.	.	.	.	.	.	.	.	.	11	1
Carex laeviculmis	.	.	.	.	.	.	.	.	.	.	17	2	11	0
Equisetum telmateia	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Claytonia sibirica	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Anemone deltoidea	.	.	.	.	.	.	.	.	25	0	.	.	.	.
Angelica genuflexa	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Circaea alpina	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Carex luzulina	.	.	.	.	.	.	.	.	.	.	.	.	44	2
Stellaria crispa	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Mimulus guttatus	.	.	.	.	.	.	.	.	25	1	.	.	.	.
Mitella	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Viola palustris	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Dodecatheon alpinum	.	.	.	.	.	.	.	.	.	.	.	.	11	2
Glyceria striata	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Carex utriculata	.	.	.	.	.	.	.	.	.	.	.	.	22	3
Galium trifidum	.	.	.	.	.	.	.	.	.	.	17	0	.	.
Comarum palustre	.	.	.	.	5	0	.	.	.	.	.	.	.	.
Trautvetteria caroliniensis	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Epilobium ciliatum	.	.	25	Tr	.	.	.	.	.	.	.	.	.	.
Dodecatheon jeffreyi	.	.	.	.	.	.	.	.	.	.	.	.	56	3
Pedicularis groenlandica	.	.	.	.	.	.	.	.	.	.	.	.	33	2
Carex	.	.	.	.	.	.	.	.	.	.	17	0	.	.
Carex echinata ssp. echinata	.	.	.	.	.	.	.	.	13	0	.	.	22	2
Aster alpigenus	.	.	.	.	.	.	.	.	.	.	.	.	22	2
Senecio triangularis	.	.	.	.	.	.	.	.	25	0	.	.	11	0
Boykinia major	.	.	.	.	.	.	.	.	.	.	17	0	.	.
Deschampsia caespitosa	.	.	.	.	35	8	.	.	.	.	.	.	44	0
Clintonia uniflora	.	.	.	.	.	.	.	.	25	1	.	.	.	.
Schoenoplectus acutus var. occidentalis	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Hypericum anagalloides	.	.	.	.	4	0	14	0	13	0	17	0	89	29
Platanthera dilatata	.	.	.	.	.	.	.	.	13	1	.	.	44	1
Athyrium filix-femina	.	.	.	.	2	0	.	.	63	2	.	.	.	.

Spiranthes romanzoffiana	.	.	.	.	.	.	.	.	.	.	.	.	22	0
Aster	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Castilleja miniata	.	.	.	.	.	.	.	.	.	.	.	.	22	0
Bidens cernua	.	.	.	.	.	.	.	.	.	.	17	0	.	.
Muhlenbergia filiformis	.	.	.	.	.	.	.	.	13	0	.	.	11	0
Scirpus microcarpus	.	.	.	.	.	.	.	.	.	.	67	1	.	.
Ligusticum grayi	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Epilobium ciliatum ssp. glandulosum	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Cornus canadensis	.	.	.	.	.	.	.	.	25	2	.	.	22	0
Viola glabella	.	.	.	.	.	.	.	.	38	1	17	0	.	.
Platanthera stricta	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Veronica americana	.	.	.	.	.	.	.	.	13	0	67	1	.	.
Geum macrophyllum	.	.	.	.	.	.	.	.	.	.	17	0	.	.
Carex aquatilis var. dives	.	.	.	.	.	.	.	.	.	.	.	.	44	7
Aster modestus	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Carex brunnescens	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Lysichiton americanus	.	.	.	.	.	.	.	.	100	28	33	9	.	.
Linnaea borealis	.	.	.	.	.	.	.	.	25	1	.	.	22	0
Epilobium ciliatum ssp. watsonii	.	.	.	.	.	.	.	.	.	.	17	0	.	.
Nuphar lutea ssp. polysepala	.	.	.	.	.	.	14	1	.	.	.	.	.	.
Juncus xiphoides var. triandrus	.	.	.	.	.	.	.	.	13	0	17	1	.	.
Caltha leptosepala ssp. howellii	.	.	.	.	.	.	.	.	25	1	.	.	89	9
Eleocharis palustris	.	.	.	.	.	.	.	.	.	.	17	0	.	.
Carex leptalea	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Trillium ovatum	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Equisetum arvense	.	.	.	.	.	.	.	.	13	0	17	0	22	0
Botrychium virginianum	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Luzula campestris	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Galium triflorum	.	.	.	.	.	.	.	.	63	0	.	.	.	.
Juncus effusus	.	.	.	.	.	.	.	.	.	.	50	9	.	.
Juncus nevadensis	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Echinochloa crusgalli	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Tiarella trifoliata var. unifoliata	.	.	.	.	.	.	.	.	25	0	.	.	.	.
Asarum caudatum	.	.	.	.	.	.	.	.	38	0	.	.	.	.
Agrostis exarata	.	.	.	.	.	.	.	.	.	.	17	0	.	.
Cicuta douglasii	20	2	.	.	.	.	.	.	.	.	.	.	.	.
Myosotis laxa	.	.	25	0	.	.	.	.	.	.	33	0	.	.
Anemone oregana	.	.	.	.	.	.	.	.	13	0	.	.	11	0
Oenanthe sarmentosa	.	.	.	.	.	.	.	.	13	0	50	1	.	.
Rumex crispus	.	.	25	Tr	.	.	.	.	.	.	.	.	.	.
Veronica scutellata	.	.	.	.	4	0	14	0	.	.	.	.	.	.
Packera cymbalarioides	.	.	.	.	.	.	.	.	.	.	.	.	33	1
Dryopteris austriaca	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Carex cusickii	.	.	.	.	.	.	86	45	.	.	.	.	.	.
Drosera rotundifolia	.	.	.	.	.	.	.	.	.	.	.	.	56	2

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Achlys triphylla	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Osmorhiza berteroi	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Trientalis borealis ssp. latifolia	.	.	.	.	.	.	.	.	13	1	.	.	.	.
Mitella breweri	.	.	.	.	.	.	.	.	25	0	.	.	.	.
Epilobium	.	.	.	.	.	.	.	.	.	.	17	0	.	.
Taraxacum officinale	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Menyanthes trifoliata	.	.	.	.	.	.	86	1	.	.	.	.	.	.
Ranunculus uncinatus	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Potamogeton gramineus	.	.	.	.	.	.	.	.	.	.	17	0	.	.
Polystichum munitum	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Trisetum canescens	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Sagittaria latifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lemna minor	.	.	.	.	.	.	29	0	.	.	17	0	.	.
Galium aparine	.	.	.	.	.	.	.	.	13	0	17	0	.	.
Streptopus roseus	.	.	.	.	.	.	.	.	25	0	.	.	.	.
Poa trivialis	.	.	25	0	.	.	.	.	.	.	.	.	.	.
Veratrum viride	.	.	.	.	.	.	.	.	13	0	.	.	11	0
Phalaris arundinacea	.	.	.	.	.	.	.	.	.	.	33	0	.	.
Fragaria vesca	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Pteridium aquilinum	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Agrostis thurberiana	.	.	.	.	.	.	.	.	.	.	.	.	56	1
Carex obnupta	.	.	.	.	53	8	.	.	.	.	33	1	.	.
Tofieldia glutinosa	.	.	.	.	.	.	.	.	.	.	.	.	100	5
Typha latifolia	.	.	.	.	.	.	.	.	.	.	50	5	.	.
Maianthemum dilatatum	.	.	.	.	.	.	.	.	38	1	.	.	.	.
Stellaria calycantha	.	.	.	.	.	.	.	.	.	.	33	0	.	..
Hieracium albiflorum	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Gentiana sceptrum	.	.	.	.	4	0	.	.	.	.	.	.	56	0
Polygonum punctatum	.	.	25	1	.	.	.	.	.	.	.	.	.	.
Oxalis oregana	.	.	.	.	.	.	.	.	13	2	17	0	.	.
Torreyochloa pallida var. pauciflora	.	.	.	.	.	.	.	.	13	4	100	56	.	.
Arnica mollis	.	.	.	.	.	.	.	.	13	0	.	.	22	1
Mimulus moschatus	.	.	.	.	.	.	.	.	13	0	17	0	.	.
Sparganium angustifolium	.	.	.	.	.	.	.	.	.	.	33	2	.	.
Agrostis capillaris	.	.	.	.	.	.	57	1	.	.	.	.	.	.
Blechnum spicant	.	.	.	.	.	.	.	.	50	6	.	.	33	2
Oxalis trilliifolia	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Danthonia spicata	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Eriophorum gracile	.	.	.	.	.	.	.	.	.	.	.	.	67	4
Callitriche	.	.	.	.	.	.	.	.	.	.	33	2	.	.
Parnassia fimbriata	.	.	.	.	.	.	.	.	13	0	.	.	56	1
Agrostis oregonensis	.	.	.	.	.	.	.	.	.	.	.	.	11	0
Glyceria	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Carex stipata	.	.	.	.	.	.	.	.	.	.	17	0	.	.
Triteleia hyacinthina	.	.	.	.	.	.	.	.	13	0	.	.	.	.

Prunella vulgaris	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Castilleja suksdorfii	.	.	.	.	.	.	.	.	.	.	.	.	22	1
Epilobium angustifolium	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Sanguisorba officinalis	.	.	.	.	.	.	.	.	.	.	.	.	67	11
Dodecatheon hendersonii	.	.	.	.	.	.	.	.	.	.	.	.	22	2
Trientalis europaea ssp. arctica	.	.	.	.	5	0	.	.	13	1	.	.	44	0
Erechtites minima	.	.	.	.	2	0	.	.	.	.	.	.	.	.
Listera cordata	.	.	.	.	.	.	.	.	25	0	.	.	.	.
Petasites frigidus	.	.	.	.	.	.	.	.	13	0	17	0	.	.
Lycopus americanus	.	.	.	.	.	.	71	5	.	.	.	.	.	.
Stellaria media	.	.	25	Tr	.	.	.	.	.	.	.	.	.	.
Cardamine breweri	.	.	.	.	.	.	.	.	.	.	17	1	.	.
Sparganium eurycarpum	100	34	.	.	.	.	.	.	.	.	.	.	.	.
Vancouveria hexandra	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Clinopodium douglasii	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Coptis laciniata	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Goodyera oblongifolia	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Cerastium dubium	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Listera	.	.	.	.	.	.	.	.	38	0	.	.	.	.
Lactuca muralis	.	.	.	.	.	.	.	.	13	0	.	.	.	.
Trichophorum caespitosum	.	.	.	.	.	.	.	.	.	.	.	.	100	44
Luzula multiflora	.	.	.	.	.	.	.	.	.	.	17	0	.	.
Arnica	.	.	.	.	.	.	.	.	13	0	.	.	22	1
MOSS LAYER														
Moss	.	.	50	1	63	27	100	57	38	3	17	0	67	2
UNVEGETATED														
Bare ground	.	.	.	.	.	.	14	10	.	.	.	.	.	.
Litter	100	45	.	.	.	.	14	4	.	.	.	.	.	.
Water	80	19	.	.	.	.	57	12	.	.	.	.	.	.

	TRIHYA TSUHET/LEDGLA/CAROBN-LYSAME				TYPLAT VACCAE/SANOFF-CAROBN				VACCAE/XERTEN-SANOFF VACULI/CAROBN				VACULI/DESCES-CAROBN			
	12 Plots		8 Plots		4 Plots		9 Plots		8 Plots		13 Plots		73 Plots			
Species	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE	CON	AVE		
MATURE TREES																
Frangula purshiana	.	.	.	.	.	.	.	.	.	.	8	0	.	.		
Tsuga heterophylla	.	.	100	19	.	.	.	.	.	.	.	.	.	.		
Thuja plicata	.	.	38	7	.	.	.	.	.	.	.	.	.	.		
Picea sitchensis	.	.	25	2	.	.	.	.	.	.	8	0	.	.		

Pinus contorta var. contorta	.	.	75	11	.	.	.	.	.	.	85	4	11	0
REPRODUCING TREES														
Frangula purshiana	.	.	.	.	25	0	.	.	.	.	.	.	.	.
SHRUB LAYER														
Vaccinium uliginosum	.	.	.	.	.	.	.	.	.	.	85	45	70	24
Spiraea douglasii	.	.	.	.	.	.	11	1	13	0	31	2	7	0
Ledum glandulosum	.	.	100	14	.	.	.	.	.	.	.	.	7	2
Salix hookeriana	.	.	.	.	25	1	.	.	.	.	85	10	.	.
Malus fusca	.	.	.	.	.	.	.	.	.	.	38	1	.	.
Vaccinium parvifolium	.	.	38	2	.	.	.	.	.	.	8	0	.	.
Gaultheria shallon	.	.	100	21	.	.	.	.	13	0	46	1	4	0
Vaccinium macrocarpon	.	.	.	.	.	.	.	.	.	.	23	13	.	.
Myrica californica	.	.	13	2	.	.	.	.	.	.	31	1	.	.
Vaccinium ovatum	.	.	75	4	.	.	.	.	.	.	31	1	7	0
Vaccinium caespitosum	.	.	.	.	.	.	100	19	88	12	.	.	.	.
HERB LAYER														
Epilobium glaberrimum	.	.	.	.	25	0	.	.	.	.	.	.	.	.
Agrostis stolonifera	.	.	.	.	25	0	.	.	.	.	8	2	.	.
Stachys ciliata	.	.	.	.	25	1	.	.	.	.	.	.	.	.
Lotus corniculatus	.	.	.	.	.	.	.	.	.	.	8	0	.	.
Saxifraga oregana	8	0	.	.	.	.	.	.	.	.	.	.	.	.
Carex exsiccata	.	.	.	.	.	.	.	.	.	.	8	0	.	.
Lycopus uniflorus	.	.	.	.	.	.	.	.	.	.	31	0	.	.
Juncus bufonius	8	0	.	.	.	.	.	.	.	.	.	.	.	.
Juncus tenuis	17	0	.	.	.	.	.	.	.	.	.	.	.	.
Mimulus guttatus	17	0	.	.	.	.	.	.	.	.	8	0	.	.
Trifolium longipes	.	.	.	.	.	.	11	0	.	.	.	.	.	.
Ranunculus orthorhynchus	8	0	.	.	.	.	.	.	.	.	.	.	.	.
Polygonum bistortoides	.	.	.	.	.	.	11	2	.	.	.	.	.	.
Glyceria striata	.	.	.	.	25	2	.	.	.	.	.	.	.	.
Epilobium ciliatum	8	0	.	.	.	.	.	.	.	.	.	.	.	.
Aira caryophyllea	8	0	.	.	.	.	.	.	.	.	.	.	.	.
Achillea millefolium	.	.	.	.	.	.	.	.	.	.	8	0	.	.
Carex echinata ssp. echinata	.	.	.	.	25	0	.	.	.	.	.	.	.	.
Hypericum perforatum	8	0	.	.	.	.	.	.	.	.	.	.	.	.
Cirsium arvense	.	.	.	.	25	2	.	.	.	.	.	.	.	.
Holcus lanatus	17	0	.	.	.	.	.	.	13	0	.	.	.	.
Deschampsia caespitosa	.	.	.	.	.	.	11	0	13	0	31	9	85	32
Danthonia californica	50	1	.	.	.	.	.	.	.	.	.	.	.	.
Hypericum anagalloides	25	0	.	.	.	.	.	.	.	.	8	0	.	.
Platanthera dilatata	.	.	.	.	.	.	11	0	.	.	.	.	.	.
Athyrium filix-femina	.	.	25	1	25	0	.	.	.	.	.	.	.	.

Appendix A. Summary tables for plant associations described in this guide, listed alphabetically by 6-letter acronym.

Aster	.	.	.	.	.	.	.	.	.	.	8	0	.	.
Scirpus microcarpus	.	.	.	.	25	8	.	.	.	.	.	.	.	.
Plantago lanceolata	8	0	.	.	.	.	.	.	.	.	.	.	.	.
Carex aquatilis var. dives	.	.	.	.	.	.	11	0	.	.	.	.	.	.
Callitriche heterophylla	.	.	13	1	.	.	.	.	.	.	.	.	.	.
Lysichiton americanus	.	.	100	4	25	0	.	.	.	.	.	.	.	.
Epilobium ciliatum ssp. watsonii	.	.	.	.	.	.	.	.	.	.	8	0	.	.
Agrostis	.	.	13	1	.	.	22	0	13	0	.	.	1	0
Gnaphalium palustre	.	.	.	.	.	.	.	.	.	.	8	0	.	.
Juncus xiphoides var. triandrus	8	1	.	.	.	.	11	0	.	.	.	.	.	.
Caltha leptosepala ssp. howellii	.	.	.	.	.	.	67	8	.	.	.	.	.	.
Viola adunca	.	.	.	.	.	.	.	.	.	.	23	0	.	.
Eleocharis palustris	.	.	.	.	.	.	.	.	.	.	8	0	.	.
Eleocharis acicularis	25	0	.	.	.	.	.	.	.	.	.	.	.	.
Equisetum arvense	.	.	.	.	25	3	11	0	.	.	8	0	.	.
Galium boreale	.	.	.	.	.	.	.	.	.	.	8	0	.	.
Plagiobothrys figuratus	8	1	.	.	.	.	.	.	.	.	.	.	.	.
Juncus effusus	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Juncus nevadensis	.	.	.	.	.	.	.	.	.	.	15	1	.	.
Agrostis exarata	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Cicuta douglasii	.	.	.	.	25	1	.	.	.	.	8	0	.	.
Agrostis humilis	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Myosotis laxa	.	.	.	.	25	9	.	.	.	.	.	.	.	.
Oenanthe sarmentosa	.	.	50	2	.	.	.	.	.	.	.	.	.	.
Rumex crispus	.	.	.	.	.	.	.	.	.	.	8	0	.	.
Argentina egedii	.	.	.	.	.	.	.	.	.	.	77	7	.	.
Veronica scutellata	.	.	.	.	25	1	.	.	.	.	85	1	.	.
Camassia quamash	75	11	.	.	.	.	44	5	.	.	.	.	.	.
Carex cusickii	.	.	.	.	.	.	22	1	25	0	.	.	.	.
Elymus glaucus	.	.	.	.	25	1	.	.	.	.	.	.	.	.
Mentha arvensis	.	.	.	.	.	.	.	.	.	.	15	0	.	.
Utricularia macrorhiza	.	.	.	.	.	.	.	.	.	.	8	0	.	.
Polystichum munitum	.	.	.	.	.	.	.	.	.	.	8	0	.	.
Galium aparine	.	.	.	.	25	0	.	.	.	.	.	.	.	.
Pteridium aquilinum	.	.	.	.	.	.	.	.	.	.	.	.	3	0
Ranunculus flammula	.	.	.	.	.	.	.	.	.	.	46	1	.	.
Agrostis thurberiana	.	.	.	.	25	0	.	.	.	.	.	.	.	.
Carex obnupta	.	.	100	42	.	.	67	15	13	1	100	22	71	10
Typha latifolia	.	.	.	.	100	54	.	.	.	.	.	.	.	.
Polygonum amphibium	.	.	.	.	.	.	.	.	.	.	8	0	.	.
Hieracium albiflorum	.	.	.	.	.	.	.	.	.	.	8	0	.	.
Gentiana sceptrum	.	.	.	.	.	.	44	1	13	0	15	0	4	0
Anaphalis margaritacea	.	.	.	.	.	.	.	.	.	.	8	0	.	.
Blechnum spicant	.	.	38	2	.	.	.	.	.	.	.	.	.	.
Juncus	.	.	88	11	.	.	.	.	.	.	.	.	.	.

Senecio pseudaureus	.	.	.	.	.	.	33	1	.	.	.	.	.	.
Sisyrinchium californicum	.	.	.	.	.	.	.	.	.	.	8	0	.	.
Carex stipata	.	.	.	.	25	3	.	.	.	.	.	.	.	.
Lotus pinnatus	33	1	.	.	.	.	.	.	.	.	.	.	.	.
Triteleia hyacinthina	100	62	.	.	.	.	.	.	.	.	.	.	.	.
Prunella vulgaris	33	8	.	.	.	.	.	.	.	.	15	0	.	.
Hypochaeris radicata	92	12	.	.	.	.	.	.	.	.	31	1	16	0
Sanguisorba officinalis	.	.	.	.	.	.	78	59	100	35	.	.	49	2
Calamagrostis nutkaensis	.	.	.	.	.	.	.	.	.	.	15	0	.	.
Trientalis europaea ssp. arctica	.	.	.	.	.	.	.	.	.	.	.	.	1	0
Erechtites minima	.	.	.	.	.	.	.	.	.	.	15	1	.	.
Potamogeton	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lycopus americanus	.	.	.	.	.	.	.	.	.	.	15	0	.	.
Dichanthelium acuminatum var. fasciculare	.	.	.	.	.	.	.	.	.	.	8	0	1	0.
Xerophyllum tenax	.	.	.	.	.	.	.	.	100	56	.	.	.	.
Geranium dissectum	8	0	.	.	.	.	.	.	.	.	.	.	.	.
Centaurium erythraea	33	0	.	.	.	.	.	.	.	.	.	.	.	.
Bromus mollis	17	0	.	.	.	.	.	.	.	.	.	.	.	.
Mentha	.	.	.	.	25	8	.	.	.	.	.	.	.	.
Polygonum hydropiper	.	.	.	.	25	0	.	.	.	.	.	.	.	.
Aster chilensis	.	.	.	.	.	.	.	.	.	.	31	2	.	.
Juncus lesueurii	.	.	.	.	.	.	.	.	.	.	54	2	7	0
Lupinus littoralis	.	.	.	.	.	.	.	.	.	.	8	0	.	.
MOSS LAYER														
Moss	58	15	100	20	25	24	67	36	75	33	.	.	99	40
UNVEGETATED														
Bare ground	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Litter	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Water	.	.	.	.	.	.	.	.	.	.	.	.	.	.

	VACULI/DODJEF-CALLEPH 42 Plots	
Species	CON	AVE
MATURE TREES		
Acer macrophyllum	.	.
Picea engelmannii	14	3
Pinus contorta var. latifolia	17	2
Tsuga mertensiana	2	0
Abies lasiocarpa	5	0

Abies amabilis	2	0
Tsuga heterophylla	5	0
Thuja plicata	2	0
Chamaecyparis nootkatensis	5	1
REPRODUCING TREES		
Picea engelmannii	17	1
Chamaecyparis nootkatensis	5	0
Abies lasiocarpa	10	1
Pinus contorta var. latifolia	17	1
Abies amabilis	12	1
Tsuga heterophylla	7	0
Tsuga mertensiana	7	0
Pinus monticola	2	0
Lonicera	2	0
Alnus incana	5	0
Sorbus sitchensis	7	0
Vaccinium	2	Tr
Salix	7	0
Salix myrtillifolia	2	0
Spiraea densiflora	14	1
Rhododendron albiflorum	2	0
Betula nana	7	1
Sorbus scopulina	2	Tr
Vaccinium membranaceum	17	1
Rhododendron macrophyllum	2	0
Vaccinium deliciosum	5	1
Rosa pisocarpa	10	1
Kalmia microphylla	26	1
Vaccinium uliginosum	100	41
Salix geyeriana	7	1
Salix planifolia	5	0
Vaccinium scoparium	2	0
Spiraea douglasii	33	3
Vaccinium oxycoccos	7	1
Rubus lasiococcus	7	0
Menziesia ferruginea	2	0
Gaultheria ovatifolia	5	0
Salix pedicellaris	5	0
Lonicera caerulea	14	1
HERB LAYER		
Orthilia secunda	2	0
Carex angustata	2	0
Hypericum formosum	2	0

Maianthemum stellatum	5	0
Carex arcta	2	Tr
Allium validum	2	0
Calamagrostis canadensis	17	1
Microseris borealis	2	0
Lupinus latifolius	2	0
Viola	7	0
Saxifraga oregana	7	0
Poaceae	2	Tr
Ranunculus alismifolius	7	0
Carex exsiccata	5	1
Microseris borealis	5	0
Ranunculus gormanii	7	0
Viola macloskeyi	2	0
Equisetum	2	Tr
Viola orbiculata	5	0
Fragaria virginiana	2	Tr
Aster occidentalis	14	0
Juncus balticus	10	0
Eleocharis quinqueflora	10	1
Carex luzulina	12	1
Mitella	2	0
Potentilla drummondii	10	0
Carex canescens	2	Tr
Trifolium longipes	21	1
Viola palustris	5	Tr
Danthonia intermedia	10	0
Polygonum bistortoides	12	0
Veronica wormskjoldii	2	Tr
Carex utriculata	17	1
Comarum palustre	5	0
Aconitum columbianum	19	0
Potentilla flabellifolia	2	0
Dodecatheon jeffreyi	81	7
Pedicularis groenlandica	17	0
Carex	5	0
Carex echinata ssp. echinata	10	1
Aster alpigenus	2	0
Senecio triangularis	31	1
Deschampsia caespitosa	40	2
Hackelia diffusa	2	Tr
Triantha occidentalis	5	0
Hypericum anagalloides	21	1
Platanthera dilatata	38	0
Agrostis scabra	10	0

Carex scopulorum	5	1
Spiranthes romanzoffiana	2	0
Aster	2	Tr
Castilleja miniata	14	0
Calamagrostis stricta ssp. inexpansa	7	0
Carex deweyana ssp. leptopoda	2	0
Muhlenbergia filiformis	2	0
Ligusticum grayi	43	6
Epilobium ciliatum ssp. glandulosum	5	0
Cornus canadensis	7	0
Viola glabella	7	0
Carex aquatilis var. dives	57	10
Carex aquatilis	5	1
Aster modestus	5	0
Lysichiton americanus	5	0
Linnaea borealis	2	0
Epilobium ciliatum ssp. watsonii	2	Tr
Agrostis	7	0
Juncus xiphoides var. triandrus	5	0
Caltha leptosepala ssp. howellii	64	11
Achnatherum occidentalis	2	0
Eleocharis palustris	2	0
Carex leptalea	2	Tr
Equisetum arvense	12	1
Luzula campestris	7	0
Galium triflorum	2	0
Equisetum fluviatile	5	0
Agrostis exarata	2	Tr
Eleocharis	2	0
Packera cymbalarioides	5	0
Camassia quamash	2	0
Carex cusickii	2	0
Drosera rotundifolia	10	0
Rudbeckia occidentalis	5	0
Mitella breweri	5	Tr
Menyanthes trifoliata	7	1
Veratrum viride	5	0
Fragaria vesca	2	0
Agrostis thurberiana	19	1
Tofieldia glutinosa	26	1
Valeriana sitchensis	5	0
Gentiana sceptrum	2	0
Arnica mollis	7	0
Eriophorum gracile	5	0
Parnassia fimbriata	2	0

Epilobium angustifolium	5	Tr
Sanguisorba officinalis	7	0
Trientalis europaea ssp. arctica	19	0
Listera cordata	2	Tr
Utricularia	5	Tr
Xerophyllum tenax	2	0
Carex saxatilis	2	0
Trichophorum caespitosum	2	0
Pedicularis bracteosa	5	0
Eleocharis rostellata	2	0
MOSS LAYER		
Moss	62	42
UNVEGETATED		
Bare ground	.	.
Litter	14	2
Water	.	.