AQUATIC SERIES

AQUATIC N = 59

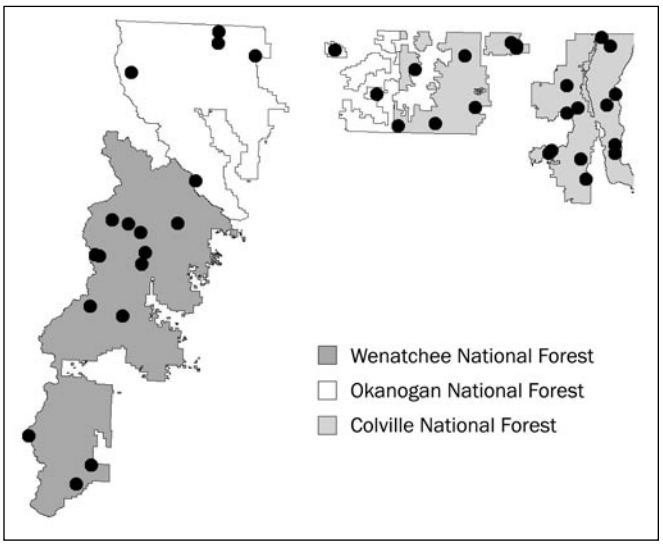


Figure 35—Plot locations for the AQUATIC series.

AS A WHOLE, the numerous plant species used to characterize the AQUATIC[1] series are widely distributed across the temperate to subarctic latitudes of North America. Most of these plants occur from Alaska to southeastern Canada, and extend south through much of the Western, north central, and Northeastern United States. Some of the plants are circumpolar. (All the cross references to species codes, common, and scientific names are located in app. A.) The general site requirements and distribution for each species are described below (Hitchcock and Cronquist 1973):

- Creeping spike-rush is found in shallowly flooded water and shorelines. It is widespread in temperate and cold-temperature regions of the Northern Hemisphere. Creeping spike-rush also occurs throughout the Pacific Northwest.
- Water horsetail is found in shallow, standing water, and is circumboreal. It is found throughout the Pacific Northwest.
- Northern mannagrass and western mannagrass are found in shallow standing water. They occur from Alaska to central California, east to Newfoundland, Maine, and Pennsylvania. These mannagrasses occur throughout the Pacific Northwest.
- Indian water-lily and cow-lily are found in deep standing water and occur in western North America. They are found throughout the Pacific Northwest.
- Bur-reed species are plants of shallow standing water. They are found from Alaska south through the Pacific Northwest region, east to Newfoundland, and the Northeastern states. Bur-reed species occur throughout the Pacific Northwest.
- Common cattail is a species of shallow standing water and wet places. It occurs from Alaska to Mexico, east through most of southern Canada, and throughout the United States. It is found throughout the Pacific Northwest.
- Pondweed species are plants of moderately deep standing water. The primary indicator species (grass-leaved and floatingleaf pondweed) are found from Alaska south on both sides of the Cascade Range to California and in Arizona and Colorado. These two species occur throughout the Pacific Northwest and extend east through most of Central and Northeastern United States and southeastern Canada. The pondweed genus, as a whole, occurs all over North America. In addition, other pondweeds also can be used to identify the AQUATIC series.
- Softstem bulrush and hardstem bulrush are plants of marshes and muddy shores that are widespread in temperate North America. Softstem bulrush extends south into tropical America. Hardstem bulrush is most common in the Western United States. They both occur throughout the Pacific Northwest.

This is a complex series. It includes eight plant associations, each characterized by one or more species or genera. For simplicity, all AQUATIC plant associations are lumped into the AQUATIC series based on similarity of site (aquatic, and shoreline).

The AQUATIC series includes all herbaceous associations supporting rooted vascular or emergent vegetation that grows in deep water or in shallow water along the shoreline of permanently standing water. These sites include natural ponds and lakes, seasonally flooded shorelines, beaver

[1] See appendix A for a cross reference for all species codes and common and scientific names used in this document.

ponds, reservoirs, sloughs, or the quiet backwaters of Rosgen E and C channels. In general, the species characterizing the AQUATIC series can be listed by decreasing water depth: Indian water-lily or cow-lily, pondweed species or water ladysthumb, bur-reed species, northern or western mannagrass, softstem and hardstem bulrush, water horsetail, creeping spike-rush, and common cattail, respectively.

The most important factor determining the distribution of the AQUATIC series species and their corresponding associations is water depth. Secondary factors are wave action, water temperature, oxygenation, and chemistry. The transition from deep to shallow water and shoreline characteristics is probably more important to the distribution of the AQUATIC series and plant associations in lakes and ponds, than size of the water body and wave action. In deep freshwater lakes, the progression of associations in the AQUATIC series often goes from NUPO in deep water, to POTAM in moderately deep water, and finally, to SCVA (in addition, perhaps ELPA) on the shoreline. ELPA, EQFL, or GLBO associations may dominate shallow margins of freshwater ponds, whereas TYLA may dominate if poorly oxygenated.

The transition from one association to another may be different from the above. Species may experience zones of intermixing (mosaic) in the transition of sites (water depth) from one association to another. Abrupt changes in water depth may skip associations entirely. For example, abrupt changes such as from NUPO or POTAM associations to fen or bog associations such as CAUT or ERPO2 may occur when there is a steep vertical jump from deep or shallow water to the peat mat overhanging it (such as Fish Lake on the Wenatchee NF). The above discussion refers to ponds and lakes only. Only the ELPA, EQFL, and SPARG associations were found in sluggish streams or overflow channels.

Given that elevation for the AQUATIC series extends from below lower timberline to alpine environments, the climate range associated with the AQUATIC series is extreme. Annual precipitation varies from under 10 inches at low elevation in the dry interior of the study area to well over 100 inches in maritime climate zones along the Cascade crest, and over 40 inches in the weaker inland maritime climate in the Selkirk Mountains of northeastern Washington. In general, ambient air temperature should modify the temperature and other water qualities of the water body supporting the AQUATIC series. However, such generalities need to be interpreted carefully when considering cold air drainage and permanently flooded water tables in sites associated with the AQUATIC series. For instance, low precipitation and high summer temperatures at low elevation may be modified by the inflow of cold water from streams originating at higher elevation. In fact, measured water temperatures appear to be surprisingly similar between plant associations in the AQUATIC series (see the "soils" subsection).

CLASSIFICATION DATABASE

The AQUATIC series includes all stands dominated by what the author considers aquatic vegetation (as listed), and is common throughout eastern Washington. AQUATIC series plots were sampled on all three NFs and all but the Twisp RD (fig. 35). The absence or low plot numbers on some RDs is an artifact of plot distribution, and not actual occurrence, as lakes and ponds are common throughout all three NFs. Plots are somewhat limited, as aquatic classification was not the primary goal of this study. Aquatic sites were sampled only when easily accessible from the shore. Fifty-nine riparian and wetland sampling plots were measured in the AQUATIC series. From this database, six major and two minor aquatic plant associations are recognized. Three potential one-plot associations (ELAC, PUPA, and SELAG) are not used in the database or described in this classification. All samples represent mature, stable aquatic and shoreline communities in good ecological condition.

VEGETATION CHARACTERISTICS

Eleven genera or species are used to define the AQUATIC series and the eight plant associations within it. Therefore, it is difficult to characterize the species composition of the AQUATIC series without considering the associations in some detail:

- The ELPA association is characterized by the dominance of creeping spike-rush. Other common species include water lentil, pondweed species, bladder sedge, inflated sedge, reed mannagrass, and pale false mannagrass.
- The EQFL association is characterized by the dominance of water horsetail. Other species are infrequent but include common water milfoil, Cusick's sedge, smooth sedge, slender sedge, bladder sedge, and creeping spike-rush.

AQUATIC plant associations

	Scientific name	Common name	Ecoclass code	Plots
Major associations:				
ELPA	*Eleocharis palustris*	Creeping spike-rush	MW4912	8
EQFL	*Equisetum fluviatile*	Water horsetail	WL0111	11
GLBO	*Glyceria borealis*	Northern mannagrass	WL0112	5
NUPO	*Nuphar polysepalum*	Indian water-lily	WL0101	9
SPARG	*Sparganium* spp.	Bur-reed species	WL0113	10
TYLA	*Typha latifolia*	Common cattail	MT8121	9
Minor associations:				
POTAM	*Potamogeton* spp.	Pondweed species	WL0103	4
SCVA	*Scirpus validus*	Softstem bulrush	MT1931	3

- The GLBO association is characterized by the dominance of northern or western mannagrass. Other common plant species include Watson's willow-weed, bur-reed species, common cattail, bladder sedge, and creeping spike-rush.
- The NUPO association is characterized by the dominance of Indian water-lily or cow-lily. Other plant species are infrequent but include Canada waterweed, bur-reed species, and water horsetail.
- The SPARG association is characterized by the dominance of bur-reed species. Other common plant species include water lentil, creeping spike-rush, northern mannagrass, and bladder sedge.
- The TYLA association is characterized by the dominance of common cattail. Other common plant species include water lentil, bladder sedge, and water horsetail.
- The POTAM association is characterized by the dominance of grass-leaved or floating leaf pondweed (occasionally water ladysthumb). Other common plant species include water lentil, Indian water-lily, watercrowfoot buttercup, and northern mannagrass.
- The SCVA association is characterized by the dominance of softstem (occasionally hardstem) bulrush. Other common plant species include Indian water-lily, water ladysthumb, watercrowfoot buttercup, common bladderwort, water sedge, and slender sedge.

PHYSICAL SETTING

Elevation—

The elevations of plots in the AQUATIC series range from 1,850 to 7,350 feet, with the majority being below 5,500 feet. On the Colville NF, the range was 2,240 to 5,100 feet, but there are known unsampled aquatic sites in excess of 6,000 feet as well as below 2,000 feet. The Okanogan NF sample plots ranged from 4,150 to 7,350 feet. There may be few lakes and ponds below 4,000 feet on FS lands, but they are common on other land ownerships at much lower elevation. The Wenatchee NF plots ranged from 1,850 to 6,970 feet but, again, there are sites below 1,800 feet on other ownerships. Therefore, elevation range for the AQUATIC series may be an artifact of sample plot distribution, as plant associations belonging to the AQUATIC series have been observed from elevations below 1,000 feet in the Columbia basin to over 7,000 feet along the crest. Data are limited and should be viewed with caution.

	Elevation (feet)			
Forest	Minimum	Maximum	Average	N
Colville	2,240	5,100	3,227	36
Okanogan	4,150	7,350	5,278	8
Wenatchee	1,850	6,970	3,696	15
Series	1,850	7,350	3,624	59

In addition, elevation differed between the associations. Most associations occur below 5,300 feet, but the GLBO and SPARG associations extend to considerably higher elevations. This perhaps reflects the species' ability to withstand deeply frozen water and submerged soil at these high elevations.

	Elevation (feet)			
Plant association	Minimum	Maximum	Average	N
ELPA	1,850	4,621	3,279	8
EQFL	2,325	5,320	3,694	11
GLBO	3,290	6,970	4,792	5
NUPO	2,550	5,100	3,834	9
POTAM	1,950	4,650	3,051	4
SCVA	2,550	4,150	3,083	3
SPARG	2,500	7,350	4,049	10
TYLA	1,950	4,300	2,950	9
Series	1,850	7,350	3,624	59

Valley Geomorphology—

Plots in the AQUATIC series were located in a limited variety of valley width and gradient classes. Most plots were restricted to wide and gentle valleys. According to plot data, all but 2 of 59 plots were located in valleys more than 99 feet wide, and most of these were located in valleys wider than 330 feet. Almost all these valleys are essentially flat (less than 1 percent valley gradient). Only three plots were in valleys with 1 to 3 percent valley gradient.

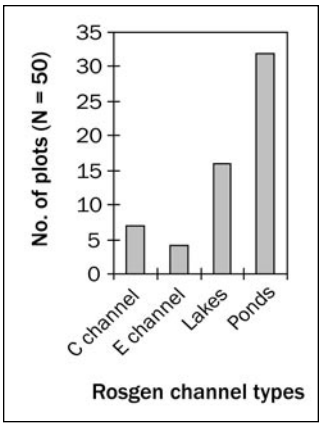
	Valley gradient					
Valley width	Very low	Low	Moderate	Steep	Very steep	N
Very broad	22	1	0	0	0	23
Broad	17	1	0	0	0	18
Moderate	15	1	0	0	0	16
Narrow	2	0	0	0	0	2
Very narrow	0	0	0	0	0	0
Series total	56	3	0	0	0	59

The same pattern is reflected in the plant associations, which are almost totally restricted to very low gradient valleys of moderate to very broad valley widths.

	Valley width					
Plant association	Very broad	Broad	Moderate	Narrow	Very narrow	N
ELPA	1	3	3	1	0	8
EQFL	8	2	1	0	0	11
GLBO	0	2	2	1	0	5
NUPO	5	1	3	0	0	9
POTAM	1	2	1	0	0	4
SCVA	1	2	0	0	0	3
SPARG	3	3	4	0	0	10
TYLA	4	3	2	0	0	9
Series total	23	18	16	2	0	59

Plant association	Valley gradient					N
	Very low	Low	Moderate	Steep	Very steep	
ELPA	7	1	0	0	0	8
EQFL	10	1	0	0	0	11
GLBO	5	0	0	0	0	5
NUPO	9	0	0	0	0	9
POTAM	4	0	0	0	0	4
SCVA	3	0	0	0	0	3
SPARG	9	1	0	0	0	10
TYLA	9	0	0	0	0	9
Series total	56	3	0	0	0	59

Channel Types—

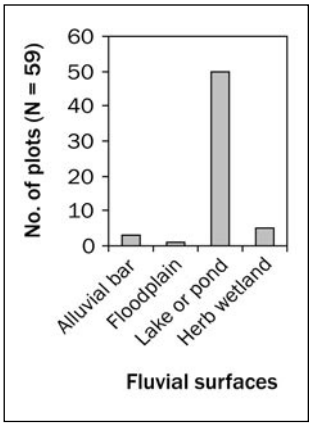


Fifty of 59 plots were in standing water, along the shores of ponds (including beaver ponds), or lakes. The other plots were located in quiet backwaters of Rosgen C or E channels or in tiny pools within wetlands.

Little additional information is gained by looking at the distribution of plant associations by channel type. GLBO, NUPO, POTAM, SCVA, and TYLA associations are almost always found in lake or pond ecosystems. The other three associations are occasionally found in quiet portions of Rosgen C and E channels or their backwaters.

Plant association	Rosgen channel types				N
	C	E	Lakes	Ponds	
ELPA	1	2	2	3	8
EQFL	3	0	3	5	11
GLBO	1	0	1	3	5
NUPO	0	0	4	5	9
POTAM	0	0	1	3	4
SCVA	0	0	1	2	3
SPARG	1	2	2	5	10
TYLA	1	0	2	6	9
Series total	7	4	16	32	59

Fluvial Surfaces—

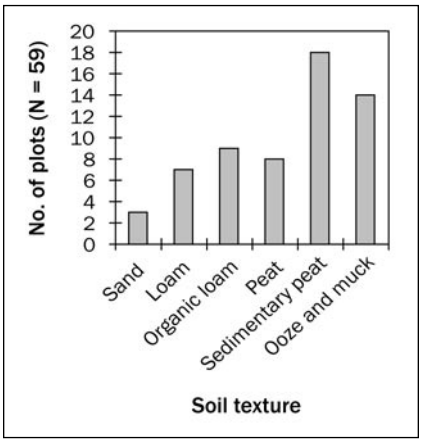


In contrast to other series, the AQUATIC series is found on a limited variety of fluvial surfaces. Most were found along the margins of lakes or ponds (50 of 59 plots). The rest were associated with very quiet water in Rosgen C or E channels that were coded alluvial bars and floodplains (for lack of a better code category) or in small, semiponded areas within herb wetlands. These sites are all permanently or semipermanently flooded during the growing season.

The same fluvial surface pattern holds when looking at the plant associations, all of which are by far most common along the margins of ponds and lakes.

Plant association	Fluvial surfaces				N
	Alluvial bar	Flood-plain	Lake/ pond	Herb wetland	
ELPA	2	0	4	2	8
EQFL	1	1	8	1	11
GLBO	0	0	5	0	5
NUPO	0	0	9	0	9
POTAM	0	0	4	0	4
SCVA	0	0	3	0	3
SPARG	0	0	9	1	10
TYLA	0	0	8	1	9
Series total	3	1	50	5	59

Soils—



Soils are variable. Thirty-two of 59 plots were coded as sedimentary peat, ooze, or muck. Loam, organic loam, and peat soils were also common. In general, sedimentary peat, ooze, and mucks are more common in deeper water. Peat, organic loam, and mineral soils are more prominent in streams, shallowly ponded water, or along shores.

Additional insight is gained by looking at individual plant associations. All associations usually are found growing on organic soils. The GLBO, NUPO, POTAM, and SPARG associations are mostly found growing on sedimentary soils, on the margins of ponds, and lakes. ELPA pots were evenly split between loam and organic soils.

Plant association	Soil texture						N
	Sand	Loam	Organic loam	Peat	Sedimentary peat	Ooze/ muck	
ELPA	0	4	1	0	1	2	8
EQFL	1	0	4	2	2	2	11
GLBO	1	0	0	0	3	1	5
NUPO	0	0	0	2	5	2	9
POTAM	0	1	1	0	2	0	4
SCVA	0	0	1	2	0	0	3
SPARG	1	1	1	1	4	2	10
TYLA	0	1	1	1	1	5	9
Series total	3	7	9	8	18	14	59

Water depths for the associations ranged from several feet for NUPO and POTAM associations to 1 or 2 feet for SCVA and TYLA associations. ELPA, EQFL, GLBO, and SPARG associations are found in shallowly ponded water. The depths summarized in the tables are somewhat misleading. Aquatic plots were taken only from the shore, off logs, or when accessible with hip boots. The depths of NUPO, POTAM, and to lesser extent the other associations, would have been deeper if AQUATIC series vegetation had been sampled from a boat.

	Water table (inches)			
Plant association	Minimum	Maximum	Average	N
NUPO	8	28	19	9
SPARG	8	39	15	10
ELPA	6	20	13	7
POTAM	6	17	11	4
EQFL	0	22	9	10
GLBO	2	28	9	5
SCVA	0	16	8	3
TYLA	-6	16	5	9
Series	-6	39	12	56

Surface flooding ranged from 51 to 100 percent and averaged 83 percent for the series as a whole. The NUPO and POTAM associations were 100 percent flooded on all plots. Late-season periods of bare soil occurred on some plots in the TYLA, EQFL, SPARG, ELPA, SCVA, and GLBO associations. The percentage of flooding is much higher compared with the other wet series such as SALIX, ALIN, and MEADOW.

	Submerged (percent)			
Plant association	Minimum	Maximum	Average	N
POTAM	100	100	100	4
NUPO	100	100	100	9
GLBO	70	100	94	5
SCVA	80	100	93	3
ELPA	0	100	87	8
SPARG	0	100	83	10
EQFL	0	100	78	11
TYLA	0	100	51	9
Series	0	100	83	59

Daytime water temperatures ranged from 43 to 72 degrees Fahrenheit and averaged 56 degrees Fahrenheit. The reasons for differences in water temperature between the associations are not clear. It makes sense that the shallowly flooded shoreline in TYLA and SCVA associations are among the warmest sites. However, it seems the POTAM association should have had cooler water because of its greater water depth. Also it seems that temperatures for the SPARG association should be more similar to GLBO. Perhaps temperature is one of the key controlling factors for the distribution of some of the associations. Bur-reed species do better where water temperatures are relatively warm in comparison with the GLBO association. The water temperature for the AQUATIC series appears to be generally high (warm) compared with soil temperatures for other series. Plots were few so the data should be considered with caution. The temperatures were taken at a 5-inch depth in the water and varied depending on whether the temperature was taken in the cool morning or warm afternoon.

	Water temperature (°F)			
Plant association	Minimum	Maximum	Average	N
TYLA	43	68	58	9
POTAM	47	65	57	3
SCVA	56	60	57	3
SPARG	52	72	57	6
ELPA	44	67	56	7
NUPO	43	65	56	7
EQFL	45	64	54	9
GLBO	47	67	54	5
Series	43	72	56	49

ECOSYSTEM MANAGEMENT

Natural Regeneration of AQUATIC Series Plants—

The AQUATIC series indicator species regenerate by a variety of sexual and vegetative strategies. Indian water-lily, cow-lily, pondweed species, water ladysthumb, bur-weed species, mannagrass species, and water horsetail all reproduce by rhizomes and seed. Conditions for the production of horsetails from spores are rare, and they reproduce primarily by vegetative means (Duckett and Duckett 1980, Marshall 1984). The majority of shoots grow from rhizomes, which may outweigh aerial shoots by a ratio of 100:1 (Achuff 1989, Correll 1956, Crouch 1985). Creeping spike-rush regenerates primarily from rhizomes (Routledge 1987) but, like softstem and hardstem bulrushes, the hard achenes and seed are almost always stored in the seed bank. They germinate under suitable conditions associated with moist mud or shallow standing water. Colonized areas are not conducive to seedling establishment owing to the dense sod of spike-rush stands. Softstem and hardstem bulrush also reproduce from seed and rhizomes (Fernald 1950, Godfrey and Wooten 1979). The hard seeds can remain viable in the seed bank for as long as 20 years (Harris and Marshall 1963, Wienhold and van der Valk 1989). Colonized areas are not conducive to seedling establishment. Seed likely germinates best in shallow water or on exposed, moist, vegetation-free soil. Once established, maintenance and spread of bulrush stands is through rhizome expansion.

Common cattail reproduces vegetatively by extension of the rhizome system, which is largely responsible for the maintenance and expansion of existing stands. Each spike of cattail may produce over 117,000 minute seeds (Yeo 1964). At maturity, the spikes burst under dry conditions, and bristly hairs aid seed dispersal. When the seed is released, it is capable of immediate germination but requires moist or wet

substrates, warm temperatures, low oxygen concentrations, and long days for germination to occur (Bonnewell et al. 1983, Sifton 1959). The seed may overwinter in northern latitudes on account of temperature limitations (McNaughton 1966). Germination requirements are best met in shallow water or on moist mud flats in vegetation-free areas. Once established, a single seedling may spread rapidly and cover an area of 624 square feet in 2 years (Grace and Wetzel 1981, Yeo 1964). Seedling establishment is essentially nonexistent within dense cattail stands, as the dense vegetation cover reduces light and temperatures for germination (Grace and Harrison 1986, McNaughton 1968).

Artificial Establishment of AQUATIC Series Plants—

As described above, almost all the aquatic indicators reproduce vigorously from either rhizomes or seeds. Live rooted plants, plugs, or segments of rhizomes can be used to rapidly establish any of these plants on appropriate sites. The seed of bulrush and spike-rush is stored for many years in soil seed banks making it readily available for quick germination and establishment on newly disturbed sites. Plants will then spread from rhizomes. (For more information on the short- and long-term revegetation potential of selected riparian wetland plant species, see app. B-5.)

Stand Management—

All sampled stands were in fair or better ecological condition. Where sites have been highly altered, management should consider restoring aquatic vegetation for its excellent wildlife, fisheries, and shoreline stability values. Bare shores can be planted with live plants, plugs, or rhizomes; or seeded and protected from the factor that caused the aquatic vegetation to be eliminated from the site. However, seed banks usually contain sufficient seed to regenerate disturbed sites.

Excessively dense stands of common cattail or softstem bulrush may be undesirable on waters managed for ducks. On sites where water levels are stable, management-initiated reduction of cattail cover may be difficult (Beule 1979, Martin et al. 1957). Where water levels can be controlled, drawdown followed by burning and rapid reflooding may kill cattail if the regrowth is kept completely submerged. Conversely, cattail cover may decrease dramatically when water levels rise in internally drained lakes and ponds during wet climate cycles.

Growth and Yield—

No forage or growth estimates were taken during this study. However, potential biomass production for the SCVA and TYLA associations is high, whereas the other associations are moderate (Hansen et al. 1995). The total biomass of common cattail stands may reach 15 tons per acre. (For more information on potential biomass production, see app. B-5.)

Down Wood—

The overall cover of wood is very low compared with other series (app. C-3). Logs cover only 1 percent of the water surface (or ground in the case of associations that are occasionally not flooded during late summer). However, these logs protect the shoreline from wave action, facilitate shoreline development in eddies behind logs, serve as detritus source, and provide important cover and habitat for aquatic animals. It is important to note that the source of down wood is mostly offsite, except where beaver develop ponds and kill nearby trees.

	Down log attributes				
Log condition	Tons/ acre	Cu. ft./ acre	Linear ft./ acre	Sq. ft./ acre	% ground cover
Class 1	0.33	35	92	57	0.1
Class 2	.26	34	113	64	.1
Class 3	.23	42	98	64	.1
Class 4	.12	37	55	50	.1
Class 5	.94	148	358	235	.5
Total	1.88	296	716	470	1.1

Fire—

The AQUATIC series is almost always growing on permanently flooded or temporarily flooded soils, so the heat of fire cannot harm them. However, fire is not out of the realm of possibility on shoreline and shallow water associations such as SCVA, TYLA, ELPA, and GLBO. On flooded sites and on sites with exposed but saturated soils, fire consumes the aboveground biomass. Underground rhizomes usually remain undamaged and plants survive (Gorenzel et al. 1981, Smith and Kadlec 1985). Plants quickly resprout following a summer or fall fire, when growth is reinitiated in spring. The aboveground standing crop of creeping spike-rush may be nearly double following fire compared with unburned stands (Young 1986). Winter burning of common cattail is an efficient method to remove accumulated litter and thin stands (Ball 1984). When soils do become dry, owing to drought or wetland drainage, fires may burn into the organic soils and kill the plants (Smith 1942).

Animals—

Livestock. Permanent to seasonally flooded conditions and saturated soils, as well as the low palatability of aquatic vegetation, limit the grazing value of the AQUATIC series for livestock (Hansen et al. 1995). In drought years, shoreline and shallow water associations such as GLBO, TYLA, ELPA, and SCVA may be used more heavily (in fall) because availability and palatability of upland forage is limited. Point source trampling by livestock gaining access to water is a problem in some grazing allotments. Northern mannagrass is rated as highly palatable for livestock, but GLBO sites usually are flooded and use is low. Horsetails ingested in large quantities can cause scours, paralysis, and death in horses. Cattle, sheep, and goats are rarely affected by

ingesting horsetail (Hansen et al. 1995). (For more information on forage palatability, see app. B-1. For potential biomass production, see app. B-5.)

Wildlife. Water horsetail is seldom grazed by wildlife owing to its low palatability. Elk, moose, and deer make moderate use of all species of mannagrass (Hansen et al. 1995). White-tailed deer may use the TYLA and SCVA associations for forage and hiding cover. Moose are especially fond of aquatic habitat and eat Indian water-lily, cow-lily, pondweeds, water ladysthumb, bur-reed species, mannagrass species, and many other kinds of vegetation found on these associations. Horsetail species are an important part of the spring diet of black bears in interior Alaska (Kuchler 1964), and common horsetail is a spring food of grizzly bears in Yellowstone National Park (Gleason and Cronquist 1991). Water horsetail may provide the same benefits in eastern Washington. Common cattail along with softstem and hardstem bulrush are staple foods for muskrat. Muskrats use the stems for hiding cover and construction of their dens. Many associations in the AQUATIC series are found in beaver ponds or on edges of lakes supporting beaver populations. The variety of herbs associated with the AQUATIC series, as well as the shrubs and herbs in the adjacent carrs and fens, provide a variety of forage and dam-building materials for beaver. Although willow species and quaking aspen are often thought of as primarily beaver forage, other aquatic vegetation was observed being used. Beaver extensively used the roots, rhizomes, and foliage of common cattail, softstem or hardstem bulrush, Indian water-lily, and sedges.

Broad zones of AQUATIC associations provide valuable nesting and feeding areas for waterfowl (Hansen et al. 1995). The seeds of spike-rush and bulrush are eaten by a variety of birds. Creeping spike-rush foliage provides valuable hiding and nesting cover for waterfowl. Waterfowl use the EQFL association for nesting and hiding cover. Mannagrass seeds provide good forage for ducks and many other species of birds. Water lentil, a floating plant found on many of these associations, is an important food for many waterfowl species (Parish et al. 1996). TYLA and SCVA associations provide valuable nesting and roosting cover for a variety of songbirds, most notably red-winged and yellow-headed blackbirds. The structure and density of TYLA associations affect their usefulness for nesting and hiding cover for waterfowl (Kantrud 1990, Murkin et al. 1982). In general, ducks rarely nest in dense extensive stands of common cattail but are attracted to wetlands where open water and cattail are intermixed in roughly equal portions. Ruddy and redhead ducks will nest under these open stand conditions (Beule 1979, Conway 1949). (For more information on thermal or feeding cover values, see apps. B-2 and B-3. For information on food values or degree of use, see apps. B-2 and B-4.)

Fish. The AQUATIC series provides valuable spawning areas, feeding areas, and hiding cover for many species of fish (Hansen et al. 1995). (For more information, see app. B-5, erosion control potential.)

Recreation—

Aquatic associations provide valuable bird watching, fishing, and waterfowl hunting opportunities. Humans trample shoreline vegetation near campgrounds or while fishing.

Estimating Vegetation Potential on Disturbed Sites—

Estimating vegetation potential on disturbed sites is usually unnecessary on FS lands because these sites usually are minimally impacted by human uses owing to the flooded nature of the sites. Usually, plenty of native vegetation is present to aid identification of the AQUATIC series and plant associations. For the rare stand where the vegetation is gone, users can use nearby undisturbed stands or personal observations from similar sites to help estimate site potential.

Sensitive Species—

Sensitive species were not found on AQUATIC series plots (app. D).

ADJACENT SERIES

The AQUATIC series usually grades into bogs, and wetlands in the SALIX, MEADOW, or ALIN series.

RELATIONSHIPS TO OTHER CLASSIFICATIONS

Kovalchik (1992c) described many of the plant associations in the AQUATIC series in the draft classification for northeastern Washington. Several authors have described similar AQUATIC associations in eastern Washington, central and eastern Oregon, and Montana (Crowe and Clausnitzer 1997, Hansen et al. 1995, Kovalchik 1987, Kovalchik 1992c). These include the ELPA association of central Oregon; ELPA and TYLA associations of northeastern Oregon; and EQFL, POAM2, TYLA, ELPA, and GLBO habitat types of Montana.

U.S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE WETLANDS CLASSIFICATION

Owing to its variability, the classification will vary according to flood regime. It is possible for individual associations to fit into different wetland classification types depending on the size of the water body and its flood regime. The TYLA, SPARG, ELPA, EQFL, GLBO, and SCVA associations usually belong to the system palustrine; class, emergent wetland; subclass, persistent; water regime (nontidal), semipermanently to permanently flooded. The NUPO and POTAM associations usually belong to the system lacustrine; class, floating; subclass, persistent; water regime, (nontidal) permanently flooded.

KEY TO THE AQUATIC PLANT ASSOCIATIONS

1. Indian water-lily (*Nuphar polysepalum*), and/or cow-lily (*Nuphar variegatum*) ≥25 percent canopy coverage or dominant ..... **Indian water-lily (NUPO) association**

2. Pondweeds (*Potamogeton* species), and/or water ladysthumb (*Polygonum amphibium*) ≥25 percent canopy coverage or dominant ..... **Pondweed (POTAM) association**

3. Softstem bulrush (*Scirpus validus*), and/or hardstem bulrush (*Scirpus acutus*) ≥25 percent canopy coverage or dominant ..... **Softstem bulrush (SCVA) association**

4. Bur-reed species (*Sparganium* species) ≥25 percent canopy coverage or dominant ..... **Bur-reed (SPARG) association**

5. Northern mannagrass (*Glyceria borealis*), and/or western mannagrass (*Glyceria occidentalis*) ≥25 percent canopy coverage or dominant ..... **Northern mannagrass (GLBO) association**

6. Water horsetail (*Equisetum fluviatile*) ≥25 percent canopy coverage or dominant ..... **Water horsetail (EQFL) association**

7. Common cattail (*Typha latifolia*) ≥25 percent canopy coverage or dominant ..... **Common cattail (TYLA) association**

8. Creeping spike-rush (*Eleocharis palustris*) ≥25 percent canopy coverage or dominant ..... **Creeping spike-rush (ELPA) association**

Table 23—Constancy and mean cover of important plant species in the AQUATIC plant associations

Species	Code	ELPA 8 plots		EQFL 11 plots		GLBO 5 plots		NUPO 9 plots		POTAM 4 plots		SCVA 3 plots		SPARG 10 plots		TYLA 9 plots	
		CON[a]	COV[b]	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV
Perennial forbs:																	
nodding beggars-tick	BICE	—	—	—	—	20	2	11	Tr[c]	—	—	—	—	10	10	11	Tr
western water-hemlock	CIDO	38	2	9	1	20	Tr	—	—	25	Tr	—	—	20	8	—	—
Canada waterweed	ELCA3	—	—	—	—	20	3	11	45	—	—	—	—	10	10	—	—
waterweed species	ELODE	—	—	—	—	—	—	—	—	25	65	—	—	—	—	—	—
Watson's willow-weed	EPWA	—	—	—	—	40	1	—	—	—	—	—	—	—	—	11	10
water lentil	LEMI	50	10	—	—	20	5	11	Tr	50	Tr	—	—	30	13	33	44
skunk-cabbage	LYAM	13	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—
common monkey-flower	MIGUG	13	2	—	—	—	—	—	—	—	—	—	—	—	—	11	5
common water-milfoil	MYSBE	—	—	9	40	—	—	11	3	—	—	—	—	—	—	11	5
Indian water-lily	NUPO	13	Tr	—	—	—	—	89	32	50	15	33	Tr	—	—	—	—
cow-lily	NUVA	—	—	9	Tr	—	—	11	30	—	—	—	—	—	—	11	3
water ladysthumb	POAM2	—	—	—	—	—	—	—	—	—	—	67	3	—	—	—	—
grass-leaved pondweed	POGR3	13	Tr	—	—	—	—	—	—	25	75	—	—	—	—	—	—
floatingleaf pondweed	PONA2	13	20	9	Tr	—	—	11	1	75	47	—	—	—	—	—	—
watercrowfoot buttercup	RAAQ	25	39	—	—	—	—	—	—	50	8	—	—	—	—	—	—
lesser spearwort	RAFL	—	—	—	—	—	—	—	—	25	5	—	—	—	—	11	2
small yellow water-buttercup	RAGM	13	1	—	—	20	3	—	—	—	—	—	—	10	5	—	—
Suksdorf's buttercup	RASU	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11	10
skullcap species	SCUTE	—	—	9	5	—	—	—	—	—	—	—	—	—	—	11	Tr
simplestem bur-reed	SPEM	25	1	9	Tr	40	1	11	5	25	10	—	—	50	34	11	1
small bur-reed	SPMI	13	1	9	Tr	20	2	22	7	—	—	—	—	50	48	11	Tr
bur-reed species	SPARG	13	Tr	—	—	—	—	11	5	—	—	—	—	10	70	—	—
common cattail	TYLA	38	2	18	3	20	15	22	4	25	Tr	—	—	10	2	100	72
lesser bladderwort	UTMI	—	—	—	—	—	—	—	—	—	—	—	—	10	5	—	—
bladderwort species	UTRIC	—	—	—	—	20	5	—	—	—	—	—	—	—	—	—	—
common bladderwort	UTVU	—	—	—	—	—	—	22	4	—	—	67	2	—	—	—	—
water pimpernel	VEAN	13	1	—	—	—	—	—	—	—	—	—	—	10	35	—	—
Grasses or grasslike:																	
water sedge	CAAQA	13	Tr	—	—	—	—	—	—	—	—	67	26	—	—	—	—
awned sedge	CAAT2	13	5	—	—	—	—	—	—	—	—	—	—	—	—	11	5
Cusick's sedge	CACU2	13	3	9	20	—	—	11	Tr	—	—	33	Tr	—	—	22	6
smooth sedge	CALA	—	—	9	15	—	—	—	—	—	—	—	—	—	—	—	—
slender sedge	CALA4	—	—	18	7	—	—	11	2	—	—	67	3	10	Tr	22	3
bladder sedge	CAUT	38	15	73	1	40	9	33	1	25	3	33	Tr	40	5	67	11
inflated sedge	CAVE	50	16	18	3	—	—	—	—	—	—	—	—	—	—	11	1
creeping spike-rush	ELPA	100	28	18	9	40	7	33	2	—	—	—	—	20	10	33	3
northern mannagrass	GLBO	25	4	9	Tr	80	31	33	1	75	5	—	—	20	3	11	2
tall mannagrass	GLEL	—	—	18	Tr	20	5	—	—	—	—	—	—	—	—	22	2
reed mannagrass	GLGR	13	50	—	—	—	—	—	—	—	—	—	—	—	—	—	—
western mannagrass	GLOC	—	—	—	—	20	35	—	—	—	—	—	—	—	—	—	—
pale false mannagrass	PUPAM	25	13	27	1	—	—	—	—	—	—	—	—	—	—	—	—
small-fruited bulrush	SCMI	13	7	9	Tr	—	—	—	—	—	—	—	—	—	—	11	5
softstem bulrush	SCVA	13	2	—	—	—	—	11	3	—	—	100	52	—	—	—	—
Ferns and fern allies:																	
water horsetail	EQFL	13	5	100	44	—	—	56	3	—	—	—	—	10	5	44	4
quilwort species	ISOET	13	Tr	9	5	20	Tr	—	—	—	—	—	—	—	—	—	—

[a] CON = percentage of plots in which the species occurred.

[b] COV = average canopy cover in plots in which the species occurred.

[c] Tr = trace cover, less than 1 percent canopy cover.

MEADOW SERIES

Fens, Meadows, and Bogs N = 260

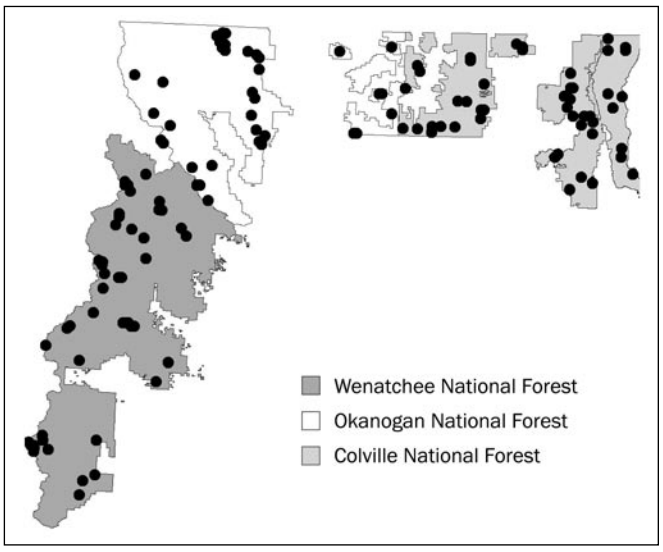


Figure 36—Plot locations for the MEADOW series.

MANY OF THE graminoids used to define the MEADOW[1] series and the numerous MEADOW plant associations are characteristic of northern latitudes. The indicator species occur from Alaska to eastern Canada and south into the United States. Several of the species are circumboreal; others are very widespread and extend well into the southern states. All the cross references to species codes and common and scientific names are located in appendix A, and the general site requirements and distribution for each species are described below (Hitchcock and Cronquist 1973):

- Water sedge grows in shallow water and wet places. It is circumboreal and extends south to California (mainly in and east of the Cascade Range), New Mexico, and New Jersey.
- Sitka sedge (an alternative indicator for the CAAQ association) is found in shallow water and wet places. It is circumboreal and is found from Alaska to California (mainly in and west of the Cascade Range) and occasionally east to northern Idaho.
- Bluejoint reedgrass grows in wet places and is found from Alaska to Quebec, south to all but the Southeastern United States.
- Slender sedge is found on flat, poorly drained wetlands (poor fens). It is circumboreal and extends south to the Cascade Range of central Oregon (Kovalchik 1987) and east to Pennsylvania. One slender sedge stand is found in the Blue Mountains of northeastern Oregon (Crowe and Clausnitzer 1997).
- Buxbaum's sedge (an alternate indicator of the CALA4 association) is a species of peat bogs and poor fens. It is circumboreal and extends south to central California, Utah, Colorado, and North Carolina.
- Black alpine sedge occurs in moist uplands as well as moist riparian and wetland zones. This high-elevation species is found throughout the mountains of western North America, extending south to California and Colorado.
- Holm's sedge, another high-elevation sedge, occurs in wet meadows and on lakeshores (occasionally moist upland meadows). It is found from southern British Columbia to California and east to western Montana, Wyoming, and Colorado.
- Saw-leaved sedge, a subalpine species, grows in wet fens and swamps. It occurs from southern British Columbia through the Cascade Range and Selkirk Mountains of Washington, east to northwestern Montana, northern and central Idaho, and northeastern Oregon.
- Showy sedge is found near or above the timberline in wet meadows and shallowly flooded water. It is circumboreal, extending south into the Cascade Range of north-central Washington (one population is located in the Selkirk Mountains) and the Rocky Mountains to Nevada, Utah, Colorado, and east in Canada to Labrador.
- Bladder sedge (misnamed beaked sedge in Hitchcock and Cronquist 1973; see Kovalchik 1991a) grows in shallow water and wet places. It is circumboreal and extends south to California, New Mexico, Nebraska, and Delaware.
- Awned sedge (an alternate indicator for the CAUT association) is found in shallow water, wet fens, and meadows. It is circumboreal and extends south to southern Oregon, Colorado, and New York.

[1] See appendix A for a cross reference for all species codes and common and scientific names used in this document.

- Inflated sedge grows in shallow water and wet places. It is circumboreal and extends south to California, New Mexico, Missouri, and Delaware.
- Timber oatgrass grows on a variety of sites, from prairies to alpine meadows. It is found on the dry margins of wetlands in this classification. Its range extends from Alaska to California in the mountains of the Western States, east across Canada to Newfoundland, and is found in northern Michigan.
- Few-flowered spike-rush is a species of bogs and poor fens. It is circumboreal and extends south through Washington to California, New Mexico, Illinois, and New Jersey.
- Many-spiked cotton-grass grows in bogs and poor fens. It is circumboreal and extends south to central Oregon, northern New Mexico, northern Utah, and Idaho.
- Small-fruited bulrush is a species of wet ground. It extends throughout the mountainous regions of the Western United States and Canada, and east to the Atlantic provinces and states.
- Columbia sedge is found on wet ground, especially on lakeshores. It occurs from southern British Columbia to northwestern Oregon, east to Idaho and northwestern Montana.
- Cusick's sedge is a species of wet places. It is found from southern British Columbia to California, east to northwestern Montana, northwestern Wyoming, and central Idaho.
- Sheep sedge grows in wet places, often above timberline. It is found from the Olympic Mountains and Cascade Range of Washington (and adjacent British Columbia), south to the Sierra Mountains of California, and east to Montana and Colorado.
- Lenticular sedge grows in shallow water and wet places. It is widespread in North America.
- Mud sedge grows in bogs and poor fens. It is circumboreal and extends south through Washington to Oregon, California, Nevada, and Utah.
- Poor sedge (an alternate indicator for the CALI association) is found in bogs and poor fens. It is circumboreal and extends south to Washington, northern Idaho, and northeast Utah.
- Beaked sedge (misnamed as bladder sedge in Hitchcock and Cronquist 1973; see Kovalchik 1991a) is found in wet, poor fens and fens. It is circumboreal, but in the Western United States is known from only three locations in northeastern Washington (Kovalchik 1991b) and one population in Glacier National Park. It is widely scattered across the boreal zone in Canada but is common in Eurasia.
- Russet sedge grows in shallow water and wet places and is circumboreal. This high-elevation species extends south to the Cascade Range in north central Washington, Nevada, Utah, and Colorado, and east to Labrador.
- Tufted hairgrass is found from coastal marshes and prairies to alpine ridges. It is limited to the dry margins of moist to wet meadows in this classification. Its range extends from Alaska to Greenland, south to most of the United States and northern Mexico. It is also Eurasian.
- Sheep fescue grows on a variety of sites from prairies to subalpine meadows. It is found on the dry margins of wetlands in this classification. It is found from British Columbia to Newfoundland, Oregon, Utah, Colorado, and Nebraska.
- Tall mannagrass grows in wet meadows and carrs and is widespread in North America.
- Reed mannagrass (an alternative indicator for the GLEL association) is a species of sloughs, meadows, and damp ground. It occurs from Alaska to northwestern Oregon and northern Nevada, east into eastern Canada and the Northeastern United States.
- The dominant species in the POPR community type include Kentucky bluegrass, reed canarygrass, redtop, and Oregon bentgrass. These introduced or increaser grasses are lumped together into a single community type (not enough plots) representing a general altered vegetative state. These grasses are not discussed any further in this section. Between them they occur at low to moderate elevations throughout the study area.

Sites dominated by the above graminoids are broadly characterized as fens, poor fens, meadows, and bogs. Each plant association is dominated by different graminoids that make up the 24 associations in the MEADOW series. Graminoid dominance and relative similarities between sites are the basis for this grouping.

Climate, elevation, and hydrologic conditions (such as presence of water and its chemistry) are important factors in the distribution of these graminoids and their plant associations. Given the range of sites associated with the graminoids, the MEADOW series is extremely diverse. Annual precipitation varies from under 10 inches at low elevation in the continental climate associated with the dry interior of the study area to well over 80 inches in maritime climate along the Cascade crest to over 20 inches in the weaker inland maritime climate in the Selkirk Mountains of northeastern Washington. Such generalities need to be interpreted carefully when considering cold air drainage and high water tables associated with the MEADOW series. In general, climate is highly modified by soil water properties such as

temperature, aeration, and fertility. The effects of low precipitation and high summer temperatures on sites characteristically at low elevation may be modified by the inflow of cool water from streams originating at higher elevation (or from springs) and cold air drainage. For example, the cool climate and short growing seasons normally associated with the higher elevation associations may extend to lower elevation owing to cold air drainage and cold water seepage.

CLASSIFICATION DATABASE

The MEADOW series includes almost all riparian and wetland plant associations dominated by moist-to-wet site members of the Cyperaceae and Gramineae families (sedge, bulrush, spike-rush, cotton-grass, grasses). SCVA and ELPA are the only graminoid-dominated plant associations not included in the MEADOW series (see the AQUATIC series). The MEADOW series was sampled on all NFs and RDs (fig. 36). The somewhat poor distribution and low number of plots in some areas is probably an artifact of the sampling process. For instance, difficult access limited the number of samples in wilderness areas and lands administered by the Okanogan NF found west of the Cascade crest. As an example, the CASA2 association (only four plots) is probably common in the inaccessible high-elevation areas west of the Okanogan Cascade crest. There were 252 riparian and wetland plots sampled in the MEADOW series. Four plots from other ecology sampling projects were included to augment species composition, distribution, and elevation for the MEADOW series. From this database, 13 major and 11 minor (fewer than five plots, except for the POPR community type) plant associations are described. Four potential, one-plot associations (CAAM, CALU, CARE, and CAMU2) are not used in the database or described in this classification. With the exception of the POPR community type, information presented in the MEADOW series represents mature, stable communities in good ecological condition.

VEGETATION CHARACTERISTICS

Climate, water table depth, water chemistry, duration of surface water, and water aeration all play important roles in the occurrence of individual plant species and plant associations. Most of the associations within the MEADOW series are classic fens and meadows with nutrient-rich, well-aerated soil and water. Elevation, precipitation, growing season, soil and water characteristics, and climate strongly influence the species dominating these fens and meadows. For example, the CAUT, CALA4, CAAQ, and CAVE associations usually are found at low to moderately high elevations, whereas CANI2, CASCB, and CASP associations are characteristic of high elevations. Other sites are representative of bogs and poor fens. For example, CALA4 is a poor fen that is intermediate in soil and water characteristics between true bogs and fens. ELPA2, ERPO2, and CALI are characteristic of nutrient-poor, poorly aerated bogs. Meadows are generally found on moist to wet, well-aerated mineral soils. However, these meadows usually are drier in comparison to fens and bogs. Examples are the higher elevation DAIN and FEOVR associations located on well-drained mineral soils that are in the zone transitional from wetlands to upland. The CACA association dominates similar sites at lower elevations.

MEADOW plant associations

	Scientific name	Common name	Ecoclass code	Plots
Major associations:				
CAAQA	*Carex aquatilis*	Water sedge	MM2914	11
CACA	*Calamagrostis canadensis*	Bluejoint reedgrass	GM4111	12
CALA4	*Carex lasiocarpa*	Slender sedge	MM2920	11
CANI2	*Carex nigricans*	Black alpine sedge	MS2111	30
CASCB	*Carex scopulorum* var. *bracteosa*	Holm's sedge	MS3111	17
CASCP2	*Carex scopulorum* var. *prionophylla*	Saw-leaved sedge	MS3114	18
CASP	*Carex spectabilis*	Showy sedge	MS3115	11
CAUT	*Carex utriculata*	Bladder sedge	MM2917	55
CAVE	*Carex vesicaria*	Inflated sedge	MW1923	10
DAIN	*Danthonia intermedia*	Timber oatgrass	MD1111	5
ELPA2	*Eleocharis pauciflora*	Few-flowered spike-rush	MW4911	13
ERPO2	*Eriophorum polystachion*	Many-spiked cotton-grass	MW1114	19
SCMI	*Scirpus microcarpus*	Small-fruited bulrush	MM2924	6
Minor associations:				
CAAP3	*Carex aperta*	Columbia sedge	MW1111	2
CACU2-WA	*Carex cusickii*	Cusick's sedge	MW1112	4
CAIL	*Carex illota*	Sheep sedge	MS3112	3
CALE5	*Carex lenticularis*	Lenticular sedge	MW2919	3
CALI	*Carex limosa*	Mud sedge	MW1113	4
CARO2	*Carex rostrata*	Beaked sedge	MW1924	3
CASA2	*Carex saxatilis*	Russet sedge	MS3113	4
DECE	*Deschampsia cespitosa*	Tufted hairgrass	MM1912	4
FEOVR	*Festuca ovina*	Sheep fescue	MD43	2
GLEL	*Glyceria elata*	Tall mannagrass	MM2925	4
POPR	*Poa pratensis*	Kentucky bluegrass	MD3111	5

MEADOW series sites in good ecological condition are often dominated by one or two graminoid species. For example, the CAUT association (a fen) is very clearly dominated by bladder sedge and awned sedge, and other species generally have low constancy and cover except where site conditions are transitional to other plant associations. On the other hand, poor soil aeration and low nutrient availability limit the amount of plant cover that can develop on bog sites. Therefore, a relatively large number of bog-tolerant species find their niche and are often common or well represented in the CALI, ERPO2, and ELPA2 associations.

There are 34 species used as indicators to key, name, and characterize the MEADOW series and the 24 MEADOW plant associations. Therefore, it is difficult to describe the MEADOW series as a whole without considering the associations in some detail. The 13 major associations are described below:

- The CACA association is dominated by bluejoint reedgrass. Herbs with high constancy include small bedstraw and largeleaf avens. Fewflower aster, fanleaf cinquefoil, arrowleaf groundsel, Canada goldenrod, Cooley's hedge-nettle, pioneer violet, redtop, and small-fruited bulrush are well represented on some sites.
- The DAIN association is dominated by timber oatgrass. Other shrubs and herbs with high constancy include Farr's willow, red mountain-heath, dwarf huckleberry, umber pussytoes, aster species, fanleaf cinquefoil, bluejoint reedgrass, saw-leaved sedge, and green fescue.
- The ELPA2 association is dominated by few-flowered spike-rush. Other herbs with high constancy include elephanthead pedicularis, ladies-tresses, bluejoint reedgrass, and cotton-grass species. All of these plants, with the exception of bluejoint reedgrass, are indicative of bog conditions.
- The ERPO2 association is dominated by various cotton-grass species. Many-spiked cotton-grass is the usual dominant, but Chamisso cotton-grass or green-keeled cotton-grass dominate some sites. Other herbs with high constancy include elephanthead pedicularis, Holm's sedge, saw-leaved sedge, and bladder sedge.
- The SCMI association is dominated by small-fruited bulrush. Other herbs with high constancy include mountain alder, smooth willow-weed, and lenticular sedge.
- The CAAQ association is dominated by either water sedge or Sitka sedge. Other herbs with high constancy include marsh cinquefoil, bluejoint reedgrass, and bladder sedge.
- The CALA4 association is dominated by slender sedge and Buxbaum's sedge. Other herbs with high constancy include small bedstraw, marsh cinquefoil, and bladder sedge.
- The CANI2 association is dominated by black alpine sedge. Other shrubs and herbs with high constancy include red mountain-heath, dwarf huckleberry, elephanthead pedicularis, and fanleaf cinquefoil.
- The CASCB association is dominated by Holm's sedge. Other shrubs and herbs with high constancy include fanleaf cinquefoil, bluejoint reedgrass, and black alpine sedge.
- The CASCP2 association is dominated by saw-leaved sedge. Other shrubs and herbs with high constancy include red mountain-heath, common bogbean, and bluejoint reedgrass.
- The CASP association is dominated by showy sedge. Other shrubs and herbs with high constancy reflect higher elevations and include red mountain-heath, partridgefoot, and black alpine sedge.
- The CAUT association is dominated by bladder sedge and/or awned sedge. Other herbs have low constancy and are uncommon owing to the wide environmental distribution of the association. Only bluejoint reedgrass has more than 40 percent constancy. Those with 30 to 40 percent constancy include small bedstraw, largeleaf avens, and marsh cinquefoil.
- The CAVE association is dominated by inflated sedge. Other herbs are generally scarce. Those with relatively high constancy include small bedstraw, bladder sedge, and creeping spike-rush.

The 11 minor associations are described below:

- The CAAP3 association is dominated by Columbia sedge. Other herbs are scarce. Those with relatively high constancy include Holm's sedge, creeping spike-rush, and green-keeled cotton-grass.
- The CACU2 association is dominated by Cusick's sedge. Other shrubs and herbs are scarce. Those with relatively high constancy include mountain alder, marsh cinquefoil, gray sedge, bladder sedge, and fowl mannagrass.
- The CAIL association is dominated by sheep sedge. Other shrubs and herbs are scarce. Those with relatively high constancy include tea-leaved willow, twinflower marshmarigold, alpine willow-weed, cleftleaf groundsel, and black alpine sedge.
- The CALE5 association is dominated by lenticular sedge. Other herbs are scarce. Those with relatively high constancy include sheep sedge, saw-leaved sedge, and many-spiked cotton-grass.
- The CALI association is dominated by mud sedge and/or poor sedge. Other shrubs and herbs are scarce. Those

with relatively high constancy include Farr's willow, common bogbean, marsh cinquefoil, scheuchzeria, lesser panicled sedge, bladder sedge, and slender cotton-grass.

- The CARO2 association is dominated by beaked sedge. Other herbs are scarce. Those with relatively high constancy include marsh cinquefoil, slender sedge, and bladder sedge.
- The CASA2 association is dominated by russet sedge. Other shrubs and herbs are scarce. Those with relatively high constancy include Farr's willow, elephanthead pedicularis, cleftleaf groundsel, bluejoint reedgrass, thick-headed sedge, and water horsetail.
- The DECE association is dominated by tufted hairgrass. Other herbs are scarce. Those with relatively high constancy include western yarrow, western aster, Watson willow-weed, broadpetal strawberry, small bedstraw, largeleaf avens, slender-beaked sedge, thick-headed sedge, bladder sedge, and reed canarygrass.
- The FEOVR association is dominated by sheep fescue. A variety of other shrubs and herbs are present on these transitional sites. Those with relatively high constancy include dwarf huckleberry, thick-headed sedge, timber oatgrass, and spike trisetum.
- The GLEL association is dominated by tall mannagrass and/or reed mannagrass. Other shrubs and herbs are scarce. Those with relatively high constancy include mountain alder, fewflower aster, Watson willow-weed, small bedstraw, largeleaf avens, redtop, bladder sedge, creeping spike-rush, small-fruited bulrush, and common horsetail.
- The POPR community type is composed of all sites dominated by introduced or increaser grasses, which include Kentucky bluegrass, reed canarygrass, redtop, or Oregon bentgrass. Other shrubs and herbs are surprisingly scarce on these vegetatively altered sites.

PHYSICAL SETTING

Elevation—

The MEADOW series is capable of occurring at all elevations on NF ownership. On the Colville NF, most plots were between 2,000 and 6,500 feet, but unsampled MEADOW sites are likely in excess of 6,500 feet in the Selkirk Mountains as well as below 2,000 feet on lands of other ownership. The Okanogan and Wenatchee NF plots ranged from 3,800 to 7,650 and 1,940 to 7,530 feet, respectively. Meadow sites have been observed both above and below these elevations, especially on low-elevation sites on lands of other ownership. Therefore, plot elevation ranges are often an artifact of sample plot distribution, with lower elevation limits constrained by NF boundaries and upper elevations constrained by the accessibility of the mountains sampled. In general, the MEADOW series is widespread and occurs from elevations below 1,000 feet in the Columbia basin to well over 7,000 feet along the Cascade crest and over 6,000 feet in the Kettle River Range and Selkirk Mountains.

	Elevation (feet)			
Forest	Minimum	Maximum	Average	N
Colville	1,940	6,520	3,928	90
Okanogan	3,800	7,650	5,963	71
Wenatchee	1,940	4,530	4,864	95
Series	1,940	7,650	4,813	256

Elevation varies considerably between plant associations. Many associations, such as CACA, CAUT, and ELPA2, average less than 5,000 feet in elevation with occasional plots extending into the subalpine, timberline, and alpine zones. Other associations, such as CANI2, CASCB, and CASCP2, are more reflective of high-elevation environments in excess of 5,400 feet. However, some plots in these high-elevation associations may extend to moderate elevations in cold air drainages or extreme maritime areas where the timberline environment is lowered owing to extreme snowpacks and short growing seasons.

	Elevation (feet)			
Plant association	Minimum	Maximum	Average	N
CAIL	5,500	7,100	6,547	3
CANI2	4,130	7,530	6,259	30
CASA2	5,320	7,380	6,258	4
CASCB	3,950	7,350	6,252	17
FEOVR	6,150	6,150	6,150	2
DAIN	4,980	7,050	5,999	5
CAAP3	4,030	7,270	5,650	2
CASCP2	3,975	6,620	5,548	18
CASP	4,600	7,220	5,480	11
ERPO2	3,560	7,350	5,435	19
CARO2	4,637	4,980	4,753	3
ELPA2	2,950	6,060	4,750	13
CALE5	3,200	5,500	4,583	3
DECE	3,150	5,385	4,331	4
CAUT	2,240	7,350	4,132	55
CALA4	2,900	5,600	4,096	11
CACA	2,210	7,650	4,038	12
CAAQ	2,550	5,210	3,855	11
CAVE	2,380	4,621	3,461	10
CALI	1,940	5,100	3,395	4
GLEL	2,210	4,025	3,146	4
CACU2-WA	2,750	3,900	3,125	4
SCMI	2,250	4,000	3,051	6
POPR	1,900	3,800	2,930	5
Series	1,940	7,650	4,813	256

Valley Geomorphology—

The MEADOW series is found in a limited variety of valley width and gradient classes. Most plots are found in broader, lower gradient valleys. Sixty-eight percent of the plots were located in valleys more than 330 feet wide. Ninety-two percent of the plots were located in valleys wider

than 99 feet. Eighty-five percent of the plots occurred in valleys with low to very low gradient (0 to 3 percent). Only 38 plots had greater than 3 percent valley gradient and most of these were located in the subalpine or alpine zones. At upper elevations, fens, meadows, and bogs often occurred on steeper gradients where late snowmelt, summer storms, and short growing seasons contribute to and maintain excess soil moisture, even on relatively steep slopes.

	Valley gradient					
Valley width	Very low	Low	Moderate	Steep	Very steep	N
Very broad	66	11	2	1	0	80
Broad	54	23	9	4	1	91
Moderate	32	19	0	1	6	58
Narrow	4	3	0	3	7	17
Very narrow	0	0	1	0	3	4
Series total	156	56	12	9	17	250

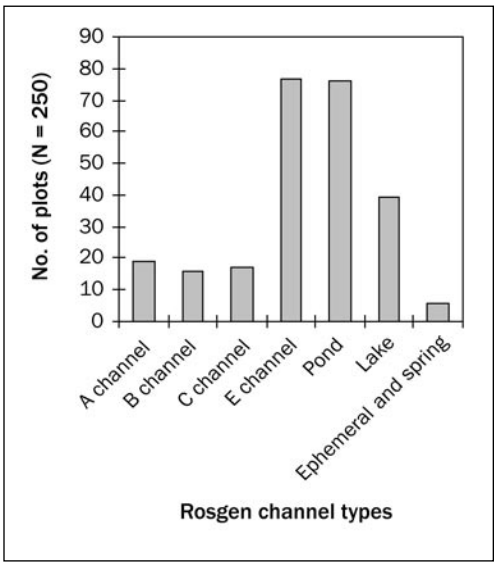
The data for individual associations reflect these assumptions. Only the CASCP2 association is equally distributed across all valley width classes. Between them, the CANI2, CASCB, CASCP2, and CASP associations (all high-elevation fens) represent 29 of the 35 moderate to very steep valley gradient plots. Looking at the overall data, the MEADOW series appears to be uncommon in narrow (less than 99 feet) and steeper (greater than 3 percent) valleys except at high elevations.

	Valley width					
Plant association	Very broad	Broad	Moderate	Narrow	Very narrow	N
CAAP3	0	0	1	0	0	1
CAAQ	7	3	1	0	0	11
CACA	2	6	2	1	0	11
CACU2-WA	0	2	2	0	0	4
CAIL	0	2	0	1	0	3
CALA4	6	4	1	0	0	11
CALE5	1	0	1	1	0	3
CALI	2	1	1	0	0	4
CANI2	6	12	7	3	1	29
CARO2	2	1	0	0	0	3
CASA2	2	0	1	1	0	4
CASCB	2	9	4	1	0	16
CASCP2	5	1	4	5	3	18
CASP	0	7	4	0	0	11
CAUT	23	15	16	0	0	54
CAVE	3	4	3	0	0	10
DAIN	2	1	0	1	0	4
DECE	2	2	0	0	0	4
ELPA2	7	4	0	2	0	13
ERPO2	4	7	7	1	0	19
FEOVR	0	2	0	0	0	2
GLEL	0	3	1	0	0	4
POPR	1	3	1	0	0	5
SCMI	3	2	1	0	0	6
Series total	80	91	58	17	4	250

	Valley gradient					
Plant association	Very low	Low	Moderate	Steep	Very steep	N
CAAP3	1	0	0	0	0	1
CAAQ	10	1	0	0	0	11
CACA	8	3	0	0	0	11
CACU2-WA	2	1	1	0	0	4
CAIL	2	1	0	0	0	3
CALA4	11	0	0	0	0	11
CALE5	3	0	0	0	0	3
CALI	4	0	0	0	0	4
CANI2	10	10	4	2	3	29
CARO2	3	0	0	0	0	3
CASA2	3	0	0	0	1	4
CASCB	9	5	1	0	1	16
CASCP2	4	6	2	4	2	18
CASP	1	0	3	2	5	11
CAUT	47	7	0	0	0	54
CAVE	9	1	0	0	0	10
DAIN	2	1	0	0	1	4
DECE	3	1	0	0	0	4
ELPA2	7	3	1	0	2	13
ERPO2	9	7	0	1	2	19
FEOVR	0	2	0	0	0	2
GLEL	2	2	0	0	0	4
POPR	3	2	0	0	0	5
SCMI	3	3	0	0	0	6
Series total	156	56	12	9	17	250

Channel Types—

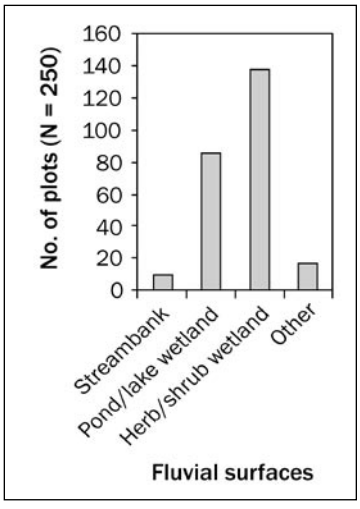
Forty-five percent of the plots were located in wetlands adjacent to lakes, ponds, or beaver ponds. Most streams running through MEADOW series sites were Rosgen E channels. Rosgen E channels would have been even more frequent except where ponds and streams were intermixed along a plot; the pond code often took precedence over the stream channel code. Rosgen A, B, and C channels were of secondary importance, with the A and B channels often found in steeper valleys at high elevation. Most C channels were associated with larger low-elevation streams.



These observations are verified by looking at individual associations. The higher elevation associations (ERPO2, CANI2, CASCB, CASCP2, CASP, etc.) include 71 percent of the 35 A and B channel types. The lower elevation associations (CAVE, CAAQ, CACA, CALA4, CAUT, ELPA2, etc.) include 62 percent of the 209 Rosgen C and E channels, lakes, and ponds (including beaver ponds).

	Rosgen channel types							
Plant association	A	B	C	E	Pond	Lake	Ephemeral and springs	N
CAAP3	0	0	0	0	1	0	0	1
CAAQ	0	0	2	4	3	2	0	11
CACA	0	2	0	1	4	2	2	11
CACU2-WA	0	0	0	2	2	0	0	4
CAIL	0	0	0	0	2	1	0	3
CALA4	0	0	0	2	5	4	0	11
CALE5	0	0	0	1	2	0	0	3
CALI	0	0	0	0	1	3	0	4
CANI2	3	4	1	12	4	5	0	29
CARO2	0	0	0	1	1	1	0	3
CASA2	0	0	0	2	2	0	0	4
CASCB	1	2	1	7	2	3	0	16
CASCP2	2	3	0	7	4	1	1	18
CASP	9	1	0	1	0	0	0	11
CAUT	0	1	2	18	23	9	1	54
CAVE	0	0	2	2	4	2	0	10
DAIN	0	0	0	3	1	0	0	4
DECE	0	1	1	0	0	1	1	4
ELPA2	2	1	0	7	3	0	0	13
ERPO2	2	0	1	4	8	3	1	19
FEOVR	0	0	0	2	0	0	0	2
GLEL	0	1	1	0	2	0	0	4
POPR	0	0	2	1	0	2	0	5
SCMI	0	0	4	0	2	0	0	6
Series total	19	16	17	77	76	39	6	250

Fluvial Surfaces—



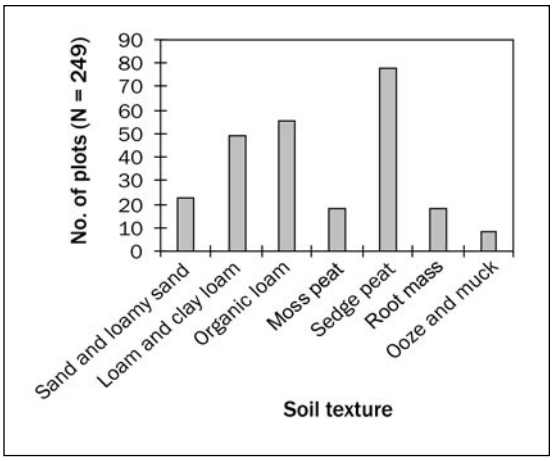
In contrast to many other series, the MEADOW series is found on a limited variety of fluvial surfaces. Eighty-eight percent (222 plots) of the sample plots were located in wetlands adjacent to natural lakes and ponds, the margins of beaver ponds, and/or shrub- or herb-dominated wetlands. The remaining 28 plots are associated with streambanks, alluvial bars, flood plains, overflow channels, avalanche chutes, and springs. The common site attributes are (1) the vegetation is dominated by graminoids, (2) the sites have measurably high water tables for much of the growing season, and (3) the sites are too wet for trees and shrubs.

Little additional insight is gained by looking at the distribution of fluvial surfaces by plant association. Most associations are located in wetlands adjacent to ponds or lakes or within herb- or shrub-dominated wetlands. The CASCP2 association is the most prominent association on streambanks. The POPR community type was prominent on alluvial bars (reed canary grass) and toeslopes (Kentucky bluegrass). Fifty percent of the SCMI association occurred on floodplains.

	Fluvial surfaces				
Plant association	Stream-bank	Pond/lake wetland	Herb/shrub wetland	Other	N
CAAP3	0	0	1	0	1
CAAQ	0	4	7	0	11
CACA	0	4	5	2	11
CACU2-WA	0	4	0	0	4
CAIL	0	3	0	0	3
CALA4	0	4	7	0	11
CALE5	0	2	1	0	3
CALI	0	4	0	0	4
CANI2	2	7	19	1	29
CARO2	0	1	2	0	3
CASA2	0	3	1	0	4
CASCB	1	4	10	1	16
CASCP2	5	5	6	2	18
CASP	1	0	9	1	11
CAUT	0	22	30	2	54
CAVE	0	4	6	0	10
DAIN	0	1	3	0	4
DECE	0	1	3	0	4
ELPA2	0	1	11	1	13
ERPO2	1	7	9	2	19
FEOVR	0	0	2	0	2
GLEL	0	1	2	1	4
POPR	0	2	1	2	5
SCMI	0	1	2	3	6
Series total	10	85	137	18	250

Soils—

Soils in the MEADOW series are variable. Seventy-two percent of the plots were coded as organic soils in the rooting zone. Most of these soils had sedge peat or organic loam textures. Forty-four other plots had moss peat, root mass, and ooze or muck soils. Loam and clay loam textures were also common, but some of these may have been organic loam soils as field crews had trouble distinguishing between loam and organic loam textures (greater than 12 percent organic material). The sand and loamy sand soils usually are associated with frequently flooded alluvial bars, floodplains, and streambanks (coarse fragment percentages are high). Loam soils were largely reflective of sites dominated by drier grass or sedge sites such as the CACA, DAIN, FEOVR, CANI2, or CASP associations, where the soils are drier and well aerated by late summer.



Additional insight is gained by looking at the distribution of soil texture by plant association. The wettest associations (CACU2-WA through DECE) occurred primarily on organic soils. The drier associations (CALE5 through CAAP3) usually occurred on mineral soils.

Plant association	Soil texture							N
	Sand and loamy sand	Loam and clay loam	Organic loam	Moss loam	Sedge peat	Root mass	Ooze/ muck	
CACU2-WA	0	0	0	0	0	2	2	4
CARO2	0	0	0	0	1	1	1	3
CASA2	0	1	1	0	2	0	0	4
CALA4	0	0	1	1	6	3	0	11
ELPA2	1	0	1	1	9	1	0	13
ERPO2	0	0	3	6	9	1	0	19
CAAQ	1	0	1	0	7	2	0	11
CAUT	2	4	14	1	22	7	4	54
CASCP2	1	3	6	2	5	0	1	18
CALI	0	0	0	3	0	1	0	4
CAVE	0	3	3	0	4	0	0	10
DECE	0	1	1	0	2	0	0	4
CACA	0	6	5	0	0	0	0	11
CAIL	0	1	1	0	1	0	0	3
GLEL	1	0	2	0	1	0	0	4
CASCB	3	5	3	2	3	0	0	16
CANI2	5	10	9	2	3	0	0	29
CALE5	1	1	1	0	0	0	0	3
CASP	5	4	0	0	1	0	0	10
DAIN	0	2	1	0	1	0	0	4
POPR	1	3	1	0	0	0	0	5
FEOVR	0	2	0	0	0	0	0	2
SCMI	2	2	1	0	1	0	0	6
CAAP3	0	1	0	0	0	0	0	1
Series	23	49	55	18	78	18	8	249

Average water depths for the MEADOW series (at the time of sampling) averaged 4 inches below the soil surface. The measured depths for individual plant associations range from more than 8 inches below the soil surface for the relatively dry GLEL, CANI2, CASCB, CALE5, CASP, DAIN, CACA, DECE, FEOVR, and CAAP3 associations, to at or above the soil surface for the wet CASA2, CAVE, CARO2, CAUT, and CACU2-WA associations. The other listed associations are intermediate in soil moisture as represented by water tables. Most of the wetter MEADOW associations are flooded or have saturated soils for most of the growing season. The soils of the drier associations usually are saturated to partially flooded at snowmelt but become moist but well drained within the rooting zone by midsummer.

Plant association	Water table (inches)			N
	Minimum	Maximum	Average	
CASA2	0	8	4	4
CAVE	-12	18	2	6
CARO2	0	4	2	3
CAUT	-24	22	1	53
CACU2-WA	-2	2	0	4
CALI	-1	0	0	4
SCMI	-8	6	-1	5
CALA4	-15	3	-1	10
ELPA2	-6	1	-2	13
ERPO2	-7	1	-2	16
CAAQ	-31	22	-3	10
CASCP2	-20	0	-5	15
CAIL	-15	-4	-7	3
GLEL	-16	-4	-9	3
CASCB	-28	0	-9	13
CANI2	-59	1	-9	21
CALE5	-15	-8	-11	2
CASP	-33	0	-13	4
DAIN	-16	-12	-13	3
CACA	-31	2	-14	5
POPR	-41	-2	-17	3
DECE	-28	-7	-19	4
FEOVR	-33	-17	-25	2
CAAP3	-31	-31	-31	1
Series	-59	22	-4	207

The average percentage of soil surface flooding (at the time of sampling) shows similar patterns. Although all associations may be partially to totally flooded at snowmelt, the flooding rapidly decreases in the relatively dry GLEL through FEOVR associations, whereas some degree of surface flooding is maintained throughout summer in the CASA2 through ELPA2 associations. The water table and submerged data represent a continuum of sampling throughout the growing season, and the interpretations need to be taken with a degree of caution.

Plant association	Submerged (percent)			N
	Minimum	Maximum	Average	
CASA2	30	100	74	4
CAUT	0	100	54	54
CACU2-WA	12	60	49	4
CARO2	20	90	48	3
CAAQ	0	100	40	11
SCMI	0	100	38	6
CALI	5	65	38	4
CAVE	0	100	36	10
CALA4	0	75	35	11
ERPO2	0	90	24	19
ELPA2	0	65	19	13
CAIL	0	30	10	3
CASCP2	0	75	10	17
CACA	0	55	9	10
CASCB	0	35	8	16
GLEL	0	15	7	3
POPR	0	25	7	5
CANI2	0	40	4	28
CASP	0	20	2	11
DAIN	0	0	0	4
DECE	0	0	0	4
FEOVR	0	0	0	2
Series	0	100	26	242

Although little difference is apparent between many associations, as shown in the following table, average soil temperatures at the time of sampling (degrees Fahrenheit) are high for bog and poor fen associations (ERPO2, ELPA2, and CALA4) as well as for shallowly flooded sites (CACU2-WA and CASA2). The herb cover on these associations is open and allows exposure of the soil surface to direct sunlight heating during the day. These sites are often shallowly flooded well into the growing season, and as water temperatures rise during sunny days, warm water temperatures are conducted into the porous peat soil. Higher elevation associations such as CANI2, CASP, CASCP2, and CASCB usually have dense herb cover (shade), cool mean daily temperatures, and generally have cool soils. However, moderate-elevation associations such as CAUT and CAAQ also have cool soils, perhaps as a result of deeper standing water and dense sedge cover that provides shade. The water volume may function as a heat sink that reacts slowly to solar inputs and diurnal temperature changes, thus modifying soil temperatures compared with less flooded soils.

Plant association	Soil temperature (°F)			N
	Minimum	Maximum	Average	
CASA2	56	70	63	2
CACU2-WA	55	60	58	3
CALI	46	65	57	3
ELPA2	43	67	56	11
CALA4	44	62	54	10
SCMI	47	62	53	5
ERPO2	34	68	53	14
CAVE	40	67	52	8
GLEL	50	54	52	3
CALE5	42	60	51	3
CAAQ	42	57	50	10
CACA	42	58	50	10
CASP	43	67	50	11
CASCP2	40	61	50	15
CASCB	44	62	50	12
DECE	48	51	49	4
CAUT	36	68	48	53
CANI2	38	62	48	22
Series	34	70	52	199

ECOSYSTEM MANAGEMENT

Natural Regeneration of MEADOW Series Plants—

The sedges used as indicator species in this classification are all rhizomatous. In general, long rhizomes produce additional shoots at the rhizome nodes, whereas short rhizomes produce culms in tufts or tillered clumps (Bernard 1990). Therefore, vegetative reproduction is a major source of regeneration of sedges. Pieces of culms or rhizomes can be broken off by ice or bank erosion and transported by water to new locations where they root from the base or rhizome nodes. Seed production rates are variable. About 6 to 9 percent of the shoots of water sedge culms flower each year (Bliss and Grulke 1988), whereas bladder sedge is a prolific seeder (Dittberner and Olson 1983). The resulting abundant seeds are stored in the soil seed bank for many years. In general, disturbed areas are colonized by seedling establishment (from seed or pieces of rhizomes) on dry sites and by rhizome expansion on wetter sites (McKendrick 1987). Occupied, undisturbed areas are not conducive to seedling establishment owing to competition from the dense sedge canopy and rhizomes.

Few-flowered spike-rush reproduces primarily by vegetative expansion from rhizomes. The hard seeds are stored for long periods in the seed bank and can germinate under proper conditions (generally where the herb cover has been reduced by factors such as fire or grazing). Occupied, undisturbed areas are not conducive to seedling establishment.

Cotton-grass species also reproduce by seed and rhizomes. Wind-borne dispersal of seed is aided by the dense tuft of stylar hairs at the base of the achene. The seed may remain viable for hundreds of years and make up a large portion of the seed bank on cotton-grass bogs (Gartner et al. 1983). Seeds germinate on suitable seedbeds such as live

mosses and liverworts, dead leaves, or peat after overwintering, and when the soil substrate is exposed to light and warm temperatures. Seedling establishment is best where herb cover has been reduced on disturbed bog sites. Seedling establishment is rare on mature and in well-established bog communities. Growth is dependent on nutrient availability and is most rapid following fire.

Small-fruited bulrush, like many of the other Cyperaceae in this classification, regenerates from seed or by vegetative expansion through rhizome growth. The hard seed can remain viable in the soil for many years. Small-fruited bulrush is considered an increaser on recently deposited alluvium, and seedling establishment is more favorable on disturbed sites compared with more stable areas already colonized by bulrush. Once established, maintenance and spread of the small-fruited bulrush stand is through rhizome expansion.

Mannagrass species reproduce by both rhizome extension and seed. The grass seed is probably stored in the seed bank for several years and is available to colonize disturbed sties first by seed germination and then rhizome extension.

Bluejoint reedgrass produces abundant, wind-borne seed (MacDonald and Lieffers 1991). Seed can remain viable in the soil for up to 5 years (Conn and Farr'sis 1987, Hardy BBT Limited 1989). Bluejoint reedgrass also reproduces vegetatively by rhizomes, and seedlings are capable of producing an extensive network of rhizomes during a single growing season. Small sections of rhizomes with two or more internodes can produce shoots and establish new clones (Powelson and Lieffers 1991).

Tufted hairgrass is a perennial bunchgrass that reproduces solely by seed (Gehring and Linhart 1992). The seed remains viable for several years in the seed bank. Germination is more favorable on disturbed sites compared with colonized sites. However, once a disturbed site becomes dominated by invader species such as Kentucky bluegrass, it is almost impossible for tufted hairgrass to establish on the site (Kovalchik 1987).

Timber oatgrass reproduces by seeds and tillering (Stubbendieck et al. 1986). Seedling establishment is best on exposed mineral soil. It also produces self-fertilized spikelets (cleistogenes) in the axils of the lower leaves (Welsh et al. 1987). This enables the plant to reproduce even if development of the flowering stalk is retarded. Sheep fescue is a perennial bunchgrass that reproduces by seed (Hitchcock and Cronquist 1973). Kentucky bluegrass, reed canarygrass, redtop, and Oregon bentgrass are invader and increaser (last two species) grasses that reproduce both from rhizomes and seed (Hitchcock and Cronquist 1973).

Artificial Establishment of MEADOW Series Plants—

As described in the previous section, almost all the MEADOW series indicator plants reproduce vigorously from rhizomes, the soil seed bank, or freshly dispersed seed. Live rooted plants, plugs, or segments of rhizomes can be used to rapidly establish many of these plants on appropriate fen, poor fen, or bog sites. Direct seeding of native grasses may be more appropriate for drier sites such as the DAIN and FEOVR associations or the drier edges of the CACA and DECE associations. In addition, the soil seed bank may provide for quick germination and establishment on newly disturbed sites. Individual plants will then spread from rhizomes. (For more information on the short- and long-term revegetation potential of selected riparian wetland plant species, see app. B-5.)

Stand Management—

The scattered conifers found on some sites are located on dry microsites such as hummocks or are invading drier transitional sites on the edges of wetlands. These trees have value as components of structural diversity as well as a future supply of snags and logs. Conifer vegetation adjacent to fens, poor fens, meadows, and bogs provide horizontal diversity at a landscape scale as well as contributing to woody debris input to MEADOW series sites.

Where sites have been highly altered, management should consider restoring MEADOW series vegetation for its excellent wildlife, fisheries, and streambank/shoreline stability values. Bare streambanks can be planted with live plants, plugs, and rhizomes or seeded, but the site must be protected from the limiting factor(s) that caused the vegetation to be originally decreased in cover or eliminated from the site. However, there usually are enough seeds in seed banks or rhizomes in nearby vegetation to regenerate disturbed sites.

Down Wood—

The overall amount of down woody debris is low compared with forest series (app. C-3). As trees generally do not grow onsite (except occasional dry microsites), logs cover less than 1 percent of the ground surface. However, these logs are extremely important for their added structural diversity and habitat for wildlife.

	Down log attributes				
Log decomposition	Tons/ acre	Cu. ft./ acre	Linear ft./ acre	Sq. ft./ acre	% ground cover
Class 1	0.05	4	7	5	0
Class 2	.23	25	71	40	.1
Class 3	.55	71	186	112	.3
Class 4	.69	197	267	219	.5
Class 5	0	1	2	1	0
Total	1.52	298	533	377	.9

Fire—

Fens, poor fens, bogs, and wet meadows near timberline or in alpine zones rarely dry out enough to carry fire. Although unusual, many of the low- to moderate-elevation fen associations such as CAUT, CAAQ, and CALA4 will

carry fire in the late fall or early spring when the previous culms are dry. Nonuse by livestock in the year preceding the fire is essential (Hansen et al. 1995). These sites usually are flooded or have saturated soils so that the heat of fire cannot harm them, except in severe drought years. Fall or spring fire consumes the aboveground biomass, but underground rhizomes remain undamaged, and plants quickly resprout during the growing season. Fire reduces litter accumulation and temporarily increases productivity. Species composition dominance will not change appreciably from that present before the fire. However, hot fires during periods of extreme drought can burn into the organic soil killing rhizomes and plants.

Associations such as DAIN, DECE, FEOVR, and CACA occur on drier (usually) mineral soils at the edge of wetlands and may be subject to more frequent fire (DeBenedetti and Parsons 1979, Hansen et al. 1995). Bluejoint reedgrass is resistant to all but the most intense ground fire as it quickly resprouts from rhizomes (Lyon and Stickney 1976). In addition, fire tends to reduce the abundance of associated species, dramatically increasing the cover of bluejoint reedgrass and other rhizomatous species (Haeussler and Coates 1986). Sheep fescue and tufted hairgrass have a dense, tufted base that is resistant to damage by low- to-moderate-intensity fire (DeBenedetti and Parsons 1979, Hansen et al. 1995). High-intensity fires do not usually destroy the root crown, but repeated burning could reduce their density and cover in favor of rhizomatous competitors. Timber oatgrass is intermediate in postfire regeneration response, and it takes 5 to 10 years to approximate preburn frequency and cover (Volland and Dell 1981).

Bog sites such as the CALI, ERPO2, and ELPA2 associations are resistant to damage by fire owing to saturated soils and sprouting from rhizomes of cotton-grass species and few-flowered spike-rush (Gartner et al. 1983, Kovalchik 1987). In addition, the biomass of the vegetation on these associations may be too low to carry a surface fire in normal years. Fire during periods of extreme drought may dry the soils enough to allow a deep, smoldering fire that destroys organic soils, rhizomes, and plants. However, such fires will create ideal seedbeds for the establishment of seedlings from the soil seed banks or, in the case of cotton-grass, from light, abundant, wind-borne seed (Gartner et al. 1986). Deeply burning ground fire reduces the accumulation of peat and may change the site potential away from bog species toward short willows and sedges.

Animals—

Biomass production. Forage estimates were not done for this study. However, potential biomass production for the plant associations in the taller, thicker graminoid communities is generally high, whereas production for the bog and shorter grass communities is low to moderate (Hansen et al. 1995, Kovalchik 1987). Total air-dry herbaceous biomass (pounds per acre) in several northeastern Oregon plant associations is shown in the following table (Crowe and Clausnitzer 1997). Stands in eastern Washington may be similar (app. B-5).

	Herbage production (pounds/acre dry weight)	
Plant association	Range	Average
ELPA2	488–900	536
GLEL	366–2,200	1,076
CALE5	833–2,000	1,523
SCMI	500–2,967	1,764
CASCB	733–3,377	2,092
DECE	900–5,066	2,538
CACU2-WA	1,387–4,033	2,563
CAUT	200–8,000	2,753
CAAQ	1,000–5,333	2,786
CACA	1,667–7,533	3,352

Livestock. Livestock use of the MEADOW series is variable depending on the plant association, season of use, previous grazing history, extent of the site, palatability of the herbs, forage production, soil wetness, and length of seasonal flooding (Hansen et al. 1995). On narrow riparian or wetland sites within rangelands, the MEADOW series may be heavily used, particularly when upland plants are overused or where livestock distribution or stocking rate problems occur. On larger fens and meadows, livestock use is usually less severe owing to abundant forage and wet soils. However, use and resultant long-term damage may be high on the drier, accessible fringe in associations such as DAIN, FEOVR, DECE, and CACA. Bogs (CALI, ERPO2, and ELPA2 associations) are especially resistant to livestock use and damage owing to permanently wet soils and the generally low palatability of the herbs.

Livestock forage values are variable and range from poor to good depending on the species (Hansen et al. 1995). Sheep have been reported to graze cotton-grass in Canada (Chapin and Slack 1979, Grant et al. 1987, Wein and MacLean 1973). Associations dominated by more palatable graminoids tend to be grazed earlier in summer if soils are not saturated. Palatability of sedges varies seasonally. Many of the sedges, even coarse sedges such as bladder sedge, provide palatable forage in spring, but use is usually delayed by flooded or wet soil. Some sedges may become tough in summer, but palatability usually increases late in the growing season relative to the uplands, especially after the first frost. At this time, both the availability and palatability of herbaceous forage in uplands is low, and livestock use may turn to the wetland and riparian zones.

In theory, MEADOW series vegetation should respond satisfactorily to more traditional upland grazing systems

(Hansen et al. 1995). Late-season use of less than 40 percent of the aboveground biomass (about a 4-inch stubble height) followed by a period of rest is best (Kovalchik and Elmore 1991). On sites adjacent to streams, residual cover can filter out sediments and protect streambanks during fall rains or spring runoff. Removing cattle from the allotment for at least 30 days during the growing season should provide for sedge regrowth and sufficient residual cover for streambank protection.

Frisina (1991) states that for a grazing system to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. To meet these requirements, long periods of rest are needed. It is during long growing-season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to improve or maintain the plant community.

Wet soils may deter animal use until late summer, which allows the graminoids to replenish carbohydrate reserves early in the growing season and persist within these associations (Hansen et al. 1995). Heavy grazing, especially for several seasons in a row, will markedly decrease the vigor and cover of highly palatable species, resulting in an increase in less palatable species such as Baltic rush or increaser grasses and forbs.

Wet mineral soils are very susceptible to compaction. Organic soils can be broken and churned by grazing animals at the wrong season of the year. For both soil types these actions can be very damaging (Hansen et al. 1995). The biomass productivity of these sites may be lowered as the soils are compacted, perhaps on account of lower soil porosity. This makes the sites less favorable for the usual plant dominants. Churned soils also lower biomass productivity through plant damage alone. The recovery from damage depends on the severity of disturbance. The combination of churned and compacted soil, replacement of natural dominants with increaser species and weeds, plus physical damage to the plants can result in long-term damage to the site that can take decades, even centuries to recover to predisturbance conditions. Improper trail location can lead to rutting, often in multiple parallel paths. Cattle can create rutting at water access points or while traveling along the stream or river channel. Ruts from any of these sources may concentrate floodwaters, creating streambank erosion or new channels. (For more information on forage palatability, see app. B-1. For potential biomass production, see app. B-5.)

Wildlife. The hiding and thermal cover value of the MEADOW series is generally poor for elk, deer, and moose unless in mosaic patterns with other series that provide cover such as SALIX and ALIN (app. B-3). Bluejoint reedgrass has been reported to furnish large amounts of forage for big game species and makes up a major portion of the winter diet of elk (Gullion 1964, Kufeld 1973, USDA FS 1937). Elk, deer, and moose may make moderate use of water sedge, inflated sedge, awned sedge, and tufted hairgrass. Slender sedge is seldom grazed by large ungulates on account of its low palatability, although deer have been observed eating its seed heads (Kovalchik 1987). Several members of the forb component of these graminoid-dominated sites may be important to bears (Foote 1983, Knight and Blanchard 1983). Horsetail species are a common component in many MEADOW associations and are an important part of the spring diet of black bears in interior Alaska. Horsetails also are a common spring food of grizzly bears. Bears also are known to eat tufted hairgrass (Hardy BBT Limited 1989). Thistle, white clover, common and water horsetail, American vetch, western yarrow, broadpetal strawberry, sweet-root, and Sitka valerian occur in small quantities in MEADOW plots and are important food sources for grizzly bears in Montana (Hansen et al. 1995).

Beaver play a vital role in the health, maintenance, and structure of riparian ecosystems (Gordon et al. 1992, Hansen et al. 1995). Beaver dams assist in controlling downcutting of channels, bank erosion, and the movement of sediments downstream. When beavers construct a dam, they raise the water table in the surrounding area, which provides water for hydrophilous plants such as willow and sedge. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition plus plant production raises the channel and pond bed, creating a wetland environment that is excellent waterfowl and fish habitat. Water storage provided by beaver dams and surrounding soils benefits the water regime by releasing water during summer low flow periods. Landowners often trap and kill beaver because they are considered a nuisance. However, beaver produce such desirable habitat and beneficial stream functions that their removal from a stream system needs to be closely evaluated. The variety of herbs associated with the MEADOW series as well as the shrubs and herbs in the adjacent carrs and fens provide a variety of forage as well as dam building materials for beaver. Although willows and aspen are generally thought of as primary beaver forage, beaver have been observed to make extensive use of the roots, rhizomes, and foliage of common cattail, small-fruited bulrush, Indian water-lily, sedges, and other AQUATIC and MEADOW vegetation in study plots.

The wettest MEADOW series sites (such as the CALA4, CAUT, and CAVE associations) are flooded long enough to provide important nesting habitat for waterfowl (Kovalchik 1987). Additionally, these and other plant associations are often adjacent to open water where they provide valuable

feeding areas for waterfowl. These wet associations may be more important as feeding grounds than nesting grounds owing to the low stature of the plants, lack of structural diversity, and high water levels (Youngblood et al. 1985a). The seeds of the various graminoids provide valuable food for a variety of waterfowl and songbirds. Birds commonly associated with fen habitat include mallard, green-winged teal, common yellowthroat, red-winged blackbird, song sparrow, common snipe, sandhill crane, and tree swallow (Douglas and Ratti 1984). The CAUT association is an important breeding and feeding ground for geese in northern Canada (Vogl 1964). (For more information on thermal or feeding cover values, see apps. B-2 and B-3. For information on food values or degree of use, see apps. B-2 and B-4.)

Fish. The MEADOW series provides valuable spawning areas, feeding areas (insects), and hiding cover for many species of fish. The wettest MEADOW series sites (such as the CASCP2, CASCB, CAUT, and CAAQ associations) are often located adjacent to streams, rivers, lakes, or ponds supporting trout fisheries (Hansen et al. 1995). The rhizomatous growth habit of the graminoids usually provides a dense sod that stabilizes soils and streambanks, and provides overhead cover for fish habitat. (For more information, see app. B-5, erosion control potential.) The sod also may be undercut and sag into the water providing additional excellent cover for fish. The weight of livestock can cause sloughing where the sod is undercut and suspended over the water (Hansen et al. 1995).

Recreation—

The MEADOW series provide valuable bird or big game animal watching, fishing, and waterfowl hunting opportunities. Heavy use by people in spring and summer can result in soil compaction, bank damage, and exposed soils along streambanks. Ruts from any source may concentrate floodwaters, creating streambank erosion or new channels. Improper off-road vehicle use also creates long-term ecosystem damage. Many MEADOW sites have been literally destroyed by inconsiderate off-road vehicle use. Vigorous efforts to discourage off-road travel on MEADOW series sites are appropriate for resource protection of new roads and trails, which should be located in adjacent uplands. The key to natural restoration of MEADOW sites is to change the management factors that led to the deterioration of the site. Eliminating or discouraging use of dispersed campsites or off-road vehicle use will often lead to the reestablishment of native vegetation and ultimately the return of the site to proper functioning condition.

Estimating Vegetation Potential on Disturbed Sites—

Estimating vegetation potential on disturbed sites is not usually necessary on FS lands in eastern Washington because most sites are minimally affected by people on account of wet soils (which discourage livestock and off-road vehicle use) and high productivity (resiliency) of the sites. There is usually sufficient native vegetation to identify the MEADOW series and plant associations. For the rare stand where the potential natural vegetation has been altered to increaser or invader species, users can rely on past experience or look at adjacent drainages to help estimate the potential.

Sensitive Species—

The MEADOW series supports more sensitive plants than all other series combined (app. D). Thirty-one of the 54 individual sensitive plants found were located on the CALA4, CASA2, CAUT, and ELPA2 associations. Sensitive plants also are relatively common on the CACU2, CARO2, CASCP2, DAIN, and ERPO2 associations. Russet sedge and green-keeled cotton-grass are particularly common on the ecology plots and could perhaps be eliminated from the Washington state sensitive plant species list (app. D).

	Sensitive species														
Plant association	pale agoseris	yellow sedge	Smoky Mountain sedge	beaked sedge	russet sedge	western singlespike sedge	bulbed water-hemlock	crested shield-fern	green-keeled cotton-grass	water avens	curved woodrush	marsh muhly	hoary willow	McCalla's willow	N
CAAP3									1						1
CAAQ										1					1
CACU2-WA		1						1							2
CALA4		1		1			1		2						5
CALI									1						1
CAMU2									1						1
CANI2			1												1
CARO2				3											3
CASA2					4				1						5
CASCB					1				1		1				3
CASCP2					1				2						3
CAUT		1			1		1		3	2			2		10
DAIN					1	1			1						3
ELPA2		1			2				5	1		1		1	11
ERPO2					1				2						3
FEOVR	1														1
Series total	1	4	1	4	11	1	2	1	20	4	1	1	2	1	54

ADJACENT SERIES

The numerous plant associations in the MEADOW series occur at all elevations and can be found adjacent to virtually all upland forest series described for eastern Washington NFs (Lillybridge et al. 1995, Williams et al. 1995). The MEADOW series also is bounded by shrub-steppe at lower elevations and alpine meadows, rock, and cliffs above timberline.

RELATIONSHIPS TO OTHER CLASSIFICATIONS

Kovalchik (1992c) described many of the plant associations in the MEADOW series in the draft classification for northeastern Washington. MEADOW associations and community types are described throughout North America. Classifications in and near the study area include those in eastern Washington, northern Idaho, and Montana (Crawford 2003; Hansen et al. 1988, 1995; Kovalchik 1992c); central and northeastern Oregon (Crowe and Clausnitzer 1997, Kovalchik 1987); and Idaho, Utah, and Nevada (Manning and Padgett 1995; Padgett et al. 1989; Youngblood et al. 1985a, 1985b).

U.S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE WETLANDS CLASSIFICATION

Owing to its variability, the classification will vary according to the MEADOW plant association and flood regime. It is possible for individual associations to belong to different wetland classification classes, depending on the size of the water body and the flood regime. Most of the wettest associations belong to the system palustrine; class, emergent wetland; subclass, persistent; water regime, (nontidal) temporarily saturated to semipermanently flooded.

KEY TO THE MEADOW PLANT ASSOCIATIONS

1. Aquatic sites on the edges of lakes or ponds or in sluggish streams, usually with standing water for all or much of the growing season, potential vegetation with species such as NUPO, POTAM, POAM2, SCVA, SPARG, GLBO, EQFL, TYLA, ELPA, or PUPAM with combined canopy coverage of at least 25 percent or dominant ..... **Go to "Key to the Aquatic Plant Associations"** (p. 238)
2. Potential vegetation dominated by sedge (*Carex* spp.*)* with combined canopy coverage of at least 25 percent or dominant and *Eriophorum* and *Eleocharis* spp. <25 percent ..... **"Key to the Sedge Plant Associations"** (below)
3. Sedge species with a combined canopy coverage of <25 percent or not dominant ..... **"Key to the Nonsedge Plant Associations"** (below)

Key to the Sedge *(Carex)* Plant Associations

1. Russet sedge (*Carex saxatilis*) ≥25 percent canopy coverage or dominant ..... **Russet sedge (CASA2) association**
2. Saw-leaved sedge (*Carex scopulorum* var. *prionophylla*) ≥25 percent canopy coverage or dominant ..... **Saw-leaved sedge (CASCP2) association**
3. Holm's sedge (*Carex scopulorum* var. *bracteosa*) ≥25 percent canopy coverage or dominant ..... **Holm's sedge (CASCB) association**
4. Showy sedge (*Carex spectabilis*) ≥25 percent canopy coverage or dominant ..... **Showy sedge (CASP) association**
5. Sheep sedge (*Carex illota*) ≥25 percent canopy coverage or dominant ..... **Sheep sedge (CAIL) association**
6. Black alpine sedge (*Carex nigricans*) ≥25 percent canopy coverage or dominant (plots with hidden, minute, *Ericaceous* shrubs should stay here) ..... **Black alpine sedge (CANI2) association**
7. Cusick's sedge (*Carex cusickii)* ≥25 percent canopy coverage or dominant ..... **Cusick's sedge (CACU2) association**
8. Beaked sedge (*Carex rostrata*) ≥25 percent canopy coverage or dominant ..... **Beaked sedge (CARO2) association**
9. Bladder sedge (*Carex utriculata*) and/or awned sedge (*Carex atherodes*) ≥25 percent canopy coverage or dominant ..... **Bladder sedge (CAUT) association**
10. Inflated sedge (*Carex vesicaria*) ≥25 percent canopy coverage or dominant ..... **Inflated sedge (CAVE) association**

11. Columbia sedge (*Carex aperta*) ≥25 percent canopy coverage or dominant ..... **Columbia sedge (CAAP3) association**
12. Water sedge (*Carex aquatilis* var. *aquatilis*) and/or Sitka sedge (*Carex aquatilis* var. *sitchensis*) ≥25 percent canopy coverage or dominant ..... **Water sedge (CAAQ) association**
13. Mud sedge (*Carex limosa*) and/or poor sedge (*Carex paupercula*) ≥25 percent canopy coverage or dominant ..... **Mud sedge (CALI) association**
14. Slender sedge (*Carex lasiocarpa*) and/or Buxbaum's sedge (*Carex buxbaumii*) ≥25 percent canopy coverage or dominant ..... **Slender sedge (CALA4) association**
15. Lenticular sedge (*Carex lenticularis*) ≥25 percent canopy coverage or dominant ..... **Lenticular sedge (CALE5) association**

Key to the Nonsedge Plant Associations

1. Creeping spike-rush (*Eleocharis palustris*) ≥25 percent canopy coverage or dominant ..... **Go to the key to the AQUATIC series or creeping spike-rush (ELPA) association**
2. Few-flowered spike-rush (*Eleocharis pauciflora*) ≥25 percent canopy coverage or dominant ..... **Few-flowered spike-rush (ELPA2) association**
3. Cotton-grass species (*Eriophorum* spp.), individually or in combination, ≥10 percent canopy coverage ..... **Many-spiked cotton-grass (ERPO2) association**
4. Small-fruited bulrush (*Scirpus microcarpus*) ≥25 percent canopy coverage or dominant ..... **Small-fruited bulrush (SCMI) association**
5. Tall mannagrass (*Glyceria elata*) and/or reed mannagrass (*G. grandis*) ≥25 percent canopy coverage or dominant ..... **Tall mannagrass (GLEL) association**
6. Bluejoint reedgrass (*Calamagrostis canadensis*) ≥25 percent canopy coverage or dominant ..... **Bluejoint reedgrass (CACA) association**
7. Tufted hairgrass (*Deschampsia cespitosa*) ≥25 percent canopy coverage or dominant ..... **Tufted hairgrass (DECE) association**
8. Timber oatgrass (*Danthonia intermedia*) ≥25 percent canopy coverage or dominant (plots with abundant but hidden, minute, *Ericaceous* shrubs should stay here) ..... **Timber oatgrass (DAIN) association**
9. Sheep fescue (*Festuca ovina* var. *rybergii)* ≥25 percent canopy coverage or dominant (plots with abundant but hidden, minute, *Ericaceous* shrubs should stay here) ..... **Sheep fescue (FEOVR) association**
10. Introduced or increaser grasses such as Kentucky bluegrass (*Poa pratensis*), reed canarygrass (*Phalaris arundinacea*), redtop (*Agrostis alba*), or Oregon bentgrass (*Agrostis oregonensis*) ≥25 percent canopy coverage or dominant ..... **POPR community type**

Table 24—Constancy and mean cover of important plant species in the MEADOW plant associations—Part 1

Species	Code	CACA 12 plots		DAIN 5 plots		DECE 4 plots		ELPA2 13 plots		ERPO2 19 plots		FEOVR 2 plots	
		CON[a]	COV[b]	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV
Tree understory:													
subalpine fir	ABLA2	17	2	40	8	—	—	15	Tr[c]	32	1	—	—
Engelmann spruce	PIEN	17	1	40	4	25	Tr	23	1	32	1	—	—
lodgepole pine	PICO	8	Tr	20	4	25	Tr	23	1	11	3	50	Tr
Shrubs:													
mountain alder	ALIN	25	6	—	—	—	—	—	—	11	3	—	—
red-osier dogwood	COST	25	Tr	—	—	—	—	—	—	—	—	—	—
Low shrubs and subshrubs:													
red mountain-heath	PHEM	8	15	40	5	—	—	—	—	16	1	—	—
Farr's willow	SAFA	—	—	60	7	—	—	31	2	5	Tr	—	—
tea-leaved willow	SAPLM2	—	—	—	—	—	—	8	Tr	5	8	50	15
dwarf huckleberry	VACA	8	20	100	10	—	—	8	Tr	11	Tr	100	25
Perennial forbs:													
western yarrow	ACMI	33	1	20	3	75	2	—	—	—	—	50	1
woolly pussytoes	ANLA	8	2	40	1	—	—	—	—	—	—	50	5
umber pussytoes	ANUM	8	2	60	5	—	—	—	—	—	—	—	—
fewflower aster	ASMO	17	31	—	—	—	—	8	Tr	5	Tr	—	—
western aster	ASOC	17	1	—	—	50	15	—	—	—	—	—	—
aster species	ASTER	25	2	80	2	—	—	15	3	16	3	—	—
twinflower marshmarigold	CABI	17	5	—	—	—	—	31	2	21	3	—	—
alpine willow-weed	EPAL	—	—	20	Tr	25	Tr	8	1	11	Tr	—	—
smooth willow-weed	EPGL	—	—	—	—	—	—	—	—	5	Tr	—	—
Watson's willow-weed	EPWA	8	2	—	—	50	1	—	—	—	—	—	—
peregrine fleabane	ERPE	8	3	20	Tr	25	1	—	—	—	—	—	—
broadpetal strawberry	FRVIP	8	2	—	—	50	1	8	Tr	5	1	50	5
small bedstraw	GATR	42	2	—	—	75	1	8	Tr	—	—	—	—
largeleaf avens	GEMA	50	2	—	—	50	1	—	—	—	—	50	1
partridgefoot	LUPE	—	—	20	Tr	—	—	—	—	—	—	—	—
broadleaf lupine	LULA	—	—	40	Tr	—	—	—	—	—	—	—	—
common bogbean	METR	—	—	—	—	—	—	8	2	11	6	—	—
elephanthead pedicularis	PEGR	17	3	40	1	—	—	62	2	47	2	—	—
fanleaf cinquefoil	POFL2	8	15	80	4	—	—	31	Tr	16	1	50	3
marsh cinquefoil	POPA3	17	5	—	—	—	—	8	3	11	3	—	—
scheuchzeria	SCPA	—	—	—	—	—	—	8	3	—	—	—	—
cleftleaf groundsel	SECY	—	—	20	5	—	—	8	1	11	4	—	—
arrowleaf groundsel	SETR	17	18	—	—	25	Tr	—	—	16	2	—	—
Canada goldenrod	SOCA	8	77	—	—	25	15	8	2	—	—	—	—
ladies-tresses	SPRO	—	—	20	1	—	—	38	Tr	11	Tr	—	—
Cooley's hedge-nettle	STCO4	8	48	—	—	—	—	—	—	—	—	—	—
globeflower	TRLA4	—	—	20	Tr	—	—	8	Tr	11	8	—	—
Sitka valerian	VASI	8	3	20	Tr	—	—	—	—	5	1	—	—
American false hellebore	VEVI	8	8	—	—	—	—	—	—	16	Tr	—	—
thyme-leaved speedwell	VESE	—	—	20	3	50	Tr	—	—	—	—	—	—
Wormskjold's speedwell	VEWO	17	1	20	2	—	—	15	1	11	1	—	—
pioneer violet	VIGL	17	26	—	—	—	—	8	Tr	—	—	—	—
Grasses or grasslike:													
redtop	AGAL	17	20	—	—	—	—	—	—	5	2	—	—
Oregon bentgrass	AGOR	8	1	—	—	—	—	8	5	—	—	—	—
Thurber's bentgrass	AGTH	—	—	—	—	—	—	15	1	21	1	—	—
bluejoint reedgrass	CACA	100	60	60	4	25	Tr	38	1	32	1	—	—
Columbia sedge	CAAP3	8	10	—	—	—	—	—	—	—	—	—	—
water sedge	CAAQA	8	Tr	—	—	—	—	8	5	—	—	—	—
Sitka sedge	CAAQS	8	Tr	—	—	—	—	8	7	5	3	—	—
awned sedge	CAAT2	8	Tr	—	—	—	—	—	—	—	—	—	—
slender-beaked sedge	CAAT	8	1	—	—	75	4	—	—	—	—	—	—
Buxbaum's sedge	CABU2	—	—	—	—	—	—	15	11	5	60	—	—
gray sedge	CACA4	8	3	—	—	—	—	—	—	11	Tr	—	—
Cusick's sedge	CACU2	—	—	—	—	—	—	—	—	—	—	—	—
lesser panicled sedge	CADI2	—	—	—	—	—	—	—	—	5	3	—	—
sheep sedge	CAIL	—	—	20	Tr	—	—	8	Tr	21	4	—	—
slender sedge	CALA4	—	—	—	—	—	—	15	3	—	—	—	—
tufted sedge	CALE5	8	1	20	Tr	25	Tr	23	1	11	Tr	—	—
mud sedge	CALI	—	—	—	—	—	—	23	1	11	6	—	—
black alpine sedge	CANI2	—	—	40	4	—	—	8	Tr	26	7	—	—
thick-headed sedge	CAPA	25	2	40	2	50	4	15	2	—	—	100	6
beaked sedge	CARO2	—	—	—	—	—	—	—	—	—	—	—	—
russet sedge	CASA2	—	—	20	2	—	—	15	9	5	Tr	—	—

Table 24—Constancy and mean cover of important plant species in the MEADOW plant associations—Part 1 (continued)

Species	Code	CACA 12 plots		DAIN 5 plots		DECE 4 plots		ELPA2 13 plots		ERPO2 19 plots		FEOVR 2 plots	
		CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV
Holm's sedge	CASCB	8	Tr	—	—	25	8	23	5	37	9	—	—
saw-leaved sedge	CASCP2	17	2	60	Tr	—	—	31	10	37	6	50	2
showy sedge	CASP	—	—	20	Tr	—	—	—	—	16	5	—	—
bladder sedge	CAUT	33	3	—	—	50	11	31	5	37	4	—	—
inflated sedge	CAVE	17	2	—	—	—	—	—	—	—	—	—	—
timber oatgrass	DAIN	—	—	100	34	25	Tr	31	2	—	—	100	5
tufted hairgrass	DECE	17	8	—	—	100	54	8	1	—	—	—	—
creeping spike-rush	ELPA	—	—	—	—	—	—	—	—	—	—	—	—
few-flowered spike-rush	ELPA2	—	—	—	—	—	—	100	55	47	7	—	—
Chamisso cotton-grass	ERCH2	—	—	—	—	—	—	—	—	5	40	—	—
slender cotton-grass	ERGR8	—	—	—	—	—	—	—	—	—	—	—	—
many-spiked cotton-grass	ERPO2	8	Tr	—	—	—	—	46	8	84	33	—	—
green-keeled cotton-grass	ERVI	—	—	20	3	—	—	38	13	11	40	—	—
sheep fescue	FEOVR	—	—	—	—	—	—	—	—	—	—	100	43
green fescue	FEVI	—	—	60	6	—	—	—	—	—	—	—	—
tall mannagrass	GLEL	33	3	—	—	—	—	—	—	—	—	—	—
reed mannagrass	GLGR	—	—	—	—	—	—	—	—	—	—	—	—
fowl mannagrass	GLST	—	—	—	—	—	—	8	2	—	—	—	—
Baltic rush	JUBA	8	1	—	—	25	7	—	—	—	—	—	—
Drummond's rush	JUDR	—	—	40	Tr	—	—	—	—	—	—	—	—
Reed canarygrass	PHAR	—	—	—	—	—	—	—	—	—	—	—	—
Kentucky bluegrass	POPR	17	1	—	—	75	1	—	—	—	—	—	—
small-fruited bulrush	SCMI	8	20	—	—	—	—	—	—	—	—	—	—
spike trisetum	TRSP	—	—	40	8	25	Tr	—	—	—	—	100	4
Ferns and fern allies:													
common horsetail	EQAR	33	3	40	Tr	—	—	15	1	26	3	—	—
water horsetail	EQFL	—	—	—	—	—	—	—	—	11	1	—	—

[a] CON = percentage of plots in which the species occurred.
[b] COV = average canopy cover in plots in which the species occurred.
[c] Tr = trace cover, less than 1 percent canopy cover.

Table 24—Constancy and mean cover of important plant species in the MEADOW plant associations—Part 2

Species	Code	GLEL 4 plots		POPR 5 plots		SCMI 6 plots		CAAP3 2 plots		CAAQ 11 plots		CACU2-WA 4 plots	
		CON[a]	COV[b]	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV
Tree understory:													
subalpine fir	ABLA2	—	—	—	—	—	—	—	—	—	—	—	—
Engelmann spruce	PIEN	—	—	—	—	—	—	—	—	9	Tr	25	Tr[c]
lodgepole pine	PICO	—	—	—	—	—	—	—	—	9	Tr	—	—
Shrubs:													
mountain alder	ALIN	50	6	—	—	50	4	—	—	18	1	75	10
red-osier dogwood	COST	50	Tr	40	2	17	Tr	—	—	9	1	25	2
Low shrubs and subshrubs:													
red mountain-heath	PHEM	—	—	—	—	—	—	—	—	—	—	—	—
Farr's willow	SAFA	—	—	—	—	—	—	—	—	9	7	—	—
tea-leaved willow	SAPLM2	—	—	—	—	—	—	—	—	9	2	—	—
dwarf huckleberry	VACA	—	—	—	—	—	—	—	—	—	—	—	—
Perennial forbs:													
western yarrow	ACMI	—	—	40	1	—	—	—	—	9	Tr	—	—
woolly pussytoes	ANLA	—	—	—	—	—	—	—	—	—	—	—	—
umber pussytoes	ANUM	—	—	—	—	—	—	—	—	—	—	—	—
fewflower aster	ASMO	50	2	—	—	—	—	—	—	—	—	—	—
western aster	ASOC	25	Tr	—	—	17	Tr	—	—	—	—	—	—
aster species	ASTER	—	—	—	—	—	—	—	—	—	—	25	1
twinflower marshmarigold	CABI	—	—	—	—	—	—	—	—	—	—	—	—
alpine willow-weed	EPAL	—	—	—	—	—	—	—	—	—	—	—	—
smooth willow-weed	EPGL	25	7	—	—	50	1	—	—	—	—	—	—
Watson's willow-weed	EPWA	50	11	20	3	—	—	—	—	9	Tr	—	—
peregrine fleabane	ERPE	—	—	—	—	—	—	—	—	—	—	—	—
broadpetal strawberry	FRVIP	—	—	40	4	—	—	—	—	—	—	25	Tr
small bedstraw	GATR	75	3	—	—	17	15	—	—	27	1	25	2
largeleaf avens	GEMA	75	2	20	1	17	Tr	—	—	27	1	25	Tr
partridgefoot	LUPE	—	—	—	—	—	—	—	—	—	—	—	—
broadleaf lupine	LULA	—	—	—	—	—	—	—	—	—	—	—	—

Table 24—Constancy and mean cover of important plant species in the MEADOW plant associations—Part 2 (continued)

Species	Code	GLEL 4 plots		POPR 5 plots		SCMI 6 plots		CAAP3 2 plots		CAAQ 11 plots		CACU2-WA 4 plots	
		CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	CON
common bogbean	METR	—	—	—	—	—	—	—	—	—	—	—	—
elephanthead pedicularis	PEGR	—	—	—	—	—	—	—	—	9	5	—	—
fanleaf cinquefoil	POFL2	—	—	—	—	—	—	—	—	—	—	—	—
marsh cinquefoil	POPA3	25	Tr	—	—	—	—	—	—	55	3	50	10
scheuchzeria	SCPA	—	—	—	—	—	—	—	—	—	—	—	—
cleftleaf groundsel	SECY	—	—	—	—	—	—	—	—	—	—	—	—
arrowleaf groundsel	SETR	—	—	—	—	—	—	—	—	—	—	—	—
Canada goldenrod	SOCA	—	—	20	1	—	—	—	—	—	—	—	—
ladies-tresses	SPRO	—	—	—	—	—	—	—	—	—	—	—	—
Cooley's hedge-nettle	STCO4	—	—	—	—	—	—	—	—	9	1	25	2
globeflower	TRLA4	—	—	—	—	—	—	—	—	—	—	—	—
Sitka valerian	VASI	—	—	—	—	—	—	—	—	—	—	—	—
American false hellebore	VEVI	—	—	—	—	—	—	—	—	—	—	—	—
thyme-leaved speedwell	VESE	—	—	—	—	17	Tr	—	—	—	—	—	—
Wormskjold's speedwell	VEWO	—	—	—	—	—	—	—	—	—	—	—	—
pioneer violet	VIGL	—	—	—	—	—	—	—	—	—	—	—	—
Grasses or grasslike:													
redtop	AGAL	50	1	40	31	17	1	—	—	—	—	—	—
Oregon bentgrass	AGOR	—	—	20	60	—	—	—	—	—	—	—	—
Thurber's bentgrass	AGTH	—	—	—	—	—	—	—	—	9	3	—	—
bluejoint reedgrass	CACA	25	15	—	—	33	8	—	—	45	15	25	1
Columbia sedge	CAAP3	—	—	—	—	—	—	100	43	—	—	—	—
water sedge	CAAQA	—	—	—	—	—	—	—	—	18	79	—	—
Sitka sedge	CAAQS	—	—	—	—	17	Tr	—	—	82	46	—	—
awned sedge	CAAT2	—	—	—	—	—	—	—	—	—	—	—	—
slender-beaked sedge	CAAT	25	Tr	20	3	—	—	—	—	—	—	—	—
Buxbaum's sedge	CABU2	—	—	—	—	—	—	—	—	—	—	—	—
gray sedge	CACA4	—	—	—	—	—	—	—	—	18	4	50	1
Cusick's sedge	CACU2	—	—	—	—	—	—	—	—	9	3	100	56
lesser panicled sedge	CADI2	—	—	—	—	—	—	—	—	—	—	—	—
sheep sedge	CAIL	—	—	—	—	—	—	—	—	—	—	—	—
slender sedge	CALA4	—	—	—	—	—	—	—	—	—	—	—	—
tufted sedge	CALE5	25	Tr	20	1	50	8	—	—	9	54	—	—
mud sedge	CALI	—	—	—	—	—	—	—	—	—	—	—	—
black alpine sedge	CANI2	—	—	—	—	—	—	—	—	—	—	—	—
thick-headed sedge	CAPA	25	Tr	20	12	33	Tr	—	—	—	—	—	—
beaked sedge	CARO2	—	—	—	—	—	—	—	—	—	—	—	—
russet sedge	CASA2	—	—	—	—	—	—	—	—	—	—	—	—
Holm's sedge	CASCB	—	—	—	—	—	—	50	5	—	—	—	—
saw-leaved sedge	CASCP2	—	—	—	—	—	—	—	—	18	3	—	—
showy sedge	CASP	—	—	—	—	—	—	—	—	—	—	—	—
bladder sedge	CAUT	50	5	—	—	33	11	50	Tr	100	9	100	6
inflated sedge	CAVE	25	Tr	—	—	33	1	—	—	9	2	—	—
timber oatgrass	DAIN	—	—	20	Tr	—	—	—	—	—	—	—	—
tufted hairgrass	DECE	—	—	20	3	—	—	—	—	—	—	—	—
creeping spike-rush	ELPA	75	1	—	—	33	2	50	1	9	Tr	—	—
few-flowered spike-rush	ELPA2	—	—	—	—	—	—	—	—	—	—	—	—
Chamisso cotton-grass	ERCH2	—	—	—	—	—	—	—	—	—	—	—	—
slender cotton-grass	ERGR8	—	—	—	—	—	—	—	—	—	—	—	—
many-spiked cotton-grass	ERPO2	—	—	—	—	—	—	—	—	18	Tr	—	—
green-keeled cotton-grass	ERVI	—	—	—	—	—	—	50	15	—	—	—	—
sheep fescue	FEOVR	—	—	—	—	—	—	—	—	—	—	—	—
green fescue	FEVI	—	—	—	—	—	—	—	—	—	—	—	—
tall mannagrass	GLEL	75	35	—	—	33	4	—	—	—	—	—	—
reed mannagrass	GLGR	25	35	—	—	—	—	—	—	—	—	25	1
fowl mannagrass	GLST	—	—	—	—	17	Tr	—	—	—	—	75	4
Baltic rush	JUBA	—	—	—	—	17	3	—	—	9	3	—	—
Drummond's rush	JUDR	—	—	—	—	—	—	—	—	—	—	—	—
reed canarygrass	PHAR	—	—	20	75	17	20	—	—	—	—	—	—
Kentucky bluegrass	POPR	25	1	40	40	33	Tr	—	—	—	—	—	—
small-fruited bulrush	SCMI	50	9	—	—	100	62	—	—	—	—	—	—
spike trisetum	TRSP	—	—	—	—	—	—	—	—	—	—	—	—
Ferns and fern allies:													
common horsetail	EQAR	75	5	40	2	67	2	50	Tr	18	1	25	Tr
water horsetail	EQFL	—	—	—	—	17	5	—	—	—	—	—	—

[a] CON = percentage of plots in which the species occurred.
[b] COV = average canopy cover in plots in which the species occurred.
[c] Tr = trace cover, less than 1 percent canopy cover.

Table 24—Constancy and mean cover of important plant species in the MEADOW plant associations—Part 3

		CAIL 3 plots		CALA4 11 plots		CALE5 3 plots		CALI 4 plots		CANI2 30 plots		CARO2 3 plots	
Species	**Code**	**CON[a]**	**COV[b]**	**CON**	**COV**	**CON**	**COV**	**CON**	**COV**	**CON**	**COV**	**CON**	**CON**
Tree understory:													
subalpine fir	ABLA2	—	—	—	—	—	—	—	—	40	2	—	—
Engelmann spruce	PIEN	33	Tr	9	Tr[c]	—	—	—	—	33	1	—	—
lodgepole pine	PICO	—	—	27	Tr	—	—	—	—	3	3	—	—
Shrubs:													
mountain alder	ALIN	—	—	18	Tr	—	—	—	—	—	—	—	—
red-osier dogwood	COST	—	—	—	—	—	—	—	—	—	—	—	—
Low shrubs and subshrubs:													
red mountain-heath	PHEM	—	—	—	—	—	—	—	—	63	2	—	—
Farr's willow	SAFA	33	Tr	9	2	—	—	50	16	20	2	—	—
tea-leaved willow	SAPLM2	67	2	9	1	—	—	—	—	10	5	—	—
dwarf huckleberry	VACA	—	—	—	—	—	—	—	—	40	5	—	—
Perennial forbs:													
western yarrow	ACMI	—	—	—	—	—	—	—	—	3	Tr	—	—
woolly pussytoes	ANLA	—	—	—	—	—	—	—	—	27	1	—	—
umber pussytoes	ANUM	—	—	—	—	—	—	—	—	10	1	—	—
fewflower aster	ASMO	—	—	—	—	—	—	—	—	7	5	—	—
western aster	ASOC	—	—	9	2	—	—	—	—	—	—	—	—
aster species	ASTER	—	—	9	1	—	—	—	—	13	4	—	—
twinflower marshmarigold	CABI	67	6	—	—	—	—	—	—	23	3	—	—
alpine willow-weed	EPAL	67	1	9	1	—	—	25	Tr	47	2	—	—
smooth willow-weed	EPGL	—	—	—	—	—	—	—	—	—	—	—	—
Watson's willow-weed	EPWA	—	—	9	1	—	—	—	—	—	—	—	—
peregrine fleabane	ERPE	—	—	—	—	—	—	—	—	10	4	—	—
broadpetal strawberry	FRVIP	—	—	—	—	—	—	—	—	—	—	—	—
small bedstraw	GATR	—	—	45	1	—	—	—	—	—	—	—	—
largeleaf avens	GEMA	—	—	27	Tr	—	—	—	—	—	—	—	—
partridgefoot	LUPE	—	—	—	—	—	—	—	—	33	3	—	—
broadleaf lupine	LULA	—	—	—	—	—	—	—	—	10	1	—	—
common bogbean	METR	—	—	36	5	—	—	50	4	—	—	33	5
elephanthead pedicularis	PEGR	—	—	9	3	—	—	—	—	40	2	33	1
fanleaf cinquefoil	POFL2	—	—	—	—	—	—	—	—	57	2	—	—
marsh cinquefoil	POPA3	—	—	82	7	—	—	75	6	—	—	67	1
scheuchzeria	SCPA	—	—	—	—	—	—	75	10	—	—	—	—
cleftleaf groundsel	SECY	67	10	—	—	—	—	—	—	40	4	—	—
arrowleaf groundsel	SETR	—	—	—	—	—	—	—	—	20	1	—	—
Canada goldenrod	SOCA	—	—	9	Tr	—	—	—	—	—	—	—	—
ladies-tresses	SPRO	—	—	9	Tr	—	—	50	1	—	—	—	—
Cooley's hedge-nettle	STCO4	—	—	—	—	—	—	—	—	—	—	—	—
globeflower	TRLA4	—	—	—	—	—	—	—	—	13	9	—	—
Sitka valerian	VASI	—	—	—	—	—	—	—	—	20	3	—	—
American false hellebore	VEVI	—	—	—	—	—	—	—	—	30	3	—	—
thyme-leaved speedwell	VESE	—	—	—	—	—	—	—	—	10	2	—	—
Wormskjold's speedwell	VEWO	33	Tr	—	—	—	—	—	—	27	1	—	—
pioneer violet	VIGL	—	—	—	—	—	—	—	—	—	—	—	—
Grasses or grasslike:													
redtop	AGAL	—	—	—	—	—	—	—	—	—	—	—	—
Oregon bentgrass	AGOR	—	—	36	3	—	—	—	—	—	—	—	—
Thurber's bentgrass	AGTH	33	2	—	—	—	—	—	—	20	7	—	—
bluejoint reedgrass	CACA	—	—	18	1	—	—	25	Tr	17	3	—	—
Columbia sedge	CAAP3	—	—	9	15	—	—	—	—	—	—	—	—
water sedge	CAAQA	—	—	9	10	—	—	—	—	—	—	—	—
Sitka sedge	CAAQS	—	—	9	3	—	—	25	2	—	—	—	—
awned sedge	CAAT2	—	—	—	—	—	—	—	—	—	—	—	—
slender-beaked sedge	CAAT	—	—	—	—	—	—	—	—	—	—	—	—
Buxbaum's sedge	CABU2	—	—	27	20	—	—	—	—	—	—	—	—
gray sedge	CACA4	—	—	36	2	—	—	25	5	—	—	—	—
Cusick's sedge	CACU2	—	—	18	Tr	—	—	—	—	—	—	—	—
lesser panicled sedge	CADI2	—	—	9	Tr	—	—	50	5	—	—	—	—
sheep sedge	CAIL	100	57	9	Tr	33	5	—	—	10	5	—	—
slender sedge	CALA4	—	—	82	54	—	—	25	1	—	—	67	2
tufted sedge	CALE5	33	7	—	—	100	47	—	—	—	—	—	—
mud sedge	CALI	—	—	27	6	—	—	100	28	—	—	33	3
black alpine sedge	CANI2	100	19	—	—	—	—	—	—	100	51	—	—
thick-headed sedge	CAPA	—	—	—	—	—	—	—	—	3	Tr	—	—
beaked sedge	CARO	—	—	9	1	—	—	—	—	—	—	100	60
russet sedge	CASA2	—	—	—	—	—	—	—	—	—	—	—	—

Table 24—Constancy and mean cover of important plant species in the MEADOW plant associations—Part 3 (continued)

Species	Code	CAIL 3 plots		CALA4 11 plots		CALE5 3 plots		CALI 4 plots		CANI2 30 plots		CARO2 3 plots	
		CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	CON
Holm's sedge	CASCB	33	Tr	—	—	—	—	—	—	33	5	—	—
saw-leaved sedge	CASCP2	—	—	—	—	33	Tr	—	—	20	4	—	—
showy sedge	CASP	—	—	—	—	—	—	—	—	23	5	—	—
bladder sedge	CAUT	—	—	91	8	—	—	50	3	—	—	67	3
inflated sedge	CAVE	—	—	—	—	33	5	—	—	—	—	—	—
timber oatgrass	DAIN	—	—	—	—	—	—	—	—	13	5	—	—
tufted hairgrass	DECE	—	—	—	—	—	—	—	—	13	5	—	—
creeping spike-rush	ELPA	—	—	9	1	—	—	—	—	—	—	—	—
few-flowered spike-rush	ELPA2	—	—	18	4	—	—	25	12	3	1	—	—
Chamisso cotton-grass	ERCH2	—	—	27	4	—	—	—	—	—	—	—	—
slender cotton-grass	ERGR8	—	—	—	—	—	—	50	3	—	—	—	—
many-spiked cotton-grass	ERPO2	—	—	27	1	33	Tr	25	2	7	2	33	1
green-keeled cotton-grass	ERVI	—	—	18	Tr	—	—	25	Tr	—	—	—	—
sheep fescue	FEOVR	—	—	—	—	—	—	—	—	—	—	—	—
green fescue	FEVI	—	—	—	—	—	—	—	—	3	Tr	—	—
tall mannagrass	GLEL	—	—	—	—	—	—	—	—	—	—	—	—
reed mannagrass	GLGR	—	—	—	—	—	—	—	—	—	—	—	—
fowl mannagrass	GLST	—	—	—	—	—	—	—	—	—	—	—	—
Baltic rush	JUBA	—	—	9	20	—	—	—	—	—	—	—	—
Drummond's rush	JUDR	67	Tr	—	—	—	—	—	—	37	2	—	—
Reed canarygrass	PHAR	—	—	—	—	—	—	—	—	—	—	—	—
Kentucky bluegrass	POPR	—	—	—	—	—	—	—	—	—	—	—	—
small-fruited bulrush	SCMI	—	—	—	—	—	—	—	—	—	—	—	—
spike trisetum	TRSP	33	2	—	—	—	—	—	—	10	1	—	—
Ferns and fern allies:													
common horsetail	EQAR	—	—	—	—	—	—	—	—	10	6	—	—
water horsetail	EQFL	—	—	36	2	33	Tr	25	3	—	—	33	5

[a] CON = percentage of plots in which the species occurred.
[b] COV = average canopy cover in plots in which the species occurred.
[c] Tr = trace cover, less than 1 percent canopy cover.

Table 24—Constancy and mean cover of important plant species in the MEADOW plant associations—Part 4

Species	Code	CASA2 4 plots		CASCB 17 plots		CASCP2 18 plots		CASP 11 plots		CAUI 55 plots		CAVE 10 plots	
		CON[a]	COV[b]	CON	COV	CON	COV	CON	COV	CON	COV	CON	CON
Tree understory:													
subalpine fir	ABLA2	—	—	29	1	67	2	64	1	—	—	—	—
Engelmann spruce	PIEN	—	—	18	3	61	2	—	—	5	1	—	—
lodgepole pine	PICO	—	—	—	—	11	3	—	—	4	2	—	—
Shrubs:													
mountain alder	ALIN	—	—	—	—	—	—	—	—	27	3	—	—
red-osier dogwood	COST	—	—	—	—	—	—	—	—	4	2	—	—
Low shrubs and subshrubs:													
red mountain-heath	PHEM	—	—	24	5	44	1	45	2	—	—	—	—
Farr's willow	SAFA	75	1	29	5	17	5	9	Tr[c]	4	2	—	—
tea-leaved willow	SAPLM2	—	—	12	2	6	Tr	—	—	4	10	—	—
dwarf huckleberry	VACA	—	—	24	1	11	3	9	2	4	1	—	—
Perennial forbs:													
western yarrow	ACMI	—	—	18	1	17	1	9	1	2	Tr	—	—
woolly pussytoes	ANLA	—	—	6	Tr	—	—	18	2	—	—	—	—
umber pussytoes	ANUM	25	Tr	12	Tr	—	—	9	2	—	—	—	—
fewflower aster	ASMO	—	—	24	7	11	3	—	—	7	2	—	—
western aster	ASOC	—	—	6	Tr	—	—	—	—	2	2	—	—
aster species	ASTER	25	Tr	6	5	—	—	27	1	11	1	—	—
twinflower marshmarigold	CABI	—	—	24	6	17	5	—	—	—	—	—	—
alpine willow-weed	EPAL	25	Tr	41	1	22	2	27	Tr	4	Tr	—	—
smooth willow-weed	EPGL	—	—	18	1	—	—	—	—	—	—	—	—
Watson's willow-weed	EPWA	—	—	—	—	—	—	—	—	22	1	—	—
peregrine fleabane	ERPE	—	—	6	Tr	17	7	18	2	4	7	—	—
broadpetal strawberry	FRVIP	—	—	6	Tr	6	1	—	—	4	1	—	—
small bedstraw	GATR	—	—	6	1	11	2	—	—	33	2	30	3
largeleaf avens	GEMA	—	—	6	Tr	—	—	9	Tr	35	1	10	1
partridgefoot	LUPE	—	—	—	—	11	3	45	4	—	—	—	—
broadleaf lupine	LULA	—	—	—	—	6	10	—	—	—	—	—	—

Table 24—Constancy and mean cover of important plant species in the MEADOW plant associations—Part 4 (continued)

Species	Code	CASA2 4 plots		CASCB 17 plots		CASCP2 18 plots		CASP 11 plots		CAUI 55 plots		CAVE 10 plots	
		CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	CO
common bogbean	METR	—	—	—	—	—	—	—	—	2	Tr	10	Tr
elephanthead pedicularis	PEGR	50	Tr	29	4	44	1	27	2	2	Tr	—	—
fanleaf cinquefoil	POFL2	25	Tr	47	6	28	6	73	4	—	—	—	—
marsh cinquefoil	POPA3	—	—	—	—	—	—	—	—	31	6	—	—
scheuchzeria	SCPA	—	—	—	—	—	—	—	—	—	—	—	—
cleftleaf groundsel	SECY	50	Tr	29	1	—	—	9	5	—	—	—	—
arrowleaf groundsel	SETR	—	—	35	3	56	4	27	1	4	1	—	—
Canada goldenrod	SOCA	—	—	—	—	—	—	—	—	2	1	—	—
ladies-tresses	SPRO	—	—	—	—	17	1	—	—	—	—	—	—
Cooley's hedge-nettle	STCO4	—	—	—	—	—	—	—	—	4	1	—	—
globeflower	TRLA4	—	—	18	8	28	2	—	—	—	—	—	—
Sitka valerian	VASI	—	—	18	3	33	11	36	4	—	—	—	—
American false hellebore	VEVI	—	—	12	Tr	11	3	73	1	—	—	—	—
thyme-leaved speedwell	VESE	—	—	12	Tr	6	Tr	—	—	2	Tr	—	—
Wormskjold"s speedwell	VEWO	—	—	29	1	17	Tr	36	Tr	4	1	—	—
pioneer violet	VIGL	—	—	6	2	17	Tr	—	—	4	Tr	—	—
Grasses or grasslike:													
redtop	AGAL	—	—	—	—	—	—	—	—	4	1	—	—
Oregon bentgrass	AGOR	—	—	—	—	—	—	—	—	5	1	—	—
Thurber's bentgrass	AGTH	—	—	6	17	28	3	9	3	2	1	—	—
bluejoint reedgrass	CACA	50	Tr	41	3	39	7	27	27	45	3	30	1
Columbia sedge	CAAP3	—	—	—	—	—	—	—	—	—	—	—	—
water sedge	CAAQA	—	—	—	—	—	—	—	—	5	5	10	Tr
Sitka sedge	CAAQS	—	—	—	—	—	—	—	—	7	13	—	—
awned sedge	CAAT2	—	—	—	—	—	—	—	—	7	39	—	—
slender-beaked sedge	CAAT	—	—	—	—	—	—	—	—	4	Tr	—	—
Buxbaum's sedge	CABU2	—	—	—	—	—	—	—	—	2	5	10	Tr
gray sedge	CACA4	—	—	6	6	6	1	—	—	27	3	—	—
Cusick's sedge	CACU2	—	—	—	—	—	—	—	—	13	4	—	—
lesser panicled sedge	CADI2	—	—	—	—	—	—	—	—	4	1	—	—
sheep sedge	CAIL	25	Tr	29	1	17	2	9	Tr	2	7	—	—
slender sedge	CALA4	—	—	—	—	—	—	—	—	9	6	—	—
tufted sedge	CALE5	25	Tr	6	Tr	11	1	—	—	4	5	10	10
mud sedge	CALI	25	Tr	—	—	6	2	—	—	2	20	—	—
black alpine sedge	CANI2	25	1	47	6	28	7	55	16	—	—	—	—
thick-headed sedge	CAPA	50	Tr	29	2	11	4	9	Tr	4	Tr	—	—
beaked sedge	CARO2	—	—	—	—	—	—	—	—	—	—	—	—
russet sedge	CASA2	100	50	6	Tr	6	Tr	—	—	2	3	—	—
Holm's sedge	CASCB	25	Tr	100	55	—	—	—	—	2	25	—	—
saw-leaved sedge	CASCP2	—	—	—	—	100	56	9	7	4	1	—	—
showy sedge	CASP	—	—	12	38	—	—	100	47	—	—	—	—
bladder sedge	CAUT	—	—	6	Tr	—	—	—	—	100	61	40	3
inflated sedge	CAVE	—	—	—	—	—	—	—	—	13	18	100	69
timber oatgrass	DAIN	—	—	6	Tr	11	Tr	9	5	—	—	—	—
tufted hairgrass	DECE	—	—	12	1	—	—	—	—	5	15	10	5
creeping spike-rush	ELPA	—	—	—	—	—	—	—	—	13	3	40	2
few-flowered spike-rush	ELPA2	25	Tr	18	4	11	5	—	—	—	—	—	—
Chamisso cotton-grass	ERCH2	—	—	—	—	—	—	—	—	2	1	—	—
slender cotton-grass	ERGR8	—	—	—	—	—	—	—	—	—	—	—	—
many-spiked cotton-grass	ERPO2	25	15	24	3	17	4	9	Tr	5	1	—	—
green-keeled cotton-grass	ERVI	25	25	6	1	11	Tr	—	—	5	4	—	—
sheep fescue	FEOVR	—	—	6	2	—	—	—	—	—	—	—	—
green fescue	FEVI	—	—	6	Tr	—	—	9	1	—	—	—	—
tall mannagrass	GLEL	—	—	—	—	—	—	—	—	9	1	10	Tr
reed mannagrass	GLGR	—	—	—	—	—	—	—	—	4	Tr	—	—
fowl mannagrass	GLST	—	—	—	—	6	3	—	—	9	6	10	10
Baltic rush	JUBA	—	—	—	—	—	—	—	—	2	5	—	—
Drummond's rush	JUDR	25	Tr	24	1	22	2	18	2	—	—	—	—
reed canarygrass	PHAR	—	—	—	—	—	—	—	—	7	7	—	—
Kentucky bluegrass	POPR	—	—	6	Tr	6	1	—	—	4	1	—	—
small-fruited bulrush	SCMI	—	—	—	—	—	—	—	—	18	3	—	—
spike trisetum	TRSP	—	—	6	Tr	6	Tr	—	—	—	—	—	—
Ferns and fern allies:													
common horsetail	EQAR	25	Tr	24	3	11	Tr	9	3	13	2	10	Tr
water horsetail	EQFL	50	Tr	—	—	—	—	—	—	15	5	20	8

[a] CON = percentage of plots in which the species occurred.
[b] COV = average canopy cover in plots in which the species occurred.
[c] Tr = trace cover, less than 1 percent canopy cover.

FORB SERIES

FORB N = 29

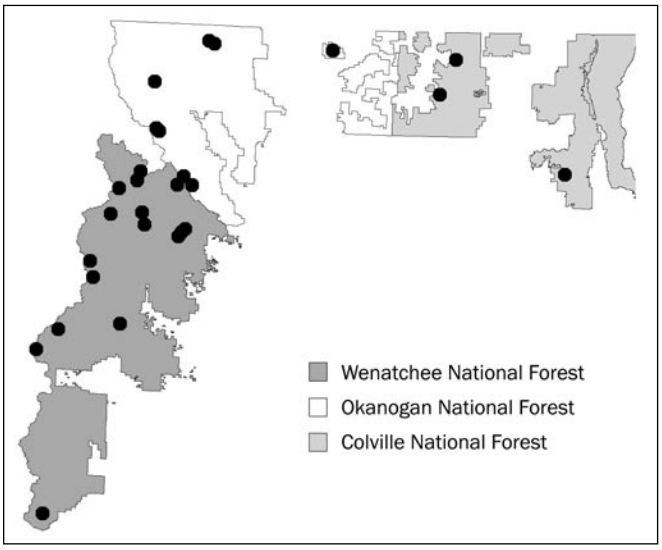


Figure 37—Plot locations for the FORB series.

AS A WHOLE, the numerous plant species used to characterize the FORB[1] series are widely distributed in the mountains of temperate and arctic North America. Most of these plants can be found from Alaska south through the mountains of British Columbia, Alberta, Washington, northern Idaho, Montana, and Oregon. All the cross references to species codes and common and scientific names are located in appendix A, and the general site requirements and distribution for each indicator species are described below (Hitchcock and Cronquist 1973):

- Alpine lady fern is found on the borders of streams, often near timberline, and is circumboreal. It extends south through North America to California, Colorado, and Quebec.
- Lady fern is found in moist woods, meadows, and swamps. It is circumboreal and is found throughout the Pacific Northwest.
- Oak fern is a species of moist woods and streambanks. It is circumboreal and is found from Alaska to eastern Canada and south to Oregon, Arizona, Idaho, and Virginia.
- Lewis' monkey-flower is a species found on moist floodplains and streambanks. It is found at upper elevations throughout the mountains of the Pacific Northwest.
- Globeflower is found in swamps to alpine meadows. It occurs from British Columbia south through the Olympic Mountains and Cascade Range of Washington, the Wallowa Mountains of Oregon, Colorado, and then extends east to Connecticut.
- Twinflower marshmarigold is a species of wet subalpine and alpine sites. It is found from Alaska south to California, Idaho, Utah, and Colorado.
- Broadleaf lupine is a species of lowland prairies to alpine ridges. It also is found in moist, well-drained riparian and wetland zones. It is found from Alaska south through the Cascade Range and coastal mountains to California.
- Dotted saxifrage is a species found on moderate- to high-elevation streambanks. It is found from Alaska south through the coastal and Cascade Range of Washington and Oregon, and east through British Columbia and Alberta. Merten's and brook saxifrage occur in similar environments but with somewhat more extensive ranges, generally ranging south from Alaska to California, the Wallowa Mountains of Oregon, Idaho, and Montana.

The FORB series is complex as it includes five plant associations, each dominated by different species. Each species responds to differences in water depth, temperature, chemistry, and aeration. Most associations are found along streams on moist, well-drained alluvium. They are associated with peak-flow flooding and "summer splash" from the adjacent stream. Some plots were located in springs or in fens. Elevation (growing season and temperature) also strongly influences the plant species growing on these sites. For instance, lady fern and oak fern are found at low to moderate elevations, whereas other indicator species are characteristic of high elevations or very cold air drainages. For simplicity, all forb-dominated associations were grouped into one FORB series based on the single similarity of forb dominance. The FORB series was not classified with the MEADOW series because the vegetation composition and sites associated with the five FORB plant associations is different from the graminoid-dominated fens, bogs, and meadows of the MEADOW series.

[1] See appendix A for a cross reference for all species codes and common and scientific names used in this document.

The species characterizing the FORB series grow in a wide range of environments. Growing seasons may be relatively long in the moderate-elevation ATFI-GYDR association, yet very short in the subalpine/alpine LULA and TRLA4-CABI associations. Annual precipitation varies from under 20 inches at low elevation in the dry interior of the study area to over 80 inches in the maritime climate along the Cascade crest and over 30 inches in the weaker inland maritime climate in the Selkirk Mountains of northeastern Washington. However, such generalities need to be interpreted carefully when considering cold air drainage and high water tables in sites associated with FORB series vegetation. The cold climate and short growing seasons normally associated with high-elevation associations may extend to lower elevations in cold air drainages, especially in deep, narrow, V-shaped valleys.

CLASSIFICATION DATABASE

The FORB series includes all terrestrial riparian and wetland sites dominated by forbs. It does not include forb-dominated sites in the AQUATIC series. The FORB series was sampled on all three eastern Washington NFs, but on only about half of the RDs (fig. 37). The poor distribution and low number of plots is probably an artifact of plot distribution as many sites in the FORB series are very small and may have been overlooked during the sampling process. For instance, SAPU and MILE sites usually are linear, a couple of feet in width, and difficult to sample. Therefore, it is possible that some associations in the FORB series are more common than depicted in this classification. Twenty-nine riparian and wetland plots were sampled in the FORB series. From this database, three major and two minor plant associations are described. Five potential, one-plot associations (VASI, ANAL, CAPE, PEFR, and SELAG) are not used in the database nor described in this classification. For the most part, these samples were located in mature, stable communities in good ecological condition.

VEGETATION CHARACTERISTICS

Because 10 species are used as indicators to define the FORB series and five FORB plant associations, it is difficult to characterize the FORB series without considering the FORB plant associations in some detail:

1. Most sites in the ATFI-GYDR association are dominated by lady fern and/or oak fern. Sites at higher elevations are dominated by alpine lady fern. Other common herbs include sweetscented bedstraw, arrowleaf groundsel, claspleaf or rosy twisted-stalk species, coolwort foamflower, pioneer violet, and wood reed-grass. Prickly currant is the most common shrub.
2. Broadleaf lupine is well represented in the LULA association. Field crews named the lupines found on the plots as broadleaf lupine, but the identification is not verified (no collections). Therefore, users of this guide should consider other moist-site lupines such as bigleaf lupine when classifying these sites. Other common herbs include hairy arnica, alpine willow weed, Gray's licorice-root, dotted saxifrage, arrowleaf groundsel, Cusick's speedwell, Drummond's rush, and alpine timothy.
3. The MILE association is characterized by Lewis' monkey-flower. Other common herbs include alpine willow-weed, partridgefoot, fanleaf cinquefoil, dotted saxifrage, spike bentgrass, black alpine sedge, showy sedge, Drummond's rush, Merten's rush, and alpine timothy.
4. Dotted saxifrage (possible alternate indicators are Merten's and brook saxifrage) is well represented in the SAPU association. Many of the associated herbs reflect the cool, moist, "splash zone" environment of the SAPU association and include mountain arnica, Jeffrey's shooting-star, alpine willow-weed, fringed grass-of-parnassia, miterwort species, arrowleaf groundsel, and Sitka valerian. Mosses are prominent and at first glance may be the most conspicuous feature of the association.
5. TRLA4-CABI association vegetation reflects its moderate to high elevation, gentle terrain, and moist soils. Combinations of twinflower marshmarigold and globeflower dominate. Other common herbs include mountain arnica, Canby's licorice-root, arrowleaf groundsel, Sitka valerian, American false hellebore, pioneer violet, and Holm's sedge. A variety of high-elevation graminoids may indicate that some of these sites are transitional to fens.

FORB plant associations

	Scientific name	Common name	Ecoclass code	Plots
Major associations:				
ATFI-GYDR	*Athyrium filix-femina–Gymnocarpium dryopteris*	Lady fern–oak fern	FW4241	12
SAPU	*Saxifraga punctata*	Dotted saxifrage	FW4242	6
TRLA4-CABI	*Trollius laxus-Caltha biflora*	Globeflower-twinflower marshmarigold	FW4243	6
Minor associations:				
LULA	*Lupinus latifolius*	Broadleaf lupine	FS6011	2
MILE	*Mimulus lewisii*	Lewis' monkey-flower	FS3011	3

PHYSICAL SETTING

Elevation—

The majority of FORB series plots are between 3,000 and 7,000 feet. These elevations are more an artifact of a limited number of sample plots rather than actual distribution of the FORB series. For example, the elevation range on the Colville NF was 3,920 to 4,360 feet based on only three plots, but the FORB series has been observed both below and above this range.

	Elevation (feet)			
Forest	Minimum	Maximum	Average	N
Colville	3,920	4,360	4,210	3
Okanogan	4,160	6,930	5,539	7
Wenatchee	3,500	7,120	5,009	19
Series	3,500	7,120	5,004	29

Additional insight is gained by comparing individual associations with elevation. The ATFI-GYDR association averages 4,272 feet in elevation but has been observed at elevations as high as 5,440 feet, especially where it is dominated by alpine lady fern. The other four associations (MILE, SAPU, TRLA4-CABI, and LULA) have been observed at elevations higher than reported in the table below. All but the LULA association can extend down to moderate elevations in severe cold air drainage.

	Elevation (feet)			
Plant association	Minimum	Maximum	Average	N
LULA	6,970	7,120	7,045	2
TRLA4-CABI	3,975	6,930	5,636	6
SAPU	4,670	6,500	5,307	6
MILE	4,140	6,004	5,182	3
ATFI-GYDR	3,500	5,440	4,272	12
Series	3,500	7,120	5,004	29

In general, the FORB series is widespread and occurs from elevations near the lower elevation of the forest boundaries to over 7,000 feet along the Cascade crest and over 6,000 feet in the Kettle River Range and Selkirk Mountains. These associations probably do not occur at elevations below the general forest zone nor in the Columbia basin.

Valley Geomorphology—

The FORB series is found in a variety of valley width and gradient classes. Most plots occur in relatively narrow, steep valleys. About 62 percent of the sample plots (17 of 29) were in valleys less than 99 feet wide, whereas 66 percent (19 of 29) were in valleys with more than 6 percent valley gradient. A second concentration of plots occurs in broad, low gradient valleys.

Additional understanding can be gained by looking at plant associations. For example, although located in a variety of valley width classes, four of six plots in the TRLA4-CABI association were located in low gradient valleys. However,

	Valley gradient					
Valley width	Very low	Low	Moderate	Steep	Very steep	N
Very broad	0	2	0	0	1	3
Broad	1	2	1	1	1	6
Moderate	0	0	0	1	2	3
Narrow	0	2	1	2	3	8
Very narrow	0	1	0	0	8	9
Series total	1	7	2	4	15	29

other than their herbaceous composition, all six plots are similar to some sites in the MEADOW series. The ATFI-GYDR and SAPU associations, on the other hand, occur in narrow, steep valleys. All five associations have some plots in valleys less than 6 percent valley gradient and more than 99 feet wide. It could be generalized from plot data that the FORB series are uncommon in broader (greater than 99 feet) and gentler (less than 6 percent) valleys, but this may be somewhat inaccurate because of the low number of plots.

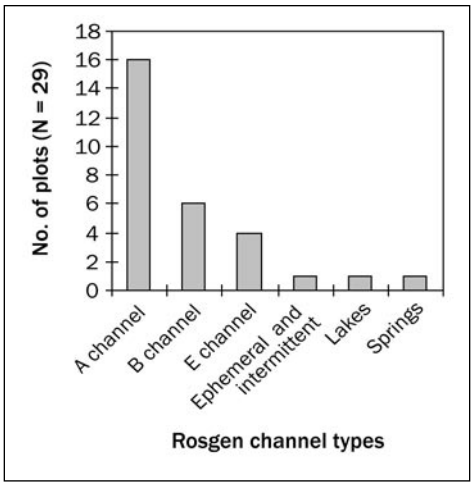
	Valley width					
Plant association	Very broad	Broad	Moderate	Narrow	Very narrow	N
ATFI-GYDR	0	1	1	4	6	12
LULA	0	1	0	0	1	2
MILE	1	2	0	0	0	3
SAPU	1	0	1	2	2	6
TRLA4-CABI	1	2	1	2	0	6
Series total	3	6	3	8	9	29

	Valley gradient					
Plant association	Very low	Low	Moderate	Steep	Very steep	N
ATFI-GYDR	0	2	1	2	7	12
LULA	1	0	0	0	1	2
MILE	0	0	1	0	2	3
SAPU	0	1	0	2	3	6
TRLA4-CABI	0	4	0	0	2	6
Series total	1	7	2	4	15	29

Channel Types—

Nearly 90 percent of the plots were located in riparian zones along Rosgen A or B channel types.

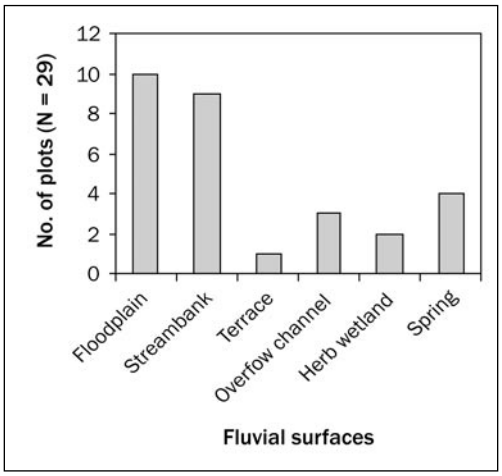
Additional insight is gained by looking at the distribution of plant associations by Rosgen channel types. All four E channels were along TRLA4-CABI, an association with site characteristics closely related to the MEADOW series, and usually associated with gentle valley gradients. One TRLA4-CABI plot was along an A channel and another along a low-gradient, spring zone. ATFI-GYDR, MILE, and SAPU associations are strongly tied to A and B channel types. Ephemeral, lake, and spring channel types are uncommon, although of three spring plots sampled, only one is listed because the others were located on terraces and the channels were coded as Rosgen B types.



Plant association	Rosgen channel type						N
	A	B	E	Ephemeral and intermittent	Lake	Spring	
ATFI-GYDR	8	3	0	1	0	0	12
LULA	1	0	0	0	1	0	2
MILE	2	1	0	0	0	0	3
SAPU	4	2	0	0	0	0	6
TRLA4-CABI	1	0	4	0	0	1	6
Series total	16	6	4	1	1	1	29

Fluvial Surfaces—

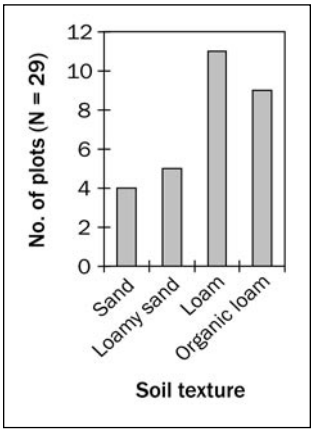
The FORB series is found on a limited variety of fluvial surfaces. Contrary to the MEADOW series, most plots are located in riparian zones on frequently flooded surfaces such as floodplains and lower streambanks. Three plots occurred in overflow channels. Two plots were in wetlands on drier margins of fens. Three of the four spring plots supported the ATFI-GYDR association, and three of these spring plots were located on terraces and could have been coded as old, overflow channels. The common factor between most plots is that they have moist, well-drained soils on account of their proximity to streams or seepage.



Additional insight is gained by looking at the distribution of fluvial surfaces by plant association. Eight of the 12 ATFI-GYDR plots were located on floodplains and streambanks. An additional three plots were located in spring zones (on terraces). Almost all MILE and SAPU plots were on floodplains and lower streambanks. The proximity of these sites to summer "splash" from the closely adjacent stream contributes to these sites being wet, although well drained, throughout the growing season.

Plant association	Fluvial surfaces						N
	Flood-plain	Stream-bank	Terrace	Overflow channel	Herb wetland	Spring	
ATFI-GYDR	4	4	0	1	0	3	12
LULA	0	1	0	0	1	0	2
MILE	3	0	0	0	0	0	3
SAPU	2	3	0	1	0	0	6
TRLA4-CABI	1	1	1	1	1	1	6
Series total	10	9	1	3	2	4	29

Soils—



Mineral soils account for 20 of 29 plots in the FORB series. Organic loam texture is common. Most of the sand and loamy sand soils were associated with frequently flooded sites on floodplains and lower streambanks. Less flood-prone sites such as overflow channels, terraces, herb wetlands, and springs tended to support finer textured loam and organic loam soils.

In general, however, these figures are inconsistent, reflecting soil differences both within and among the various associations. Most ATFI-GYDR, LULA, and TRLA4-CABI plots occurred on loam and organic loam soils. Those associated with MILE and SAPU were variable but were usually sand to sandy loam (coarse fragments usually high).

Plant association	Soil texture				N
	Sand	Loamy sand	Loam	Organic loam	
ATFI-GYDR	0	2	6	4	12
LULA	0	1	1	0	2
MILE	1	1	1	0	3
SAPU	3	1	1	1	6
TRLA4-CABI	0	0	2	4	6
Series total	4	5	11	9	29

Water tables were measured on 17 plots and averaged 9 inches below the soil surface. The measured depths for individual plant associations ranged from an average 13 inches below the soil surface for TRLA4-CABI to three inches below the soil surface for the MILE association. MILE, LULU, and SAPU appear to be the wettest associations based on water tables. This is reasonable as all three associations usually are within a few feet of the stream edge. Soils within the rooting zone of most associations are saturated or flooded early in the growing season, becoming moist but well aerated late in the growing season.

	Water table (inches)			
Plant association	Minimum	Maximum	Average	N
MILE	-8	2	-3	2
LULA	-4	-4	-4	1
SAPU	-12	0	-6	4
ATFI-GYDR	-17	-1	-11	7
TRLA4-CABI	-24	-4	-13	4
Series	-24	2	-9	17

The soil surface was rarely submerged at the time of sampling in the FORB series (no table is shown). However, it is reasonable to expect that some of these associations are partially flooded at peak runoff or snowmelt, especially where sites are associated with floodplains, overflow channels, or lower streambanks.

There was little difference in soil temperature among the associations. It is especially confounding that MILE and LULA, the two highest average elevation associations, have the warmest soil temperatures. Unlike upland associations, climatic variations may not be reflected in the soil temperatures of associations when there are large volumes of water flowing through the soil matrix. However, data are limited and should be viewed with caution.

	Soil temperature (°F)			
Plant association	Minimum	Maximum	Average	N
MILE	53	53	53	3
LULA	52	52	52	2
ATFI-GYDR	43	54	49	12
SAPU	43	53	49	5
TRLA4-CABI	47	52	49	4
Series	43	54	50	26

ECOSYSTEM MANAGEMENT

Natural Regeneration of FORB Series Plants—

Lady fern and alpine lady fern regenerate sexually by spores and vegetatively by expansion through rhizome growth (Campbell and Franklin 1979). Lady ferns also spread by water transport of whole plants or pieces of rhizomes as long as they remain moist. They even reproduced by sprouting from rhizomes transported by the pyroclastic flows of the Mount St. Helens eruption (Adams et al. 1987).

Oak fern also reproduces by both spores and rhizome extension. The spores of oak fern and lady fern are adapted for high wind dispersal (Kirkpatrick et al. 1990). Spores also are found in the seed bank, even where adult plants are absent (Milberg 1991, Mladenoff 1990).

Dotted saxifrage reproduces from both seed and horizontal rootstock extension. The small, hard seed may remain viable in the soil for a few years, but there is no literature to verify these observations. The plants may be able to regenerate from pieces of the rootstock.

Lewis' monkey-flower reproduces from both seed and rhizome extension. The small, hard seed probably remains viable for several years in the seed bank. It is reasonable to expect the plant can regenerate from pieces of rhizomes.

Lupine species are not rhizomatous but will sprout from the root caudex. They most often regenerate from seed (Steele and Geier-Hayes 1993, Stubbendieck et al. 1986, Van Dyne 1958). The seeds are heavy, not widely dispersed, and will germinate in full sun or partial shade. They can be stored for many years in the seed bank.

Twinflower marshmarigold and globeflower reproduce primarily by seed. The small, hard seed may remain viable in the seed bank for several years. They also will sprout from the root caudex.

Artificial Establishment of FORB Series Plants—

As described above, almost all the forb indicators reproduce vigorously from rhizomes, seed banks, or freshly dispersed seed. Live rooted plants, plugs, or rhizome segments can be used to establish most of them on appropriate FORB series sites. (For more information on the short- and long-term revegetation potential of selected riparian wetland plant species, see app. B-5.)

Stand Management—

The scattered conifers found on FORB series sites are generally located on microsites such as hummocks. They should not be considered for timber harvest because of their value to wildlife and as a future supply of snags and logs. Many of these sites are located adjacent to extensive stands of conifers, and the forest edge also should be considered for retention of these values.

Growth and Yield—

Forage estimates were not made during this study nor are there data for these associations in other classifications. Estimated biomass production for the plant associations in the FORB series may range from low in the SAPU and MILE associations, to moderate in the TRLA4-CABI and LULA associations, and high in the ATFI-GYDR association.

Down Wood—

The overall amount of down wood is moderate compared with other nonforest series (app. C-3). Logs cover 4.5 percent of the ground surface. Log biomass is also moderate for the shrub series. This indicates some sites are narrow and occur within one tree height of forest communities. Logs may play an important role in the function and structure of the FORB series.

	Down log attributes				
Log condition	Tons/ acre	Cu. ft./ acre	Linear ft./ acre	Sq. ft./ acre	% ground cover
Class 1	0.27	22	166	66	0.2
Class 2	3.91	379	421	389	.9
Class 3	2.48	313	567	425	1.0
Class 4	2.48	795	953	890	2.0
Class 5	.49	157	248	186	.4
Total	9.63	1,666	2,355	1,956	4.5

Fire—

Many of the indicator species in the FORB series are adapted to survive fire by resprouting from rhizomes or the root caudex. Both lady fern and oak fern tend to occur in moist forested valleys that burn infrequently (Arno and Davis 1980). These ferns are top-killed and resprout from rhizomes after light-intensity fire. Fires during periods of drought can burn into the duff or mineral soil killing rhizomes and plants. Fern cover also may be reduced when adjacent overstory conifer stands burn, because of the increased soil temperatures and reduced soil moisture that results when plants are exposed to full sunlight. Lupines, in general, have stout, deep taproots and will sprout from the root caudex following fire. In addition, lupine seeds are stored in the soil seed bank and germinate on mineral soil in full sunlight or partial shade (Steele and Geier-Hayes 1993).

Animals—

Livestock. Observations suggest that livestock use of the FORB series is variable depending on the plant association, adjacent plant associations, season of use, previous grazing history, extent of site, herb palatability, forage production, soil wetness, and length of seasonal flooding. High-elevation associations (MILE, LUPO, and TRLA4-CABI) rarely are within existing grazing allotments, although they probably were impacted in the past. Lupines are considered an increaser in overgrazed pastures, and it is possible the LULA association is a long-lasting enduring community type created by past overgrazing. The high-elevation TRLA4-CABI association often occurs in mosaic with MEADOW associations such as CANI2 and CASCB. However, most plots appear to be slightly dry for sedge dominance, and it is unlikely that these plots reflect past grazing disturbance. If fens and meadows containing TRLA4-CABI as part of the mosaic are overused, this association will be one of the first to degrade owing to its relatively lower soil moisture and accessibility earlier in the growing season compared with wetter sites in the MEADOW series. Where TRLA4-CABI sites occur within forests, on slumps, or in springs, they probably receive little use by livestock, even in active allotments. The few MILE plots appear to be natural communities that do not reflect past grazing disturbances. The SAPU association usually lies within forest valleys that receive little impact from livestock. In addition, SAPU also occurs on rather inaccessible floodplains and lower streambanks, further reducing its potential use by livestock. ATFI-GYDR is usually not heavily impacted by livestock grazing owing to the low palatability of the ferns, moist to wet soils, and their location within forested valley bottoms that receive little livestock use.

Livestock forage values are generally poor for the indicator species in the FORB series. Other plants providing fair to good forage include alpine aster, alpine leafybract aster, wood reed-grass, mannagrass species, and arrowleaf groundsel. However, many forbs in the FORB series tend to be low in palatability and function as increasers/invaders when livestock overuse sites. Lady ferns contain folic acid and may be poisonous to some classes of livestock (Dayton 1960, Ratliff 1985). Lupines contain alkaloids that may be harmful to sheep, cattle, and horses.

Cattle can create streambank sloughing when drinking water or traveling along the channel. Ruts from any of these sources may concentrate surface or flood water, creating streambank erosion or new channels. Trails at stream crossings can severely damage streambanks supporting SAPU, ATFI-GYDR, and MILE associations, and the damage can extend upstream and downstream following severe peak flows. Wet mineral soils are very susceptible to compaction, whereas wet organic soils can be broken and churned by grazing animals. For both soil types these actions can be very damaging (Hansen et al. 1995). The productivity of these sites may be lowered as the soils are compacted, perhaps owing to less soil porosity, making the sites less favorable for the natural dominants. Churned soils also lower biomass productivity through plant damage alone. The recovery from damage depends on the severity of disturbance. The combination of churned and compacted soil, replacement of natural dominants with increaser species and weeds, plus physical damage to the plants can result in long-term damage to the site that can take decades, even centuries to recover to predisturbance conditions. (For more information on forage palatability, see app. B-1. For potential biomass production, see app. B-5.)

Wildlife. Elk consume lady fern and oak fern fronds in spring and early summer, but these plants are not major food sources (Harcombe et al. 1983, Schwartz and Mitchell 1945). Grizzly bears have been reported to eat lady fern and

oak fern fronds (Alaback 1982, Banner et al. 1986). Elk, deer, and small mammals are known to feed on lupine and eat the seed. Lupine may make up a large portion of the diet of pocket gophers in June (Lillybridge et al. 1995). Birds are known to eat the seeds of lupine. FORB series sites are of low importance to beavers. (For more information on thermal or feeding cover values, see apps. B-2 and B-3. For information on food values or degree of use, see apps. B-2 and B-4.)

Fish. The FORB series is often adjacent to streams that provide valuable spawning areas, feeding areas, and hiding cover for trout. The rhizome growth habit of herbs such as alpine lady fern, lady fern, oak fern, Lewis' monkey-flower, and saxifrage species help stabilize soils and streambanks. Sites on streambanks and floodplains are susceptible to the force of moving water. Where it has been highly altered, management should consider restoring forb meadow vegetation to provide plant diversity, wildlife and fish habitat, and streambank stability values. (For more information, see app. B-5, erosion control potential.) Bare streambanks can be planted with live plants, plugs, and rhizomes or seeded. Success will depend on protecting restoration efforts from the limiting factor that caused the vegetation to be reduced in cover or eliminated from the site in the first place. However, there usually are enough rhizomes and seeds in the soil seed bank or nearby vegetation to regenerate disturbed sites.

Recreation—

Forb-dominated plant associations are often next to water or near sites that provide valuable fishing and waterfowl hunting opportunities. They also are valuable sites for the enjoyment of watching songbirds or big game animals**.** Heavy use by people in spring and summer can result in soil compaction, bank damage, and exposed soils. Trail location on drier sites is important, as trails on FORB series sites tend to become rutted or to produce multiple, threaded trails through wet terrain. Off-road vehicles also create long-term damage on FORB series sites. Maintaining existing roads, discouraging off-road travel, and locating new roads and trails on adjacent uplands would be helpful in maintaining these sites.

Estimating Vegetation Potential on Disturbed Sites—

Estimating vegetation potential on disturbed sites is usually unnecessary on FS lands because FORB series sites are not usually affected by current management practices. However, where a site is next to good forage-producing communities within grazing allotments, damage can be severe. In that case, there is usually plenty of native vegetation to identify the FORB series and plant associations. For stands where the potential natural vegetation is largely gone, such as where floods have scoured the SAPU association, personal experience or similar sites in nearby drainages can help in estimating the site potential.

Sensitive Species—

One sensitive species, Smoky Mountain sedge, was found on a MILE association plot (app. D).

ADJACENT SERIES

Adjacent terraces and upland slopes are often dominated by coniferous forest in the TSHE, ABLA2, ABAM, and TSME series. Wetter sites often support plant associations in the SALIX and MEADOW series. This is especially true next to TRLA4-CABI association. The ALSI series may occur on streambanks next to the SAPU and ATFI-GYDR associations.

RELATIONSHIPS TO OTHER CLASSIFICATIONS

Several of the plant associations in the FORB series were known at the time of the draft classification for northeastern Washington (Kovalchik 1992c) but were not listed on account of low plot numbers. Therefore, virtually all FORB plant associations listed in this classification are newly classified climax communities. Plant associations similar to those found in the FORB series are unusual in other wetland and riparian classifications. The SAAR4 association of northeastern Oregon (Crowe and Clausnitzer 1997), SAAR4-SETR association of the Mount Hood and Gifford Pinchot NFs (Diaz and Mellen 1996), and CLUN association of central Oregon (Kovalchik 1987) are similar to the SAPU association of eastern Washington.

U.S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE WETLANDS CLASSIFICATION

Most of the FORB associations belong to the system palustrine; class, emergent wetland; subclass, persistent; water regime (nontidal) intermittently saturated to temporarily flooded.

KEY TO FORB PLANT ASSOCIATIONS

1. Lady fern (*Athyrium filix-femina*), alpine lady fern (*A. distentifolium*), and/or oak fern, (*Gymnocarpium dryopteris*) ≥10 percent canopy coverage or dominant ..... **Lady fern–oak fern (ATFI-GYDR) association**
2. Lewis' monkey-flower (*Mimulus lewisii*) ≥25 percent canopy coverage or dominant ..... **Lewis' monkey-flower (MILE) association**
3. Globeflower (*Trollius laxus*) and/or twinflower marshmarigold (*Caltha biflora*) ≥10 percent canopy coverage or dominant ..... **Globeflower-twinflower marshmarigold (TRLA4-CABI) association**
4. Sites are splash zones along streambanks and floodplains; saxifrages such as dotted, Merten's, or brook saxifrage (*Saxifraga* spp.) ≥5 percent canopy coverage or dominant ..... **Dotted saxifrage (SAPU) association**
5. Broadleaf lupine (*Lupinus latifolius*) ≥10 percent canopy coverage or dominant ..... **Broadleaf lupine (LULA) association**

Table 25—Constancy and mean cover of important plant species in the FORB plant associations

		ATFI-GYDR 12 plots		LULA 2 plots		MILE 3 plots		SAPU 6 plots		TRLA4-CABI 6 plots	
Species	Code	CON[a]	COV[b]	CON	COV	CON	COV	CON	COV	CON	COV
Tree overstory:											
subalpine fir	ABLA2	8	10	—	—	—	—	—	—	67	4
Engelmann spruce	PIEN	17	9	—	—	—	—	17	Tr[c]	33	2
Tree understory:											
subalpine fir	ABLA2	25	1	—	—	33	Tr	33	3	83	2
Engelmann spruce	PIEN	25	1	50	1	—	—	33	Tr	17	1
mountain hemlock	TSME	8	1	—	—	—	—	33	5	17	1
Shrubs:											
Sitka alder	ALSI	33	8	—	—	33	3	17	2	—	—
rusty menziesia	MEFE	33	5	—	—	—	—	—	—	17	3
Cascade azalea	RHAL	25	4	—	—	—	—	17	1	33	5
prickly currant	RILA	58	5	—	—	—	—	50	1	—	—
undergreen willow	SACO2	—	—	50	5	33	5	—	—	17	10
Perennial forbs:											
western yarrow	ACMI	—	—	50	Tr	—	—	17	Tr	—	—
sharptooth angelica	ANAR	42	1	—	—	33	10	33	3	33	Tr
Holboell's rockcress	ARHO	—	—	50	Tr	—	—	—	—	—	—
small-leaf rockcress	ARMI2	—	—	50	Tr	—	—	—	—	—	—
mountain arnica	ARLA	25	1	—	—	33	1	67	4	67	3
hairy arnica	ARMO	—	—	100	25	—	—	—	—	33	1
alpine aster	ASAL	—	—	50	5	—	—	—	—	33	6
alpine leafybract aster	ASFO	—	—	—	—	—	—	—	—	33	8
aster species	ASTER	25	9	—	—	—	—	—	—	33	4
twinflower marshmarigold	CABI	8	3	—	—	33	5	—	—	100	23
Jeffrey's shooting-star	DOJE	—	—	—	—	—	—	67	4	17	5
alpine willow-weed	EPAL	17	1	100	5	100	3	67	2	17	2
red willow-weed	EPLA	—	—	—	—	33	50	—	—	—	—
peregrine fleabane	ERPE	—	—	50	Tr	33	15	17	2	—	—
sweetscented bedstraw	GATR	58	1	—	—	—	—	17	Tr	—	—
common cow-parsnip	HELA	17	Tr	—	—	—	—	50	1	—	—
false saxafrage	LEPY	—	—	—	—	33	1	33	7	33	1
Canby's licoriceroot	LICA2	—	—	—	—	—	—	—	—	67	1
Gray's licoriceroot	LIGR	17	2	100	5	33	1	17	1	—	—
partridgefoot	LUPE	—	—	—	—	67	5	17	10	—	—
broadleaf lupine	LULA	—	—	100	58	—	—	—	—	—	—
Lewis' monkey-flower	MILE	—	—	50	5	100	32	33	Tr	—	—
large mountain mimulus	MITIC	—	—	—	—	33	7	—	—	—	—
fivestamen miterwort	MIPE	33	2	—	—	—	—	83	3	—	—
miterwort species	MITEL	33	4	—	—	33	5	17	1	17	Tr
broadleaved montia	MOCO	—	—	—	—	—	—	50	4	—	—
purple sweet-root	OSPU	17	Tr	—	—	33	Tr	50	1	—	—
fringed grass-of-parnassia	PAFI	8	Tr	—	—	—	—	50	5	50	2
elephanthead pedicularis	PEGR	—	—	50	Tr	33	Tr	—	—	50	Tr

Table 25—Constancy and mean cover of important plant species in the FORB plant associations (continued)

Species	Code	ATFI-GYDR 12 plots		LULA 2 plots		MILE 3 plots		SAPU 6 plots		TRLA4-CABI 6 plots	
		CON	COV	CON	COV	CON	COV	CON	COV	CON	COV
skunkleaf polemonium	POPU	—	—	50	7	—	—	—	—	—	—
fanleaf cinquefoil	POFL2	—	—	50	3	67	1	33	2	33	9
sidebells pyrola	PYSE	42	Tr	—	—	—	—	67	Tr	—	—
dotted saxifrage	SAPU	33	1	100	1	67	1	100	17	50	1
arrowleaf groundsel	SETR	50	3	100	13	33	20	83	2	83	4
claspleaf twisted-stalk	STAM	92	2	—	—	33	Tr	50	1	33	6
rosy twisted-stalk	STRO	33	7	—	—	—	—	50	1	17	30
coolwort foamflower	TITRU	67	9	—	—	33	Tr	33	13	17	5
globeflower	TRLA4	—	—	—	—	—	—	33	2	67	19
Sitka valerian	VASI	33	5	50	Tr	33	2	100	11	100	12
American false hellebore	VEVI	8	1	—	—	—	—	50	Tr	67	6
Cusick's speedwell	VECU	—	—	100	2	—	—	—	—	—	—
Wormskjold's speedwell	VEWO	—	—	—	—	67	Tr	—	—	33	1
pioneer violet	VIGL	75	1	—	—	33	Tr	50	1	67	4
Grass or grasslike:											
spike bentgrass	AGEX	—	—	—	—	67	3	—	—	17	Tr
Thurber's bentgrass	AGTH	8	1	—	—	67	3	17	25	50	1
bluejoint reedgrass	CACA	—	—	—	—	—	—	—	—	33	5
Hood's sedge	CAHO	—	—	50	Tr	—	—	—	—	—	—
black alpine sedge	CANI2	—	—	50	Tr	67	3	17	Tr	50	8
Holm's sedge	CASCB	—	—	50	2	—	—	—	—	17	2
saw-leaved sedge	CASCP2	—	—	—	—	—	—	33	1	17	5
showy sedge	CASP	—	—	—	—	67	1	—	—	33	9
wood reed-grass	CILA2	67	1	—	—	—	—	17	15	—	—
mountain hairgrass	DEAT	—	—	50	1	67	Tr	—	—	17	1
green fescue	FEVI	—	—	50	1	—	—	—	—	—	—
Drummond's rush	JUDR	—	—	100	2	100	2	17	Tr	83	Tr
Merten's rush	JUME	—	—	—	—	67	14	—	—	33	2
tuberous rush	JUNO	—	—	50	2	—	—	—	—	—	—
smooth woodrush	LUHI	—	—	50	Tr	33	1	33	Tr	33	Tr
alpine timothy	PHAL	—	—	100	2	67	1	—	—	50	Tr
Cusick's bluegrass	POCUE	—	—	50	Tr	—	—	—	—	—	—
Ferns and fern allies:											
alpine lady fern	ATDI	8	30	—	—	33	20	—	—	—	—
lady fern	ATFI	83	39	—	—	—	—	17	Tr	—	—
common horsetail	EQAR	8	Tr	—	—	33	Tr	17	Tr	33	18
oak fern	GYDR	58	42	—	—	—	—	33	Tr	—	—

[a] CON = percentage of plots in which the species occurred.
[b] COV = average canopy cover in plots in which the species occurred.
[c] Tr = trace cover, less than 1 percent canopy cover.

METRIC AND ENGLISH EQUIVALENTS

When you know:	Multiply by:	To obtain:
Inches (in)	2.540	Centimeters
Feet (ft)	0.305	Meters
Miles (mi)	1.609	Kilometers
Acres (ac)	0.405	Hectares
Ounces (oz)	28.35	Grams
Pounds (lb)	0.453	Kilograms
Pounds per acre (lb/ac)	1.129	Kilograms per hectare
Linear feet per acre	0.753	Linear meters per hectare
Square feet per acre (ft^2/ac)	0.229	Square meters per hectare
Cubic feet per acre (ft^3/ac)	0.07	Cubic meters per hectare
Trees per acre	2.471	Trees per hectare
Degrees Fahrenheit (°F)	0.5555 (°F - 32)	Degrees Celsius (°C)
Centimeters (cm)	0.394	Inches
Meters (m)	3.28	Feet
Square millimeters (mm^2)	.00155	Square inches

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Appendix A—Aquatic, Riparian, and Wetland Plant, Animal, and Insect Species, and Diseases Mentioned in This Classification

Key to Appendixes A-1 and A-2

OBL (obligate wetland plants)
FAC (facultative plants)
FACW (facultative wetland plants)
FACU (facultative upland plants)
Y = a species that is used to key and characterize the series and plant associations
N = a plant that occurs with at least 50 percent constancy in at least one plant association

Appendix A-1—Aquatic, Riparian, and Wetland Plants Listed by Scientific Name

PNW region code	Plants database code	Scientific name	Common name	Indicator species	Hydrologic status
Trees:					
ABAM	ABAM	*Abies amabilis*	Pacific silver fir	Y	FACU
ABCO	ABCO	*Abies concolor*	white fir	N	FACU
ABGR	ABGR	*Abies grandis*	grand fir	Y	FACU
ABLA2	ABLA3	*Abies lasiocarpa*	subalpine fir	Y	FACU
ABPR	ABPR	*Abies procera*	noble fir	N	FACU
ACMA	ACMA3	*Acer macrophyllum*	bigleaf maple	Y	FACU
ALRU	ALRU2	*Alnus rubra*	red alder	Y	FACW
BEPA	BEPA	*Betula papyrifera*	paper birch	Y	FACU-
CHNO	CHNO	*Chamaecyparis nootkatensis*	Alaska yellow-cedar	N	FACU
LALY	LALY	*Larix lyallii*	subalpine larch	Y	FACU
LAOC	LAOC	*Larix occidentalis*	western larch	N	FACU
PIEN	PIEN	*Picea engelmannii*	Engelmann spruce	Y	FACU
PIGL	PIGL	*Picea glauca*	white spruce	Y	FACU
PIAL	PIAL	*Pinus albicaulis*	whitebark pine	N	FACU
PICO	PICO	*Pinus contorta*	lodgepole pine	Y	FACU
PIMO	PIMO3	*Pinus monticola*	western white pine	N	FACU
PIPO	PIPO	*Pinus ponderosa*	ponderosa pine	N	FACU
POTR	POTR5	*Populus tremuloides*	quaking aspen	Y	FACU
POTR2	POTR15	*Populus trichocarpa*	black cottonwood	Y	FACW
PSME	PSME	*Pseudotsuga menziesii*	Douglas-fir	Y	FACU
QUGA	QUGA4	*Quercus garryana*	Oregon white oak	Y	FACU
THPL	THPL	*Thuja plicata*	western redcedar	Y	FACU
TSHE	TSHE	*Tsuga heterophylla*	western hemlock	Y	FACU
TSME	TSME	*Tsuga mertensiana*	mountain hemlock	Y	FACU
Shrubs:					
ACCI	ACCI	*Acer circinatum*	vine maple	Y	FACU
ACGLD	ACGLD4	*Acer glabrum* var. *douglasii*	Douglas maple	Y	FACU
ALIN	ALIN2	*Alnus incana*	mountain alder	Y	FACW
ALSI	ALSI3	*Alnus sinuata*	Sitka alder	Y	FAC+
AMAL	AMAL2	*Amelanchier alnifolia*	Saskatoon serviceberry	Y	FACU
ARUV	ARUV	*Arctostaphylos uva-ursi*	bearberry	Y	FACU-
BEAQ	BEAQ	*Berberis aquifolium*	Oregon hollygrape	N	FACU
BENE	BENE2	*Berberis nervosa*	Cascade hollygrape	N	FACU
BERE	BERE	*Berberis repens*	creeping hollygrape	N	FACU
BEGL	BEGL	*Betula glandulosa*	bog birch	Y	OBL
BEGLG	BEGLG	*Betula glandulosa* var. *glandulosa*	bog birch	Y	OBL
BEOC	BEOC2	*Betula occidentalis*	water birch	N	FACW
CAME	CAME7	*Cassiope mertensiana*	Merten's moss-heather	Y	FAC
CAST5	CAST6	*Cassiope stelleriana*	Alaska moss-heather	Y	FAC
CATE2	CATE11	*Cassiope tetragona*	four-angled moss-heather	Y	FAC
CHME	CHME	*Chimaphila menziesii*	little prince's-pine	N	FACU
CHUM	CHUM	*Chimaphila umbellata*	western prince's-pine	N	FACU
CHUMO	CHUMO	*Chimaphila umbellata* var. *occidentalis*	western prince's-pine	N	FACU
COCA	COCA13	*Cornus canadensis*	bunchberry dogwood	Y	FACW-
COST	COST	*Cornus stolonifera*	red-osier dogwood	Y	FACW
COSTO	COST4	*Cornus stolonifera* var. *occidentalis*	red-osier dogwood	Y	FACW
COCO2	COCO6	*Corylus cornuta*	California hazel	Y	FAC+
CRDOD	CRDOD	*Crataegus douglasii* var. *douglasii*	black hawthorn	Y	FAC
GAHI	GAHI2	*Gaultheria hispidula*	moxieplum	N	OBL
GAHU	GAHU	*Gaultheria humifusa*	western wintergreen	N	FAC+
GAOV	GAOV2	*Gaultheria ovatifolia*	slender wintergreen	N	FAC+
HODI	HODI	*Holodiscus discolor*	oceanspray	N	FACU
KAMI	KAMI	*Kalmia microphylla*	alpine laurel	N	FACW
LEGL	LEGL	*Ledum glandulosum*	Labrador tea	Y	FACW-
LEGLG	LEGLG	*Ledum glandulosum* var. *glandulosum*	Labrador tea	Y	FACW-

Appendix A-1—Aquatic, Riparian, and Wetland Plants Listed by Scientific Name (continued)

PNW region code	Plants database code	Scientific name	Common name	Indicator species	Hydrologic status
LIBOL	LIBOL	*Linnaea borealis* var. *longiflora*	twinflower	Y	FACU+
LOIN	LOIN5	*Lonicera involucrata*	bearberry honeysuckle	N	FACW
LOUT	LOUT2	*Lonicera utahensis*	Utah honeysuckle	N	FACU
MEFE	MEFE	*Menziesia ferruginea*	rusty menziesia	Y	FACU+
OPHO	OPHO	*Oplopanax horridum*	devil's club	Y	FACW
PAMY	PAMY	*Pachistima myrsinites*	myrtle pachistima	Y	FACU-
PHLE2	PHLE4	*Philadelphus lewisii*	Lewis' mock orange	N	FAC
PHEM	PHEM	*Phyllodoce empetriformis*	red mountain-heath	Y	FAC
PHGL	PHGL6	*Phyllodoce glanduliflora*	cream mountain-heath	Y	FAC
POFR	POFR15	*Potentilla fruticosa*	shrubby cinquefoil	Y	FAC
PREM	PREM	*Prunus emarginata*	bittercherry	N	FACU
PRVI	PRVI	*Prunus virginiana*	common chokecherry	Y	FACU
RHAL2	RHAL	*Rhamnus alnifolia*	alder buckthorn	N	FACW
RHPU	PHPU	*Rhamnus purshiana*	Pursh buckthorn	N	FACW
RHAL	RHAL2	*Rhododendron albiflorum*	Cascade azalea	Y	FACU
RIBR	RIBR	*Ribes bracteosum*	stink currant	Y	FACW
RIHO	RIHO2	*Ribes howellii*	mapleleaf currant	N	FAC
RIHU	RIHU	*Ribes hudsonianum*	Hudsonbay currant	Y	FACW+
RIIN	RIIN2	*Ribes inerme*	whitestem gooseberry	N	FACU
RILA	RILA	*Ribes lacustre*	prickly currant	Y	FACW
RILA2	RILA3	*Ribes laxiflorum*	western currant	N	FAC
RIBES	RIBES	*Ribes* spp.	currant species	N	FAC
ROGY	ROGY	*Rosa gymnocarpa*	baldhip rose	N	FAC
RONU	RONU	*Rosa nutkana*	Nootka rose	N	FAC
ROSA	ROSA	*Rosa* spp.	rose species	N	FAC
ROWO	ROWO	*Rosa woodsii*	Wood's rose	N	FAC
RUID	RUID	*Rubus idaeus*	red raspberry	N	FAC
RULA	RULA	*Rubus lasiococcus*	dwarf bramble	Y	FACU
RUPA	RUPA	*Rubus parviflorus*	western thimbleberry	N	FAC+
RUPE	RUPE	*Rubus pedatus*	five-leaved bramble	N	FACW
RUPU2	RUPU	*Rubus pubescens*	dwarf red blackberry	N	FACW-
RUSP	RUSP	*Rubus spectabilis*	salmonberry	Y	FACW-
RUUR	RUUR	*Rubus ursinus*	Pacific blackberry	N	FACW-
SABA	SABA3	*Salix barclayi*	Barclay's willow	Y	FACW+
SABE	SABE2	*Salix bebbiana*	Bebb's willow	Y	FACW+
SABEP	SABEP	*Salix bebbiana* var. *perrostrata*	Bebb's willow	Y	FACW+
SABO2	SABO2	*Salix boothii*	Booth's willow	Y	OBL
SABR2	SABR	*Salix brachycarpa*	short-fruited willow	Y	OBL
SACA9	SACA4	*Salix candida*	hoary willow	Y	OBL
SACA6	SACA6	*Salix cascadensis*	Cascade willow	Y	FAC
SACO2	SACO2	*Salix commutata*	undergreen willow	Y	OBL
SADR	SADR	*Salix drummondiana*	Drummond's willow	Y	OBL
SAEA	SAEA	*Salix eastwoodiae*	Eastwood's willow	N	OBL
SAEX	SAEX	*Salix exigua*	coyote willow	Y	OBL
SAEXE	SAEXE	*Salix exigua* var. *exigua*	coyote willow	Y	OBL
SAFA	SAFA	*Salix farriae*	Farr's willow	Y	OBL
SAGEG	SAGEG	*Salix geyeriana* var. *geyeriana*	Geyer's willow	Y	FACW+
SAGEM	SAGEM	*Salix geyeriana* var. *meleiana*	Geyer's willow	Y	FACW+
SAGL	SAGL	*Salix glauca*	glaucous willow	Y	OBL
SALAC	SALAC	*Salix lasiandra* var. *caudata*	whiplash willow	Y	FACW+
SALAL	SALAL	*Salix lasiandra* var. *lasiandra*	Pacific willow	Y	FACW+
SALE	SALE	*Salix lemmonii*	Lemmon's willow	Y	OBL
SAMA	SAMA12	*Salix maccalliana*	McCalla's willow	Y	OBL
SAME2	SAME2	*Salix melanopsis*	dusky willow	Y	OBL
SANI	SANI8	*Salix nivalis*	snow willow	Y	FAC
SANIN	SANIN	*Salix nivalis* var. *nivalis*	snow willow	Y	FACs
SAPE3	SAPE2	*Salix pedicellaris*	bog willow	Y	OBL
SAPI	SAPI	*Salix piperi*	Piper's willow	Y	OBL
SAPLM2	SAPLM3	*Salix planifolia* var. *monica*	tea-leaved willow	Y	OBL
SAPS2	SAPS	*Salix pseudomonticola*	false mountain willow	Y	OBL
SARIM2	SARIM4	*Salix rigida* var. *mackenzieana*	Mackenzie's willow	Y	OBL
SASC	SASC	*Salix scouleriana*	Scouler's willow	Y	FAC
SASI2	SASI3	*Salix sitchensis*	Sitka willow	Y	FACW
SALIX	SALIX	*Salix* spp.	willow species	Y	FACW
SATW	SATW	*Salix tweedyi*	Tweedy's willow	Y	OBL
SARA	SARA2	*Sambucus racemosa*	scarlet elderberry	N	FACU
SHCA	SHCA	*Shepherdia canadensis*	russet buffaloberry	N	FACU
SHCA	SHCA	*Shepherdia canadensis*	russet buffaloberry	N	FACU
SOSC2	SOSC2	*Sorbus scopulina*	Cascade mountain-ash	N	FACU
SOSI	SOSI2	*Sorbus sitchensis*	Sitka mountain-ash	N	FACU
SPBE	SPBE2	*Spiraea betulifolia*	shiny-leaf spiraea	N	FACU

Appendix A-1—Aquatic, Riparian, and Wetland Plants Listed by Scientific Name (continued)

PNW region code	Plants database code	Scientific name	Common name	Indicator species	Hydrologic status
SPBEL	SPBEL	*Spiraea betulifolia* var. *lucida*	shiny-leaf spiraea	N	FACU
SPDE	SPDE	*Spiraea densiflora*	subalpine spiraea	N	FAC+
SPDO	SPDO	*Spiraea douglasii*	Douglas spiraea	Y	OBL
SPDOD	SPDOD	*Spiraea douglasii* var. *douglasii*	Douglas spiraea	Y	OBL
SPDOM	SPDOM	*Spiraea douglasii* var. *menziesii*	Menzies spiraea	Y	OBL
SPPY	SPPY	*Spiraea pyramidata*	pyramid spiraea	Y	OBL
SYAL	SYAL	*Symphoricarpos albus*	common snowberry	Y	FACU
VAAL	VAAL	*Vaccinium alaskaense*	Alaska huckleberry	Y	FACU
VACA	VACA	*Vaccinium caespitosum*	dwarf huckleberry	Y	FACU
VADE	VADE	*Vaccinium deliciosum*	Cascade huckleberry	Y	FACU
VAGL	VAGL	*Vaccinium globulare*	Globe huckleberry	N	FACU
VAME	VAME	*Vaccinium membranaceum*	big huckleberry	Y	FACU
VAMY	VAMY2	*Vaccinium myrtillus*	low huckleberry	Y	FACU
VAOC2	VAOC	*Vaccinium occidentale*	western bog blueberry	N	OBL
VAOV	VAOV	*Vaccinium ovalifolium*	oval-leaf huckleberry	Y	FACU
VAPA	VAPA	*Vaccinium parvifolium*	red whortleberry	N	FACU
VASC	VASC	*Vaccinium scoparium*	grouse huckleberry	Y	FACU
VIED	VIED	*Viburnum edule*	moosewood viburnum	N	FACW
Grasslike:					
CAAM	CAAM10	*Carex amplifolia*	bigleaf sedge	Y	FACW+
CAAP3	CAAP3	*Carex aperta*	Columbia sedge	Y	FACW+
CAAQA	CAAQA	*Carex aquatilis* var. *aquatilis*	water sedge	Y	OBL
CAAQS	CAAQS	*Carex aquatilis* var. *sitchensis*	Sitka sedge	Y	OBL
CAAR2	CAAR3	*Carex arcta*	northern clustered sedge	N	FACW+
CAAT2	CAAT2	*Carex atherodes*	awned sedge	Y	OBL
CAAT	CAAT3	*Carex athrostachya*	slender-beaked sedge	N	FAC
CAAT3	CAAT5	*Carex atrata*	blackened sedge	N	FACW+
CABR6	CABR15	*Carex brunnescens*	brownish sedge	N	FACW+
CABU2	CABU6	*Carex buxbaumii*	Buxbaum's sedge	Y	OBL
CACA4	CACA5	*Carex canescens*	gray sedge	N	FACW+
CACO	CACO11	*Carex concinnoides*	northwestern sedge	N	FACU
CACR3	CACR4	*Carex crawfordii*	Crawford's sedge	N	FAC
CACU2	CACU5	*Carex cusickii*	Cusick's sedge	Y	OBL
CADE	CADE	*Carex deweyana*	Dewey's sedge	N	FACW+
CADI2	CADI4	*Carex diandra*	lesser panicled sedge	N	OBL
CADI	CADI6	*Carex disperma*	soft-leaved sedge	Y	FACW+
CAFL	CAFL4	*Carex flava*	yellow sedge	N	OBL
CAGE	CAGE	*Carex geyeri*	elk sedge	N	FACU
CAHO	CAHO	*Carex hoodii*	Hood's sedge	N	FAC
CAIL	CAIL	*Carex illota*	sheep sedge	Y	FACW+
CAIN2	CAIN10	*Carex integra*	smooth-beaked sedge	N	FACW+
CAIN5	CAIN11	*Carex interior*	inland sedge	N	OBL
CALA	CALA13	*Carex laeviculmis*	smooth sedge	N	FACW+
CALA3	CALA30	*Carex lanuginosa*	woolly sedge	Y	OBL
CALA4	CALA4	*Carex lasiocarpa*	slender sedge	Y	OBL
CALE5	CALE5	*Carex lenticularis*	lenticular sedge	Y	OBL
CALI	CALI	*Carex limosa*	mud sedge	Y	OBLtus
CALU	CALU7	*Carex luzulina*	woodrush sedge	N	OBL
CAME2	CAME	*Carex mertensii*	Merten's sedge	N	FAC
CAMU2	CAMU3	*Carex muricata*	muricate sedge	N	OBL
CANE	CANE	*Carex nebraskensis*	Nebraska sedge	N	OBL
CANI2	CANI2	*Carex nigricans*	black alpine sedge	Y	FACW-
CAPA	CAPA19	*Carex pachystachya*	thick-headed sedge	N	FACU
CAPA9	CAPA22	*Carex paupercula*	poor sedge	Y	OBL
CAPR9	CAPR10	*Carex proposita*	Smoky Mountain sedge	N	FACU
CARE	CARE4	*Carex retrorsa*	retrorse sedge	N	OBL
CARO2	CARO6	*Carex rostrata*	beaked sedge	Y	OBL
CASA2	CASA10	*Carex saxatilis* var. *major*	russet sedge	Y	OBL
CASCB	CASCB	*Carex scopulorum* var. *bracteosa*	Holm's sedge	Y	FACW+
CASCP2	CASCP	*Carex scopulorum* var. *prionophylla*	saw-leaved sedge	Y	OBL
CASC3	CASC10	*Carex scirpoidea*	western singlespike sedge	N	FAC+
CASCP	CASCP	*Carex scirpoidea* var. *pseudoscirpoidea*	western singlespike sedge	N	FAC+
CASI2	CASI3	*Carex simulata*	shortbeaked sedge	N	OBL
CASP	CASP5	*Carex spectabilis*	showy sedge	Y	FAC
CAUT	CAUT	*Carex utriculata*	bladder sedge	Y	OBL
CAVE	CAVE6	*Carex vesicaria*	inflated sedge	Y	OBL
ELAC	ELAC	*Eleocharis acicularis*	needle spike-rush	N	OBL
ELPA	ELPA3	*Eleocharis palustris*	creeping spike-rush	Y	OBL
ELPA2	ELPA6	*Eleocharis pauciflora*	few-flowered spike-rush	Y	OBL
ERCH2	ERCH7	*Eriophorum chamissonis*	Chamisso cotton-grass	Y	OBL
ERGR2	ERGR8	*Eriophorum gracile*	slender cotton-grass	Y	OBL

Appendix A-1—Aquatic, Riparian, and Wetland Plants Listed by Scientific Name (continued)

PNW region code	Plants database code	Scientific name	Common name	Indicator species	Hydrologic status
ERPO2	ERPO3	*Eriophorum polystachion*	many-spiked cotton-grass	Y	OBL
ERVI	ERVI9	*Eriophorum viridicarinatum*	green-keeled cotton-grass	Y	OBL
JUBA	JUBA	*Juncus balticus*	Baltic rush	N	FACW+
JUDR	JUDR	*Juncus drummondii*	Drummond's rush	N	FACU
JUFI	JUFI	*Juncus filiformis*	thread rush	N	FACW+
JUME	JUME3	*Juncus mertensianus*	Merten's rush	N	OBL
JUNO	JUNO2	*Juncus nodosus*	tuberous rush	N	FACW+
JUPA	JUPA	*Juncus parryi*	Parry's rush	N	FACU
LUAR4	LUAR5	*Luzula arcuata*	curved woodrush	N	FACU
LUHI	LUHI4	*Luzula hitchcockii*	smooth woodrush	Y	FACU
LUPA	LUPA4	*Luzula parviflora*	smallflowered woodrush	N	FACU
SCAC	SCAC	*Scirpus acutus*	hardstem bulrush	Y	OBL
SCMI	SCMI2	*Scirpus microcarpus*	small-fruited bulrush	Y	OBL
SCVA	SCVA	*Scirpus validus*	softstem bulrush	Y	OBL
Grasses:					
AGCA	AGCA	*Agropyron caninum*	cutting wheatgrass	N	FACU
AGAL	AGAL3	*Agrostis alba*	redtop	N	FACW
AGEX	AGEX	*Agrostis exarata*	spike bentgrass	N	FACW
AGID	AGID	*Agrostis idahoensis*	Idaho bentgrass	N	FACW
AGOR	AGOR	*Agrostis oregonensis*	Oregon bentgrass	N	FACW-
AGSC	AGSC5	*Agrostis scabra*	winter bentgrass	N	FAC+
AGTH	AGTH	*Agrostis thurberiana*	Thurber's bentgrass	N	FACW
AGVA	AGVA	*Agrostis variabilis*	variant bentgrass	N	FACW
BRCI	BRCI	*Bromus ciliatus*	fringed brome-grass	N	FACU+
BRIN	BRIN2	*Bromus inermis*	smooth brome	N	FACU
BROMU	BROMU	*Bromus* spp.	brome species	N	FACU+
BRVU	BRVU	*Bromus vulgaris*	Columbia brome	N	FACU+
CACA	CACA4	*Calamagrostis canadensis*	bluejoint reedgrass	Y	FACW+
CANE3	CANE4	*Calamagrostis neglecta*	slimstem reedgrass	N	FACW
CARU	CARU	*Calamagrostis rubescens*	pinegrass	N	FACU
CILA2	CILA2	*Cinna latifolia*	wood reed-grass	Y	FACW
CINNA	CINNA	*Cinna* spp.	woodreed species	N	FACW
DAIN	DAIN	*Danthonia intermedia*	timber oatgrass	Y	FACU+
DEAT	DEAT2	*Deschampsia atropurpurea*	mountain hairgrass	N	FACU+
DECE	DECE	*Deschampsia cespitosa*	tufted hairgrass	Y	FACW
ELCA	ELCA4	*Elymus canadensis*	Canada wildrye	N	FACW-
ELCI	ELCI2	*Elymus cinereus*	basin wildrye	N	FACW-
ELGL	ELGL	*Elymus glaucus*	blue wildrye	N	FACU
FEOC	FEOC	*Festuca occidentalis*	western fescue	N	FACW-
FEOVR	FEOVR	*Festuca ovina* var. *rydbergii*	sheep fescue	Y	FACU
FEVI	FEVI	*Festuca viridula*	green fescue	N	FACU
GLBO	GLBO	*Glyceria borealis*	northern mannagrass	Y	OBL
GLEL	GLEL	*Glyceria elata*	tall mannagrass	Y	FACW+
GLGR	GLGR	*Glyceria grandis*	reed mannagrass	Y	OBL
GLOC	GLOC	*Glyceria occidentalis*	western mannagrass	Y	OBL
GLST	GLST	*Glyceria striata*	fowl mannagrass	Y	OBL
MUGL	MUGL3	*Muhlenbergia glomerata*	marsh muhly	N	OBL
PHAR	PHAR3	*Phalaris arundinacea*	reed canarygrass	Y	FACW
PHAL	PHAL2	*Phleum alpinum*	alpine timothy	N	FAC
PHPR	PHPR3	*Phleum pratense*	timothy	N	FAC
POCUE	POCUE	*Poa cusickii epilis*	Cusick's bluegrass	N	FACU
POLE	POLE2	*Poa leptocoma*	bog bluegrass	N	FACW
POPA	POPA4	*Poa palustris*	fowl bluegrass	N	FACW
POPR	POPR	*Poa pratensis*	Kentucky bluegrass	Y	FAC
PUPAH	PUPAH	*Puccinellia pauciflora* var. *holmii*	weak alkaligrass	N	OBL
PUPAM	PUPAM2	*Puccinellia pauciflora* var. *microtheca*	pale false mannagrass	N	OBL
TRSP	TRSP2	*Trisetum spicatum*	spike trisetum	N	FACU
Forbs:					
ACMI	ACMI	*Achillea millefolium*	western yarrow	N	FACU
ACTR	ACTR	*Achlys triphylla*	deerfoot vanillaleaf	Y	FAC+
ACCO	ACCO4	*Aconitum columbianum*	Columbia monkshood	N	FACW
ACRU	ACRU2	*Actaea rubra*	baneberry	N	FACW-
ADBI	ADBI	*Adenocaulon bicolor*	pathfinder	N	FAC+
AGEL2	AGEL	*Agoseris elata*	tall agoseris	N	FACU
AGGL	AGGL	*Agoseris glauca*	pale agoseris	N	FACW
ALLIU	ALLIU	*Allium* spp.	wild onion species	N	FACU
ANMA	ANMA	*Anaphalis margaritacea*	common pearly-everlasting	N	FACU
ANOR	ANOR	*Anemone oregana*	Oregon anemone	N	FACU
ANAR	ANAR3	*Angelica arguta*	sharptooth angelica	N	FACW
ANAL	ANAL3	*Antennaria alpina*	alpine pussytoes	N	FACU

Appendix A-1—Aquatic, Riparian, and Wetland Plants Listed by Scientific Name (continued)

PNW region code	Plants database code	Scientific name	Common name	Indicator species	Hydrologic status
ANMI	ANMI2	*Antennaria microcephala*	rose pussytoes	N	FACU
ANRA	ANRA	*Antennaria racemosa*	raceme pussytoes	N	FACU
ANUM	ANUM	*Antennaria umbrinella*	umber pussytoes	N	FACU
ARHO	ARHO	*Arabis holboellii*	Holboell's rockcress	N	FACU
ARMI2	ARMI3	*Arabis microphylla*	small-leaf rockcress	N	FACU
ARNU3	ARNU3	*Aralia nudicaulis*	wild sarsaparilla	Y	FACW-
ARMA3	ARMA4	*Arenaria macrophylla*	largeleaf sandwort	N	FAC
ARAM	ARAM	*Arnica amplexicaulis*	clasping arnica	N	FACW-
ARCH	ARCH	*Arnica chamissonis*	Chamisso arnica	N	FACW-
ARCO	ARCO	*Arnica cordifolia*	heart-leaf arnica	N	FACU
ARLA	ARLA8	*Arnica latifolia*	mountain arnica	Y	FAC
ARMO	ARMO4	*Arnica mollis*	hairy arnica	N	FAC
ARNIC	ARNIC	*Arnica* spp.	arnica species	N	FAC
ARLU	ARLU	*Artemisia ludoviciana*	herbaceous sage	N	FACU
ARSY	ARSY2	*Aruncus sylvester*	sylvan goatsbeard	N	FAC
ASCA3	ASCA2	*Asarum caudatum*	wild ginger	Y	FACW-
ASAL	ASAL2	*Aster alpigenus*	alpine aster	N	FACU
ASCO	ASCO3	*Aster conspicuus*	showy aster	N	FACU
ASFO	ASFO	*Aster foliaceus*	alpine leafybract aster	N	FACW-
ASMO	ASMO3	*Aster modestus*	fewflower aster	N	FACW-
ASOC	ASOC	*Aster occidentalis*	western aster	N	FACW-
ASSI2	ASSI	*Aster sibiricus*	arctic aster	N	FACU
ASTER	ASTER	*Aster* spp.	aster species	N	FACU
BICE	BICE	*Bidens cernua*	nodding beggars-tick	N	OBL
CABI	CABI2	*Caltha biflora*	twinflower marshmarigold	Y	FACW+
CABIB	CABIB	*Caltha biflora* var. *biflora*	twinflower marshmarigold	Y	FACW+
CABIR	CABIR	*Caltha biflora* var. *rotundifolia*	twinflower marshmarigold	Y	FACW+
CALE2	CALE2	*Caltha leptosepala*	elkslip	N	FACW
CAPE3	CAPE4	*Cardamine pennsylvanica*	Pacific bittercress	N	FACW
CIDO	CIDO	*Cicuta douglasii*	western water-hemlock	N	OBL
CIBU	CIBU	*Cicuta bulbifera*	bulbed water-hemlock	N	OBL
CIAL	CIAL	*Circaea alpina*	enchanter's nightshade	N	FACW
CIAR	CIAR4	*Cirsium arvense*	Canada thistle	N	FACW-
CIRCI	CIRCI	*Cirsium* spp.	thistle species	N	FAC
CLLI	CLLI	*Clematis ligusticifolia*	western white clematis	N	FAC
CLUN	CLUN2	*Clintonia uniflora*	queencup beadlily	Y	FACU+
DEVI	DEVI	*Delphinium viridescens*	Wenatchee larkspur	N	FACW
DIHO	DIHO3	*Disporum hookeri*	Hooker's fairy-bells	N	FAC+
DITR	DITR	*Disporum trachycarpum*	roughfruit fairy-bells	N	FAC
DOCO	DOCO	*Dodecatheon conjugens*	slimpod shooting-star	N	FAC
DODE	DODE	*Dodecatheon dentatum*	dentate shooting-star	N	FAC+
DOJE	DOJE	*Dodecatheon jeffreyi*	Jeffrey's shooting-star	N	FACW
DODEC	DODEC	*Dodecatheon* spp.	shooting-star species	N	FAC+
ELCA3	ELCA7	*Elodea canadensis*	Canada waterweed	N	OBL
ELODE	ELODE	*Elodea* spp.	waterweed species	N	OBL
EPAL	EPAL	*Epilobium alpinum*	alpine willow-weed	N	FAC+
EPAN	EPAN	*Epilobium angustifolium*	fireweed	N	FACU
EPGL	EPGL	*Epilobium glaberrimum*	smooth willow-weed	N	FACW
EPLA	EPLA	*Epilobium latifolium*	red willow-weed	N	FACW
EPILO	EPILO	*Epilobium* spp.	willow-weed species	N	FAC
EPWA	EPWA3	*Epilobium watsonii*	Watson's willow-weed	N	FACW
ERAU	ERAU	*Erigeron aureus*	golden fleabane	N	FAC
ERPE	ERPE3	*Erigeron peregrinus*	peregrine fleabane	N	FACW
ERPEC	ERPEC	*Erigeron peregrinus* var. *callianthemus*	peregrine fleabane	N	FACW
ERPES	ERPES3	*Erigeron peregrinus* var. *scaposus*	peregrine fleabane	N	FACW
FRVEB	FRVEB3	*Fragaria vesca* var. *bracteata*	woods strawberry	N	FACU
FRVIP	FRVIP3	*Fragaria virginiana* var. *platypetala*	broadpetal strawberry	N	FACU
GAAP	GAAP2	*Galium aparine*	catchweed bedstraw	N	FAC-
GAAS	GAAS	*Galium asperrimum*	rough bedstraw	N	FACU
GABO	GABO2	*Galium boreale*	northern bedstraw	N	FACU
GAKA	GAKA	*Galium kamtschaticum*	boreal bedstraw	N	FACU
GATRI	GATR2	*Galium trifidum*	small bedstraw	N	OBL
GATR	GATR3	*Galium triflorum*	sweetscented bedstraw	N	FACU
GECA	GECA	*Gentiana calycosa*	Rainier pleated gentian	N	FACW
GEMA	GEMA4	*Geum macrophyllum*	largeleaf avens	N	FACW
GEMAP	GEMAP	*Geum macrophyllum* var. *perincisum*	largeleaf avens	N	FACW
GERI2	GERI2	*Geum rivale*	water avens	N	FACW
GETR	GETR	*Geum triflorum*	old man's whiskers	N	FACU
GOOB	GOOB2	*Goodyera oblongifolia*	western rattlesnake plantain	N	FACU-
HADI2	HADI7	*Habenaria dilatata*	white bog-orchid	N	OBL
HASA	HASA	*Habenaria saccata*	slender bog-orchid	N	OBL

Appendix A-1—Aquatic, Riparian, and Wetland Plants Listed by Scientific Name (continued)

PNW region code	Plants database code	Scientific name	Common name	Indicator species	Hydrologic status
HELA	HELA4	*Heracleum lanatum*	common cow-parsnip	N	FAC+
HIAL	HIAL2	*Hieracium albiflorum*	white hawkweed	N	FACU
HIGR	HIGR	*Hieracium gracile*	slender hawkweed	N	FAC
HYCA	HYCA4	*Hyrdophyllum capitatum*	ballhead waterleaf	N	FAC
HYFE	HYFE	*Hydrophyllum fendleri*	Fendler's waterleaf	N	FACW-
HYAN	HYAN2	*Hypericum anagalloides*	trailing St. John's-wort	N	FACW
LAPA2	LAPA5	*Lathyrus pauciflorus*	fewflower peavine	N	FAC
LATHY	LATHY	*Lathyrus* spp.	peavine species	N	FAC
LEMI	LEMI3	*Lemna minor*	water lentil	N	OBL
LEPY	LEPY	*Leptarrhena pyrolifolia*	false saxafrage	N	FACW
LICA2	LICA2	*Ligusticum canbyi*	Canby's licorice-root	N	FAC
LIGR	LIGR	*Ligusticum grayi*	Gray's licorice-root	N	FAC
LICA3	LICA10	*Listera caurina*	northwestern twayblade	N	FACW-
LUPE	LUPE	*Luetkea pectinata*	partridgefoot	Y	FAC+
LULA	LULA4	*Lupinus latifolius*	broadleaf lupine	Y	FAC+
LUPO	LUPO2	*Lupinus polyphyllus*	bigleaf lupine	Y	FACW-
LUPIN	LUPIN	*Lupinus* spp.	lupine species	N	FAC
LYAM	LYAM3	*Lysichiton americanus*	skunk cabbage	Y	OBL
MEAR3	MEAR4	*Mentha arvensis*	field mint	N	FACW-
METR	METR3	*Menyanthes trifoliata*	common bogbean	N	OBL
MEPA	MEPA6	*Mertensia paniculata*	panicle bluebells	N	FACW
MECI	MECI13	*Mertensia ciliata*	mountain bluebells	N	FACU
MEPAB	MEPAB	*Mertensia paniculata* var. *borealis*	northern bluebells	N	FACW
MIGUG	MIGUG	*Mimulus guttatus* var. *guttatus*	common monkey-flower	N	OBL
MILE	MILE2	*Mimulus lewisii*	Lewis' monkey-flower	Y	FACW+
MITI	MITI	*Mimulus tilingii*	large mountain mimulus	N	OBL
MITIC	MITIC	*Mimulus tilingii* var. *caespitosus*	large mountain mimulus	N	OBL
MIPE	MIPE	*Mitella pentandra*	fivestamen miterwort	N	FACW
MITEL	MITEL	*Mitella* spp.	miterwort species	N	FACW-
MIST2	MIST3	*Mitella stauropetala*	smallflower miterwort	N	FACW-
MITR2	MITR4	*Mitella trifida*	three-parted miterwort	N	FACW-
MOCO	MOCO4	*Montia cordifolia*	broadleaved montia	N	FACW
MODI3	MODI4	*Montia diffusa*	branching montia	N	FACW
MOPAP	MOPAP	*Montia parvifolia* var. *parvifolia*	littleleaf minerslettuce	N	FAC
MYSPE	MYSPE	*Myriophyllum spicatum* var. *exalbescens*	common water-milfoil	N	OBL
NUPO	NUPO2	*Nuphar polysepalum*	Indian water-lily	Y	OBL
NUVA	NUVA	*Nuphar variegatum*	cow-lily	Y	OBL
OSCH	OSCH	*Osmorhiza chilensis*	mountain sweet-root	N	FAC
OSOC	OSOC	*Osmorhiza occidentalis*	western sweet-root	N	FAC
OSPU	OSPU	*Osmorhiza purpurea*	purple sweet-root	N	FAC
OSMOR	OSMOR	*Osmorhiza* spp.	sweet-root species	N	FAC
PAFI	PAFI3	*Parnassia fimbriata*	fringed grass-of-parnassia	N	OBL
PEGR	PEGR2	*Pedicularis groenlandica*	elephanthead pedicularis	N	OBL
PEFR2	PEFR5	*Petasites frigidus*	arctic butterbur	N	FACW
PESA	PESA5	*Petasites sagittatus*	arrowleaf coltsfoot	N	OBL
POPU	POPU3	*Polemonium pulcherrimum*	skunkleaf polemonium	Y	FAC+
POAM2	POAM8	*Polygonum amphibium*	water ladysthumb	Y	OBL
POBI	POBI6	*Polygonum bistortoides*	American bistort	N	FACW+
POCO4	POCO8	*Polygonum coccineum*	water smartweed	Y	OBL
POLYG	POLYG4	*Polygonum* spp.	knotweed species	Y	OBL
POGR3	POGR8	*Potamogeton gramineus*	grass-leaved pondweed	Y	OBL
PONA2	PONA4	*Potamogeton natans*	floatingleaf pondweed	Y	OBL
POTAM	POTAM	*Potamogeton* spp.	pondweed species	Y	OBL
PODI	PODI2	*Potentilla diversifolia*	diverse-leaved cinquefoil	N	FAC
POFL2	POFL3	*Potentilla flabellifolia*	fanleaf cinquefoil	N	FAC+
POGR	POGR9	*Potentilla gracilis*	northwest cinquefoil	N	FACU
POPA3	POPA14	*Potentilla palustris*	marsh cinquefoil	N	OBL
PYAS	PYAS	*Pyrola asarifolia*	pink wintergreen	N	FACW-
PYSE	PYSE	*Pyrola secunda*	sidebells pyrola	N	FACU+
PYROLA	PYROLA	*Pyrola* spp.	pyrola species	N	FACU
PYUN	PYUN	*Pyrola uniflora*	woodnymph pyrola	N	FACW
RAAQ	RAAQ	*Ranunculus aquatilis*	watercrowfoot buttercup	N	OBL
RAFL	RAFL2	*Ranunculus flammula*	lesser spearwort	N	OBL
RAGM	RAGM	*Ranunculus gmelinii*	small yellow water-buttercup	N	FACW
RASU	RASU4	*Ranunculus suksdorfii*	Suksdorf's buttercup	N	FACW
RAUN2	PAUN	*Ranunculus uncinatus*	hooked buttercup	N	FACW
SAMA3	SAMA2	*Sanicula marilandica*	black snake-root	N	FACW
SAAR	SAAR13	*Saxifraga arguta*	brook saxifrage	Y	FACW
SAME	SAME7	*Saxifraga mertensiana*	Merten's saxifrage	Y	FACW
SAOR	SAOR2	*Saxifraga oregana*	bog saxifrage	Y	FACW
SAPU	SAPU6	*Saxifraga punctata*	dotted saxifrage	Y	FACW

Appendix A-1—Aquatic, Riparian, and Wetland Plants Listed by Scientific Name (continued)

PNW region code	Plants database code	Scientific name	Common name	Indicator species	Hydrologic status
SCPA	SCPA2	*Scheuchzeria palustris*	scheuchzeria	N	OBL
SCUTE	SCUTE	*Scutellaria* spp.	skullcap species	N	FACW
SECY	SECY	*Senecio cymbalarioides*	cleftleaf groundsel	N	FAC+
SEHY	SEHY2	*Senecio hydrophilus*	alkali-marsh butterweed	N	FACW-
SETR	SETR	*Senecio triangularis*	arrowleaf groundsel	Y	FACW
SMRA	SMRA	*Smilacina racemosa*	western solomonplume	N	FAC
SMST	SMST	*Smilacina stellata*	starry solomonplume	N	FAC
SOCA	SOCA6	*Solidago canadensis*	Canada goldenrod	N	FACU
SPEM	SPEM2	*Sparganium emersum*	simplestem bur-reed	Y	OBL
SPMI	SPMI	*Sparganium minimum*	small bur-reed	Y	OBL
SPARG	SPARG	*Sparganium* spp.	bur-reed species	Y	OBL
SPRO	SPRO	*Spiranthes romanzoffiana*	ladies-tresses	N	OBL
STCO4	STCO14	*Stachys cooleyae*	Cooley's hedge-nettle	N	FACW
STAM	STAM2	*Streptopus amplexifolius*	claspleaf twisted-stalk	Y	FACW
STAMC	STAMC	*Streptopus amplexifolius* var. *chalazatus*	claspleaf twisted-stalk	Y	FACW
STRO	STRO4	*Streptopus roseus*	rosy twisted-stalk	Y	FACU+
TAOF	TAOF	*Taraxacum officinale*	common dandelion	N	FAC
THOC	THOC	*Thalictrum occidentale*	western meadowrue	N	FACU
TITRU	TITRU	*Tiarella trifoliata* var. *unifoliata*	coolwort foamflower	Y	FAC+
TRCA3	TRCA	*Trautvetteria caroliniensis*	false bugbane	Y	FACW
TRLA2	TRLA6	*Trientalis latifolia*	broadleaf starflower	N	FACW-
TRRE	TRRE3	*Trifolium repens*	white clover	N	FACU
TROV	TROV2	*Trillium ovatum*	white trillium	N	FAC+
TRLA4	TRLA14	*Trollius laxus*	globeflower	Y	OBL
TYLA	TYLA	*Typha latifolia*	common cattail	Y	OBL
URDI	URDI	*Urtica dioica*	stinging nettle	N	FACW-
UTMI	UTMI	*Utricularia minor*	lesser bladderwort	N	OBL
UTRIC	UTRIC	*Utricularia* spp.	bladderwort species	N	OBL
UTVU	UTVU	*Utricularia vulgaris*	common bladderwort	N	OBL
VASI	VASI	*Valeriana sitchensis*	Sitka valerian	Y	FAC+
VEVI	VEVI	*Veratrum viride*	American false hellebore	N	FACW
VEAM	VEAM2	*Veronica americana*	American speedwell	N	OBL
VEAN	VEAN2	*Veronica anagallis* var. *aquatica*	water pimpernel	N	OBL
VECU	VECU	*Veronica cusickii*	Cusick's speedwell	N	FACW
VESC	VESC2	*Veronica scutellata*	marsh speedwell	N	OBL
VESE	VESE	*Veronica serpyllifolia*	thyme-leaved speedwell	N	FAC
VEWO	VEWO2	*Veronica wormskjoldii*	Wormskjold's speedwell	N	FAC+
VIAM	VIAM	*Vicia americana*	American vetch	N	FAC
VIAD	VIAD	*Viola adunca*	hook violet	N	FACU
VICA	VICA4	*Viola canadensis*	Canadian violet	N	FACW
VIGL	VIGL	*Viola glabella*	pioneer violet	N	FACW
VIMA	VIMA2	*Viola macloskeyi*	Macloskey's violet	N	OBL
VIOR2	VIOR	*Viola orbiculata*	round-leaved violet	N	FACU
VIPA2	VIPA4	*Viola palustris*	marsh violet	N	FACW
VIOLA	VIOLA	*Viola* spp.	violet species	N	FAC
XETE	XETE	*Xereophyllum tenax*	beargrass	N	FACU
Ferns and fern allies:					
ATDI	ATDI	*Athyrium distentifolium*	alpine lady fern	Y	FACW
ATFI	ATFI	*Athyrium filix-femina*	lady fern	Y	FACW
BLSP	BLSP	*Blechnum spicant*	deerfern	N	FAC
BOTRY	BOTRY	*Botrychium* spp.	grape-fern	N	FAC+
CHARA	CHARA	*Chara* spp.	water millfoil species	N	OBL
CYFR	CYFR	*Cystopteris fragilis*	brittle bladderfern	N	FAC
DRAR	DRAR3	*Dryopteris arguta*	coastal shield fern	Y	FACW
DRAU	DRAU	*Dryopteris austriaca*	mountain wood fern	Y	FACW
DRCA	DRCA11	*Dryopteris carthusiana*	wood fern	Y	FACW
DRCR2	DRCR4	*Dryopteris cristata*	crested shield fern	Y	OBL
DREX	DREX	*Dryopteris expansa*	spreading wood fern	Y	FACW
DRFI	DRFI2	*Dryopteris filix-mas*	male wood fern	Y	FACW
DRYOP	DRYOP	*Dryopteris* spp.	wood fern species	Y	FACW
EQAR	EQAR	*Equisetum arvense*	common horsetail	Y	FACW
EQFL	EQFL	*Equisetum fluviatile*	water horsetail	Y	OBL
EQHY	EQHY	*Equisetum hyemale*	common scouring-rush	Y	FAC
EQPA	EQPA	*Equisetum palustre*	marsh horsetail	Y	FACW
EQSC	EQSC	*Equisetum scirpoides*	sedgelike horsetail	N	FACW
EQSY	EQSY	*Equisetum sylvaticum*	wood horsetail	Y	FACW
EQUIS	EQUIS	*Equisetum* spp.	horsetail species	Y	FACW
GYDR	GYDR	*Gymnocarpium dryopteris*	oak fern	Y	FACW-
ISOET	ISOET	*Isoetes* spp.	quilwort species	N	OBL
LYAN	LYAN2	*Lycopodium annotinum*	stiff clubmoss	N	FACW-
POMU	POMU	*Polystichum munitum*	sword fern	N	FACW-
PTAQ	PTAQ	*Pteridium aquilinum*	western brackenfern	N	FACU

Appendix A-2—Aquatic, Riparian, and Wetland Plants Listed by Common Name

Common name	Scientific name	PNW region code	Plants database code	Indicator species	Hydrologic status
Alaska huckleberry	*Vaccinium alaskaense*	VAAL	VAAL	Y	FACU
Alaska moss-heather	*Cassiope stelleriana*	CAST5	CAST6	Y	FAC
Alaska yellow-cedar	*Chamaecyparis nootkatensis*	CHNO	CHNO	N	FACU
alder buckthorn	*Rhamnus alnifolia*	RHAL2	RHAL	N	FACW
alkali-marsh butterweed	*Senecio hydrophilus*	SEHY	SEHY2	N	FACW-
alpine aster	*Aster alpigenus*	ASAL	ASAL2	N	FACU
alpine bluegrass	*Poa alpina*	POAL	POAL2	N	FAC
alpine lady fern	*Athyrium distentifolium*	ATDI	ATDI	Y	FACW
alpine laurel	*Kalmia microphylla*	KAMI	KAMI	N	FACW
alpine leafybract aster	*Aster foliaceus*	ASFO	ASFO	N	FACW-
alpine pussytoes	*Antennaria alpina*	ANAL	ANAL3	N	FACU
alpine timothy	*Phleum alpinum*	PHAL	PHAL2	N	FAC
alpine willow-weed	*Epilobium alpinum*	EPAL	EPAL	N	FAC+
American bistort	*Polygonum bistortoides*	POBI	POBI6	N	FACW+
American false hellebore	*Veratrum viride*	VEVI	VEVI	N	FACW
American speedwell	*Veronica americana*	VEAM	VEAM2	N	OBL
American vetch	*Vicia americana*	VIAM	VIAM	N	FAC
arnica species	*Arnica* spp.	ARNIC	ARNIC	N	FAC
arrowleaf coltsfoot	*Petasites sagittatus*	PESA	PESA5	N	OBL
arrowleaf groundsel	*Senecio triangularis*	SETR	SETR	Y	FACW
arctic aster	*Aster sibiricus*	ASSI2	ASSI	N	FACU
arctic butterbur	*Petasites frigidus*	PEFR2	PEFR5	N	FACW
aster species	*Aster* spp.	ASTER	ASTER	N	FACU
awned sedge	*Carex atherodes*	CAAT2	CAAT2	Y	OBL
baldhip rose	*Rosa gymnocarpa*	ROGY	ROGY	N	FAC
ballhead waterleaf	*Hydrophyllum capitatum*	HYCA	HYCA4	N	FAC
Baltic rush	*Juncus balticus*	JUBA	JUBA	N	FACW+
baneberry	*Actaea rubra*	ACRU	ACRU2	N	FACW-
Barclay's willow	*Salix barclayi*	SABA	SABA3	Y	FACW+
basin wildrye	*Elymus cinereus*	ELCI	ELCI2	N	FACW-
beaked sedge	*Carex rostrata*	CARO2	CARO6	Y	OBL
bearberry	*Arctostaphylos uva-ursi*	ARUV	ARUV	Y	FACU-
bearberry honeysuckle	*Lonicera involucrata*	LOIN	LOIN5	N	FACW
beargrass	*Xereophyllum tenax*	XETE	XETE	N	FACU
Bebb's willow	*Salix bebbiana*	SABE	SABE2	Y	FACW+
Bebb's willow	*Salix bebbiana* var. *perrostrata*	SABEP	SABEP	Y	FACW+
big huckleberry	*Vaccinium membranaceum*	VAME	VAME	Y	FACU
bigleaf lupine	*Lupinus polyphyllus*	LUPO	LUPO2	Y	FACW-
bigleaf maple	*Acer macrophyllum*	ACMA	ACMA3	Y	FACU
bigleaf sedge	*Carex amplifolia*	CAAM	CAAM10	Y	FACW+
bittercherry	*Prunus emarginata*	PREM	PREM	N	FACU
black alpine sedge	*Carex nigricans*	CANI2	CANI2	Y	FACW-
black cottonwood	*Populus trichocarpa*	POTR2	POTR15	Y	FACW
black hawthorn	*Crataegus douglasii* var. *douglasii*	CRDOD	CRDOD	Y	FAC
black snake-root	*Sanicula marilandica*	SAMA3	SAMA2	N	FACW
blackened sedge	*Carex atrata*	CAAT3	CAAT5	N	FACW+
bladder sedge	*Carex utriculata*	CAUT	CAUT	Y	OBL
bladderwort species	*Utricularia* spp.	UTRIC	UTRIC	N	OBL
blue wildrye	*Elymus glaucus*	ELGL	ELGL	N	FACU
bluejoint reedgrass	*Calamagrostis canadensis*	CACA	CACA4	Y	FACW+
bog birch	*Betula glandulosa*	BEGL	BEGL	Y	OBL
bog birch	*Betula glandulosa* var. *glandulosa*	BEGLG	BEGLG	Y	OBL
bog bluegrass	*Poa leptocoma*	POLE	POLE2	N	FACW
bog saxifrage	*Saxifraga oregana*	SAOR	SAOR2	Y	FACW
bog willow	*Salix pedicellaris*	SAPE3	SAPE2	Y	OBL
Booth's willow	*Salix boothii*	SABO2	SABO2	Y	OBL
boreal bedstraw	*Galium kamtschaticum*	GAKA	GAKA	N	FACU
branching montia	*Montia diffusa*	MODI3	MODI4	N	FACW
brittle bladderfern	*Cystopteris fragilis*	CYFR	CYFR	N	FAC
broadleaf lupine	*Lupinus latifolius*	LULA	LULA4	Y	FAC+
broadleaf starflower	*Trientalis latifolia*	TRLA2	TRLA6	N	FACW-
broadleaved montia	*Montia cordifolia*	MOCO	MOCO4	N	FACW
broadpetal strawberry	*Fragaria virginiana* var. *platypetala*	FRVIP	FRVIP3	N	FACU
brome species	*Bromus* spp.	BROMU	BROMU	N	FACU+
brook saxifrage	*Saxifraga arguta*	SAAR	SAAR13	Y	FACW
brownish sedge	*Carex brunnescens*	CABR6	CABR15	N	FACW+
bulbed water-hemlock	*Cicuta bulbifera*	CIBU	CIBU	N	OBL
bunchberry dogwood	*Cornus canadensis*	COCA	COCA13	Y	FACW-
bur-reed species	*Sparganium* spp.	SPARG	SPARG	Y	OBL
Buxbaum's sedge	*Carex buxbaumii*	CABU2	CABU6	Y	OBL
California hazel	*Corylus cornuta*	COCO2	COCO6	Y	FAC+

Appendix A-2—Aquatic, Riparian, and Wetland Plants Listed by Common Name (continued)

Common name	Scientific name	PNW region code	Plants database code	Indicator species	Hydrologic status
Canada goldenrod	*Solidago canadensis*	SOCA	SOCA6	N	FACU
Canada thistle	*Cirsium arvense*	CIAR	CIAR4	N	FACW-
Canada waterweed	*Elodea canadensis*	ELCA3	ELCA7	N	OBL
Canada wildrye	*Elymus canadensis*	ELCA	ELCA4	N	FACW-
Canadian violet	*Viola canadensis*	VICA	VICA4	N	FACW
Canby's licorice-root	*Ligusticum canbyi*	LICA2	LICA2	N	FAC
Cascade azalea	*Rhododendron albiflorum*	RHAL	RHAL2	Y	FACU
Cascade hollygrape	*Berberis nervosa*	BENE	BENE2	N	FACU
Cascade huckleberry	*Vaccinium deliciosum*	VADE	VADE	Y	FACU
Cascade mountain-ash	*Sorbus scopulina*	SOSC2	SOSC2	N	FACU
Cascade willow	*Salix cascadensis*	SACA6	SACA6	Y	FAC
catchweed bedstraw	*Galium aparine*	GAAP	GAAP2	N	FAC-
Chamisso arnica	*Arnica chamissonis*	ARCH	ARCH	N	FACW-
Chamisso cotton-grass	*Eriophorum chamissonis*	ERCH2	ERCH7	Y	OBL
clasping arnica	*Arnica amplexicaulis*	ARAM	ARAM	N	FACW-
claspleaf twisted-stalk	*Streptopus amplexifolius*	STAM	STAM2	Y	FACW
claspleaf twisted-stalk	*Streptopus amplexifolius* var. *chalazatus*	STAMC	STAMC	Y	FACW
cleftleaf groundsel	*Senecio cymbalarioides*	SECY	SECY	N	FAC+
coastal shield fern	*Dryopteris arguta*	DRAR	DRAR3	Y	FACW
Columbia brome	*Bromus vulgaris*	BRVU	BRVU	N	FACU+
Columbia monkshood	*Aconitum columbianum*	ACCO	ACCO4	N	FACW
Columbia sedge	*Carex aperta*	CAAP3	CAAP3	Y	FACW+
common bladderwort	*Utricularia vulgaris*	UTVU	UTVU	N	OBL
common bogbean	*Menyanthes trifoliata*	METR	METR3	N	OBL
common cattail	*Typha latifolia*	TYLA	TYLA	Y	OBL
common chokecherry	*Prunus virginiana*	PRVI	PRVI	Y	FACU
common cow-parsnip	*Heracleum lanatum*	HELA	HELA4	N	FAC+
common dandelion	*Taraxacum officinale*	TAOF	TAOF	N	FAC
common horsetail	*Equisetum arvense*	EQAR	EQAR	Y	FACW
common monkey-flower	*Mimulus guttatus* var. *guttatus*	MIGUG	MIGUG	N	OBL
common pearly-everlasting	*Anaphalis margaritacea*	ANMA	ANMA	N	FACU
common scouring-rush	*Equisetum hyemale*	EQHY	EQHY	Y	FAC
common snowberry	*Symphoricarpos albus*	SYAL	SYAL	Y	FACU
common water-milfoil	*Myriophyllum spicatum* var. *exalbescens*	MYSPE	MYSPE	N	OBL
Cooley's hedge-nettle	*Stachys cooleyae*	STCO4	STCO14	N	FACW
coolwort foamflower	*Tiarella trifoliata* var. *unifoliata*	TITRU	TITRU	Y	FAC+
cow-lily	*Nuphar variegatum*	NUVA	NUVA	Y	OBL
coyote willow	*Salix exigua*	SAEX	SAEX	Y	OBL
coyote willow	*Salix exigua* var. *exigua*	SAEXE	SAEXE	Y	OBL
Crawford's sedge	*Carex crawfordii*	CACR3	CACR4	N	FAC
cream mountain-heath	*Phyllodoce glanduliflora*	PHGL	PHGL6	Y	FAC
creeping hollygrape	*Berberis repens*	BERE	BERE	N	FACU
creeping spike-rush	*Eleocharis palustris*	ELPA	ELPA3	Y	OBL
crested shield fern	*Dryopteris cristata*	DRCR2	DRCR4	Y	OBL
currant species	*Ribes* spp.	RIBES	RIBES	N	FAC
curved woodrush	*Luzula arcuata*	LUAR4	LUAR5	N	FACU
Cusick's bluegrass	*Poa cusickii* var. *epilis*	POCUE	POCUE	N	FACU
Cusick's sedge	*Carex cusickii*	CACU2	CACU5	Y	OBL
Cusick's speedwell	*Veronica cusickii*	VECU	VECU	N	FACW
cutleaf groundsel	*Senecio cymbalarioides*	SECY	SECY	N	FAC+
cutting wheatgrass	*Agropyron caninum*	AGCA	AGCA	N	FACU
deerfern	*Blechnum spicant*	BLSP	BLSP	N	FAC
deerfoot vanillaleaf	*Achlys triphylla*	ACTR	ACTR	Y	FAC+
dentate shooting-star	*Dodecatheon dentatum*	DODE	DODE	N	FAC+
devil's club	*Oplopanax horridum*	OPHO	OPHO	Y	FACW
Dewey's sedge	*Carex deweyana*	CADE	CADE	N	FACW+
diverse-leaved cinquefoil	*Potentilla diversifolia*	PODI	PODI2	N	FAC
dotted saxifrage	*Saxifraga punctata*	SAPU	SAPU6	Y	FACW
Douglas maple	*Acer glabrum* var. *douglasii*	ACGLD	ACGLD4	Y	FACU
Douglas spiraea	*Spiraea douglasii*	SPDO	SPDO	Y	OBL
Douglas spiraea	*Spiraea douglasii* var. *douglasii*	SPDOD	SPDOD	Y	OBL
Douglas spiraea	*Spiraea douglasii* var. *menziesii*	SPDOM	SPDOM	Y	OBL
Douglas-fir	*Pseudotsuga menziesii*	PSME	PSME	Y	FACU
Drummond's rush	*Juncus drummondii*	JUDR	JUDR	N	FACU
Drummond's willow	*Salix drummondiana*	SADR	SADR	Y	OBL
dusky willow	*Salix melanopsis*	SAME2	SAME2	Y	OBL
dwarf bramble	*Rubus lasiococcus*	RULA	RULA	Y	FACU
dwarf huckleberry	*Vaccinium caespitosum*	VACA	VACA	Y	FACU
dwarf red blackberry	*Rubus pubescens*	RUPU2	RUPU	N	FACW-
Eastwood's willow	*Salix eastwoodiae*	SAEA	SAEA	N	OBL
elephanthead pedicularis	*Pedicularis groenlandica*	PEGR	PEGR2	N	OBL

Appendix A-2—Aquatic, Riparian, and Wetland Plants Listed by Common Name (continued)

Common name	Scientific name	PNW region code	Plants database code	Indicator species	Hydrologic status
elk sedge	*Carex geyeri*	CAGE	CAGE	N	FACU
elkslip	*Caltha leptosepala*	CALE2	CALE2	N	FACW
enchanter's nightshade	*Circaea alpina*	CIAL	CIAL	N	FACW
Engelmann spruce	*Picea engelmannii*	PIEN	PIEN	Y	FACU
false bugbane	*Trautvetteria caroliniensis*	TRCA3	TRCA	Y	FACW
false mountain willow	*Salix pseudomonticola*	SAPS2	SAPS	Y	OBL
false saxafrage	*Leptarrhena pyrolifolia*	LEPY	LEPY	N	FACW
fanleaf cinquefoil	*Potentilla flabellifolia*	POFL2	POFL3	N	FAC+
Farr's willow	*Salix farriae*	SAFA	SAFA	Y	OBL
Fendler's waterleaf	*Hydrophyllum fendleri*	HYFE	HYFE	N	FACW-
fewflower aster	*Aster modestus*	ASMO	ASMO3	N	FACW-
fewflower peavine	*Lathyrus pauciflorus*	LAPA2	LAPA5	N	FAC
few-flowered spike-rush	*Eleocharis pauciflora*	ELPA2	ELPA6	Y	OBL
field mint	*Mentha arvensis*	MEAR3	MEAR4	N	FACW-
fireweed	*Epilobium angustifolium*	EPAN	EPAN	N	FACU
five-leaved bramble	*Rubus pedatus*	RUPE	RUPE	N	FACW
fivestamen miterwort	*Mitella pentandra*	MIPE	MIPE	N	FACW
floatingleaf pondweed	*Potamogeton natans*	PONA2	PONA4	Y	OBL
four-angled moss-heather	*Cassiope tetragona*	CATE2	CATE11	Y	FAC
fowl bluegrass	*Poa palustris*	POPA	POPA4	N	FACW
fowl mannagrass	*Glyceria striata*	GLST	GLST	Y	OBL
fringed brome-grass	*Bromus ciliatus*	BRCI	BRCI	N	FACU+
fringed grass-of-parnassia	*Parnassia fimbriata*	PAFI	PAFI3	N	OBL
Geyer's willow	*Salix geyeriana* var. *geyeriana*	SAGEG	SAGEG	Y	FACW+
Geyer's willow	*Salix geyeriana* var. *meleiana*	SAGEM	SAGEM	Y	FACW+
glaucous willow	*Salix glauca*	SAGL	SAGL	Y	OBL
globeflower	*Trollius laxus*	TRLA4	TRLA14	Y	OBL
globe huckleberry	*Vaccinium globulare*	VAGL	VAGL	N	FACU
golden fleabane	*Erigeron aureus*	ERAU	ERAU	N	FAC
grand fir	*Abies grandis*	ABGR	ABGR	Y	FACU
grape-fern	*Botrychium* spp.	BOTRY	BOTRY	N	FAC+
grass-leaved pondweed	*Potamogeton gramineus*	POGR3	POGR8	Y	OBL
gray sedge	*Carex canescens*	CACA4	CACA5	N	FACW+
Gray's licorice-root	*Ligusticum grayi*	LIGR	LIGR	N	FAC
green fescue	*Festuca viridula*	FEVI	FEVI	N	FACU
green-keeled cotton-grass	*Eriophorum viridicarinatum*	ERVI	ERVI9	Y	OBL
grouse huckleberry	*Vaccinium scoparium*	VASC	VASC	Y	FACU
hairy arnica	*Arnica mollis*	ARMO	ARMO4	N	FAC
hardstem bulrush	*Scirpus acutus*	SCAC	SCAC	Y	OBL
heart-leaf arnica	*Arnica cordifolia*	ARCO	ARCO	N	FACU
herbaceous sage	*Artemisia ludoviciana*	ARLU	ARLU	N	FACU
hoary willow	*Salix candida*	SACA9	SACA4	Y	OBL
Holboell's rockcress	*Arabis holboellii*	ARHO	ARHO	N	FACU
Holm's sedge	*Carex scopulorum* var. *bracteosa*	CASCB	CASCB	Y	FACW+
Hood's sedge	*Carex hoodii*	CAHO	CAHO	N	FAC
hook violet	*Viola adunca*	VIAD	VIAD	N	FACU
hooked buttercup	*Ranunculus uncinatus*	RAUN2	PAUN	N	FACW
Hooker's fairy-bells	*Disporum hookeri*	DIHO	DIHO3	N	FAC+
Hudsonbay currant	*Ribes hudsonianum*	RIHU	RIHU	Y	FACW+
Idaho bentgrass	*Agrostis idahoensis*	AGID	AGID	N	FACW
Indian water-lily	*Nuphar polysepalum*	NUPO	NUPO2	Y	OBL
inflated sedge	*Carex vesicaria*	CAVE	CAVE6	Y	OBL
inland sedge	*Carex interior*	CAIN5	CAIN11	N	OBL
Jeffrey's shooting-star	*Dodecatheon jeffreyi*	DOJE	DOJE	N	FACW
Kentucky bluegrass	*Poa pratensis*	POPR	POPR	Y	FAC
knotweed species	*Polygonum* spp.	POLYG	POLYG4	Y	OBL
Labrador tea	*Ledum glandulosum*	LEGL	LEGL	Y	FACW-
Labrador tea	*Ledum glandulosum* var. *glandulosum*	LEGLG	LEGLG	Y	FACW-
ladies-tresses	*Spiranthes romanzoffiana*	SPRO	SPRO	N	OBL
lady fern	*Athyrium filix-femina*	ATFI	ATFI	Y	FACW
large mountain mimulus	*Mimulus tilingii*	MITI	MITI	N	OBL
large mountain mimulus	*Mimulus tilingii* var. *caespitosus*	MITIC	MITIC	N	OBL
largeleaf avens	*Geum macrophyllum*	GEMA	GEMA4	N	FACW
largeleaf avens	*Geum macrophyllum* var. *perincisum*	GEMAP	GEMAP	N	FACW
largeleaf sandwort	*Arenaria macrophylla*	ARMA3	ARMA4	N	FAC
Lemmon's willow	*Salix lemmonii*	SALE	SALE	Y	OBL
lenticular sedge	*Carex lenticularis*	CALE5	CALE5	Y	OBL
lesser bladderwort	*Utricularia minor*	UTMI	UTMI	N	OBL
lesser panicled sedge	*Carex diandra*	CADI2	CADI4	N	OBL
lesser spearwort	*Ranunculus flammula*	RAFL	RAFL2	N	OBL
Lewis' mock orange	*Philadelphus lewisii*	PHLE2	PHLE4	N	FAC

Appendix A-2—Aquatic, Riparian, and Wetland Plants Listed by Common Name (continued)

Common name	Scientific name	PNW region code	Plants database code	Indicator species	Hydrologic status
Lewis' monkey-flower	*Mimulus lewisii*	MILE	MILE2	Y	FACW+
little prince's-pine	*Chimaphila menziesii*	CHME	CHME	N	FACU
littleleaf montia	*Montia parviflora*	MOPAP	MOPAP	N	FAC
lodgepole pine	*Pinus contorta*	PICO	PICO	Y	FACU
low huckleberry	*Vaccinium myrtillus*	VAMY	VAMY2	Y	FACU
lupine species	*Lupinus* spp.	LUPIN	LUPIN	N	FAC
McCalla's willow	*Salix maccalliana*	SAMA	SAMA12	Y	OBL
Mackenzie's willow	*Salix rigida* var. *mackenzieana*	SARIM2	SARIM4	Y	OBL
Macloskey's violet	*Viola macloskeyi*	VIMA	VIMA2	N	OBL
male wood fern	*Dryopteris filix-mas*	DRFI	DRFI2	Y	FACW
many-spiked cotton-grass	*Eriophorum polystachion*	ERPO2	ERPO3	Y	OBL
mapleleaf currant	*Ribes howellii*	RIHO	RIHO2	N	FAC
marsh cinquefoil	*Potentilla palustris*	POPA3	POPA14	N	OBL
marsh horsetail	*Equisetum palustre*	EQPA	EQPA	Y	FACW
marsh muhly	*Muhlenbergia glomerata*	MUGL	MUGL3	N	OBL
marsh speedwell	*Veronica scutellata*	VESC	VESC2	N	OBL
marsh violet	*Viola palustris*	VIPA2	VIPA4	N	FACW
Merten's moss-heather	*Cassiope mertensiana*	CAME	CAME7	Y	FAC
Merten's rush	*Juncus mertensianus*	JUME	JUME3	N	OBL
Merten's saxifrage	*Saxifraga mertensiana*	SAME	SAME7	Y	FACW
Merten's sedge	*Carex mertensii*	CAME2	CAME	N	FAC
miterwort species	*Mitella* spp.	MITEL	MITEL	N	FACW-
moosewood viburnum	*Viburnum edule*	VIED	VIED	N	FACW
mountain alder	*Alnus incana*	ALIN	ALIN2	Y	FACW
mountain arnica	*Arnica latifolia*	ARLA	ARLA8	Y	FAC
mountain bluebells	*Mertensia ciliata*	MECI	MECI13	N	FACU
mountain hairgrass	*Deschampsia atropurpurea*	DEAT	DEAT2	N	FACU+
mountain hemlock	*Tsuga mertensiana*	TSME	TSME	Y	FACU
mountain sweet-root	*Osmorhiza chilensis*	OSCH	OSCH	N	FAC
mountain wood fern	*Dryopteris austriaca*	DRAU	DRAU	Y	FACW
moxie plum	*Gaultheria hispidula*	GAHI	GAHI2	N	OBL
mud sedge	*Carex limosa*	CALI	CALI	Y	OBL
muricate sedge	*Carex muricata*	CAMU2	CAMU3	N	OBL
myrtle pachistima	*Pachistima myrsinites*	PAMY	PAMY	Y	FACU-
Nebraska sedge	*Carex nebraskensis*	CANE	CANE	N	OBL
needle spike-rush	*Eleocharis acicularis*	ELAC	ELAC	N	OBL
noble fir	*Abies procera*	ABPR	ABPR	N	FACU
nodding beggars-tick	*Bidens cernua*	BICE	BICE	N	OBL
Nootka rose	*Rosa nutkana*	RONU	RONU	N	FAC
northern bedstraw	*Galium boreale*	GABO	GABO2	N	FACU
northern bluebells	*Mertensia paniculata* var. *borealis*	MEPAB	MEPAB	N	FACW
northern clustered sedge	*Carex arcta*	CAAR2	CAAR3	N	FACW+
northern mannagrass	*Glyceria borealis*	GLBO	GLBO	Y	OBL
northwest cinquefoil	*Potentilla gracilis*	POGR	POGR9	N	FACU
northwestern sedge	*Carex concinnoides*	CACO	CACO11	N	FACU
northwestern twayblade	*Listera caurina*	LICA3	LICA10	N	FACW-
oak fern	*Gymnocarpium dryopteris*	GYDR	GYDR	Y	FACW-
oceanspray	*Holodiscus discolor*	HODI	HODI	N	FACU
old man's whiskers	*Geum triflorum*	GETR	GETR	N	FACU
Oregon anemone	*Anemone oregana*	ANOR	ANOR	N	FACU
Oregon bentgrass	*Agrostis oregonensis*	AGOR	AGOR	N	FACW-
Oregon hollygrape	*Berberis aquifolium*	BEAQ	BEAQ	N	FACU
Oregon white oak	*Quercus garryana*	QUGA	QUGA4	Y	FACU
oval-leaf huckleberry	*Vaccinium ovalifolium*	VAOV	VAOV	Y	FACU
Pacific bittercress	*Cardamine pensylvanica*	CAPE3	CAPE4	N	FACW
Pacific blackberry	*Rubus ursinus*	RUUR	RUUR	N	FACW-
Pacific silver fir	*Abies amabilis*	ABAM	ABAM	Y	FACU
Pacific willow	*Salix lasiandra* var. *lasiandra*	SALAL	SALAL	Y	FACW+
pale agoseris	*Agoseris glauca*	AGGL	AGGL	N	FACW
pale false mannagrass	*Puccinellia pauciflora* var. *microtheca*	PUPAM	PUPAM2	N	OBL
panicle bluebells	*Mertensia paniculata*	MEPA	MEPA6	N	FACW
paper birch	*Betula papyrifera*	BEPA	BEPA	Y	FACU
Parry's rush	*Juncus parryi*	JUPA	JUPA	N	FACU
partridgefoot	*Luetkea pectinata*	LUPE	LUPE	Y	FAC+
pathfinder	*Adenocaulon bicolor*	ADBI	ADBI	N	FAC+
peavine species	*Lathyrus* spp.	LATHY	LATHY	N	FAC
peregrine fleabane	*Erigeron peregrinus*	ERPE	ERPE3	N	FACW
peregrine fleabane	*Erigeron peregrinus* var. *callianthemus*	ERPEC	ERPEC	N	FACW
peregrine fleabane	*Erigeron peregrinus* var. *scaposus*	ERPES	ERPES3	N	FACW
pinegrass	*Calamagrostis rubescens*	CARU	CARU	N	FACU
pink wintergreen	*Pyrola asarifolia*	PYAS	PYAS	N	FACW-

Appendix A-2—Aquatic, Riparian, and Wetland Plants Listed by Common Name (continued)

Common name	Scientific name	PNW region code	Plants database code	Indicator species	Hydrologic status
pioneer violet	*Viola glabella*	VIGL	VIGL	N	FACW
Piper's willow	*Salix piperi*	SAPI	SAPI	Y	OBL
ponderosa pine	*Pinus ponderosa*	PIPO	PIPO	N	FACU
pondweed species	*Potamogeton* spp.	POTAM	POTAM	Y	OBL
poor sedge	*Carex paupercula*	CAPA9	CAPA22	Y	OBL
prickly currant	*Ribes lacustre*	RILA	RILA	Y	FACW
purple sweet-root	*Osmorhiza purpurea*	OSPU	OSPU	N	FAC
Pursh buckthorn	*Rhamnus purshiana*	RHPU	PHPU	N	FACW
Pussytoe spp.	*Antennaria* spp.	ANTEN	ANTEN	N	FACU
pyramid spiraea	*Spiraea pyramidata*	SPPY	SPPY	Y	OBL
pyrola species	*Pyrola* spp.	PYROLA	PYROLA	N	FACU
quaking aspen	*Populus tremuloides*	POTR	POTR5	Y	FACU
queencup beadlily	*Clintonia uniflora*	CLUN	CLUN2	Y	FACU+
quilwort species	*Isoetes* spp.	ISOET	ISOET	N	OBL
raceme pussytoes	*Antennaria racemosa*	ANRA	ANRA	N	FACU
Rainier pleated gentian	*Gentiana calycosa*	GECA	GECA	N	FACW
red alder	*Alnus rubra*	ALRU	ALRU2	Y	FACW-
red mountain-heath	*Phyllodoce empetriformis*	PHEM	PHEM	Y	FAC
red raspberry	*Rubus idaeus*	RUID	RUID	N	FAC
red whortleberry	*Vaccinium parvifolium*	VAPA	VAPA	N	FACU
red willow-weed	*Epilobium latifolium*	EPLA	EPLA	N	FACW
red-osier dogwood	*Cornus stolonifera*	COST	COST	Y	FACW
red-osier dogwood	*Cornus stolonifera* var. *occidentalis*	COSTO	COST4	Y	FACW
redtop	*Agrostis alba*	AGAL	AGAL3	N	FACW
reed canarygrass	*Phalaris arundinacea*	PHAR	PHAR3	Y	FACW
reed mannagrass	*Glyceria grandis*	GLGR	GLGR	Y	OBL
retrorse sedge	*Carex retrorsa*	CARE	CARE4	N	OBL
rose pussytoes	*Antennaria microcephala*	ANMI	ANMI2	N	FACU
rose species	*Rosa* spp.	ROSA	ROSA	N	FAC
rosy twisted-stalk	*Streptopus roseus*	STRO	STRO4	Y	FACU+
rough bedstraw	*Galium asperrimum*	GAAS	GAAS	N	FACU
roughfruit fairy-bells	*Disporum trachycarpum*	DITR	DITR	N	FAC
round-leaved violet	*Viola orbiculata*	VIOR2	VIOR	N	FACU
russet buffaloberry	*Shepherdia canadensis*	SHCA	SHCA	N	FACU
russet sedge	*Carex saxatilis major*	CASA2	CASA10	Y	OBL
rusty menziesia	*Menziesia ferruginea*	MEFE	MEFE	Y	FACU+
salmonberry	*Rubus spectabilis*	RUSP	RUSP	Y	FACW-
Saskatoon serviceberry	*Amelanchier alnifolia*	AMAL	AMAL2	Y	FACU
saw-leaved sedge	*Carex scopulorum* var. *prionophylla*	CASCP2	CASCP	Y	OBL
scarlet elderberry	*Sambucus racemosa*	SARA	SARA2	N	FACU
scheuchzeria	*Scheuchzeria palustris*	SCPA	SCPA2	N	OBL
Scouler's willow	*Salix scouleriana*	SASC	SASC	Y	FAC
sedgelike horsetail	*Equisetum scirpoides*	EQSC	EQSC	N	FACW
sharptooth angelica	*Angelica arguta*	ANAR	ANAR3	N	FACW
sheep fescue	*Festuca ovina* var. *rydbergii*	FEOVR	FEOVR	Y	FACU
sheep sedge	*Carex illota*	CAIL	CAIL	Y	FACW+
shiny-leaf spiraea	*Spiraea betulifolia*	SPBE	SPBE2	N	FACU
shiny-leaf spiraea	*Spiraea betulifolia* var. *lucida*	SPBEL	SPBEL	N	FACU
shootingstar species	*Dodecatheon* spp.	DODEC	DODEC	N	FAC+
shortbeaked sedge	*Carex simulata*	CASI2	CASI3	N	OBL
short-fruited willow	*Salix brachycarpa*	SABR2	SABR	Y	OBL
showy aster	*Aster conspicuus*	ASCO	ASCO3	N	FACU
showy sedge	*Carex spectabilis*	CASP	CASP5	Y	FAC
shrubby cinquefoil	*Potentilla fruticosa*	POFR	POFR15	Y	FAC
sidebells pyrola	*Pyrola secunda*	PYSE	PYSE	N	FACU+
simplestem bur-reed	*Sparganium emersum*	SPEM	SPEM2	Y	OBL
Sitka alder	*Alnus sinuata*	ALSI	ALSI3	Y	FAC+
Sitka mountain-ash	*Sorbus sitchensis*	SOSI	SOSI2	N	FACU
Sitka sedge	*Carex aquatilis* var. *sitchensis*	CAAQS	CAAQS	Y	OBL
Sitka valerian	*Valeriana sitchensis*	VASI	VASI	Y	FAC+
Sitka willow	*Salix sitchensis*	SASI2	SASI3	Y	FACW
skullcap species	*Scutellaria* spp.	SCUTE	SCUTE	N	FACW
skunk cabbage	*Lysichiton americanus*	LYAM	LYAM3	Y	OBL
skunkleaf polemonium	*Polemonium pulcherrimum*	POPU	POPU3	Y	FAC+
slender bog-orchid	*Habenaria saccata*	HASA	HASA	N	OBL
slender cotton-grass	*Eriophorum gracile*	ERGR2	ERGR8	Y	OBL
slender hawkweed	*Hieracium gracile*	HIGR	HIGR	N	FAC
slender sedge	*Carex lasiocarpa*	CALA4	CALA4	Y	OBL
slender wintergreen	*Gaultheria ovatifolia*	GAOV	GAOV2	N	FAC+
slender-beaked sedge	*Carex athrostachya*	CAAT	CAAT3	N	FAC
slimpod shooting-star	*Dodecatheon conjugens*	DOCO	DOCO	N	FAC

Appendix A-2—Aquatic, Riparian, and Wetland Plants Listed by Common Name (continued)

Common name	Scientific name	PNW region code	Plants database code	Indicator species	Hydrologic status
slimstem reedgrass	*Calamagrostis neglecta*	CANE3	CANE4	N	FACW
small bedstraw	*Galium trifidum*	GATRI	GATR2	N	OBL
small bur-reed	*Sparganium minimum*	SPMI	SPMI	Y	OBL
small yellow water-buttercup	*Ranunculus gmelinii*	RAGM	RAGM	N	FACW
smallflower miterwort	*Mitella stauropetala*	MIST2	MIST3	N	FACW-
smallflowered woodrush	*Luzula parviflora*	LUPA	LUPA4	N	FACU
small-fruited bulrush	*Scirpus microcarpus*	SCMI	SCMI2	Y	OBL
small-leaf rockcress	*Arabis microphylla*	ARMI2	ARMI3	N	FACU
Smoky Mountain sedge	*Carex proposita*	CAPR9	CAPR10	N	FACU
smooth brome	*Bromus inermis*	BRIN	BRIN2	N	FACU
smooth sedge	*Carex laeviculmis*	CALA	CALA13	N	FACW+
smooth willow-weed	*Epilobium glaberrimum*	EPGL	EPGL	N	FACW
smooth woodrush	*Luzula hitchcockii*	LUHI	LUHI4	Y	FACU
smooth-beaked sedge	*Carex integra*	CAIN2	CAIN10	N	FACW+
snow willow	*Salix nivalis*	SANI	SANI8	Y	FAC
snow willow	*Salix nivalis* var. *nivalis*	SANIN	SANIN	Y	FAC
soft-leaved sedge	*Carex disperma*	CADI	CADI6	Y	FACW+
softstem bulrush	*Scirpus validus*	SCVA	SCVA	Y	OBL
spike bentgrass	*Agrostis exarata*	AGEX	AGEX	N	FACW
spike trisetum	*Trisetum spicatum*	TRSP	TRSP2	N	FACU
spreading wood fern	*Dryopteris expansa*	DREX	DREX	Y	FACW
starry solomonplume	*Smilacina stellata*	SMST	SMST	N	FAC
stiff clubmoss	*Lycopodium annotinum*	LYAN	LYAN2	N	FACW-
stinging nettle	*Urtica dioica*	URDI	URDI	N	FACW-
stink currant	*Ribes bracteosum*	RIBR	RIBR	Y	FACW
subalpine fir	*Abies lasiocarpa*	ABLA2	ABLA3	Y	FACU
subalpine larch	*Larix lyallii*	LALY	LALY	Y	FACU
subalpine spiraea	*Spiraea densiflora*	SPDE	SPDE	N	FAC+
Suksdorf's buttercup	*Ranunculus suksdorfii*	RASU	RASU4	N	FACW
sweet-root species	*Osmorhiza* spp.	OSMOR	OSMOR	N	FAC
sweetscented bedstraw	*Galium triflorum*	GATR	GATR3	N	FACU
sword fern	*Polystichum munitum*	POMU	POMU	N	FACW-
sylvan goatsbeard	*Aruncus sylvester*	ARSY	ARSY2	N	FAC
tall agoseris	*Agoseris elata*	AGEL2	AGEL	N	FACU
tall mannagrass	*Glyceria elata*	GLEL	GLEL	Y	FACW+
tea-leaved willow	*Salix planifolia monica*	SAPLM2	SAPLM3	Y	OBL
thick-headed sedge	*Carex pachystachya*	CAPA	CAPA19	N	FACU
thistle species	*Cirsium* spp.	CIRCI	CIRCI	N	FAC
thread rush	*Juncus filiformis*	JUFI	JUFI	N	FACW+
three-parted miterwort	*Mitella trifida*	MITR2	MITR4	N	FACW-
Thurber's bentgrass	*Agrostis thurberiana*	AGTH	AGTH	N	FACW
thyme-leaved speedwell	*Veronica serpyllifolia*	VESE	VESE	N	FAC
timber oatgrass	*Danthonia intermedia*	DAIN	DAIN	Y	FACU+
timothy	*Phleum pratense*	PHPR	PHPR3	N	FAC
trailing St. John's-wort	*Hypericum anagalloides*	HYAN	HYAN2	N	FACW
tuberous rush	*Juncus nodosus*	JUNO	JUNO2	N	FACW+
tufted hairgrass	*Deschampsia cespitosa*	DECE	DECE	Y	FACW
Tweedy's willow	*Salix tweedyi*	SATW	SATW	Y	OBL
twinflower	*Linnaea borealis* var. *longiflora*	LIBOL	LIBOL	Y	FACU+
twinflower marshmarigold	*Caltha biflora*	CABI	CABI2	Y	FACW+
twinflower marshmarigold	*Caltha biflora* var. *biflora*	CABIB	CABIB	Y	FACW+
twinflower marshmarigold	*Caltha biflora* var. *rotundifolia*	CABIR	CABIR	Y	FACW+
umber pussytoes	*Antennaria umbrinella*	ANUM	ANUM	N	FACU
undergreen willow	*Salix commutata*	SACO2	SACO2	Y	OBL
Utah honeysuckle	*Lonicera utahensis*	LOUT	LOUT2	N	FACU
variant bentgrass	*Agrostis variabilis*	AGVA	AGVA	N	FACW
vine maple	*Acer circinatum*	ACCI	ACCI	Y	FACU
violet species	*Viola* spp.	VIOLA	VIOLA	N	FAC
water avens	*Geum rivale*	GERI2	GERI2	N	FACW
water birch	*Betula occidentalis*	BEOC	BEOC2	N	FACW
water horsetail	*Equisetum fluviatile*	EQFL	EQFL	Y	OBL
water ladysthumb	*Polygonum amphibium*	POAM2	POAM8	Y	OBL
water lentil	*Lemna minor*	LEMI	LEMI3	N	OBL
water millfoil species	*Chara* spp.	CHARA	CHARA	N	OBL
water pimpernel	*Veronica anagallis-aquatica*	VEAN	VEAN2	N	OBL
water sedge	*Carex aquatilis* var. *aquatilis*	CAAQA	CAAQA	Y	OBL
water smartweed	*Polygonum coccineum*	POCO4	POCO8	Y	OBL
watercrowfoot buttercup	*Ranunculus aquatilis*	RAAQ	RAAQ	N	OBL
waterweed species	*Elodea* spp.	ELODE	ELODE	N	OBL
Watson's willow-weed	*Epilobium watsonii*	EPWA	EPWA3	N	FACW
wax currant	*Ribes cereum*	RICE	RICE	N	FACU

Appendix A-2—Aquatic, Riparian, and Wetland Plants Listed by Common Name (continued)

Common name	Scientific name	PNW region code	Plants database code	Indicator species	Hydrologic status
weak alkaligrass	*Puccinellia pauciflora* var. *holmii*	PUPAH	PUPAH	N	OBL
Wenatchee larkspur	*Delphinium viridescens*	DEVI	DEVI	N	FACW
western aster	*Aster occidentalis*	ASOC	ASOC	N	FACW-
western bog blueberry	*Vaccinium occidentale*	VAOC2	VAOC	N	OBL
western brackenfern	*Pteridium aquilinum*	PTAQ	PTAQ	N	FACU
western currant	*Ribes laxiflorum*	RILA2	RILA3	N	FAC
western fescue	*Festuca occidentalis*	FEOC	FEOC	N	FACW-
western hemlock	*Tsuga heterophylla*	TSHE	TSHE	Y	FACU
western larch	*Larix occidentalis*	LAOC	LAOC	N	FACU
western mannagrass	*Glyceria occidentalis*	GLOC	GLOC	Y	OBL
western meadowrue	*Thalictrum occidentale*	THOC	THOC	N	FACU
western prince's-pine	*Chimaphila umbellata*	CHUM	CHUM	N	FACU
western prince's-pine	*Chimaphila umbellata* var. *occidentalis*	CHUMO	CHUMO	N	FACU
western rattlesnake plantain	*Goodyera oblongifolia*	GOOB	GOOB2	N	FACU-
western redcedar	*Thuja plicata*	THPL	THPL	Y	FACU
western singlespike sedge	*Carex scirpoidea* var. *pseudoscirpoidea*	CASCP	CASCP	N	FAC+
western singlespike sedge	*Carex scirpoidea* var. *scirpoidea*	CASC3	Unknown	N	FAC+
western solomonplume	*Smilacina racemosa*	SMRA	SMRA	N	FAC
western sweet-root	*Osmorhiza occidentalis*	OSOC	OSOC	N	FAC
western thimbleberry	*Rubus parviflorus*	RUPA	RUPA	N	FAC+
western water-hemlock	*Cicuta douglasii*	CIDO	CIDO	N	OBL
western white clematis	*Clematis ligusticifolia*	CLLI	CLLI	N	FAC
western white pine	*Pinus monticola*	PIMO	PIMO3	N	FACU
western wintergreen	*Gaultheria humifusa*	GAHU	GAHU	N	FAC+
western yarrow	*Achillea millefolium*	ACMI	ACMI	N	FACU
whiplash willow	*Salix lasiandra caudata*	SALAC	SALAC	Y	FACW+
white bog-orchid	*Habenaria dilatata*	HADI2	HADI7	N	OBL
white clover	*Trifolium repens*	TRRE	TRRE3	N	FACU
white fir	*Abies concolor*	ABCO	ABCO	N	FACU
white hawkweed	*Hieracium albiflorum*	HIAL	HIAL2	N	FACU
white spruce	*Picea glauca*	PIGL	PIGL	Y	FACU
white trillium	*Trillium ovatum*	TROV	TROV2	N	FAC+
whitebark pine	*Pinus albicaulis*	PIAL	PIAL	N	FACU
whitestem gooseberry	*Ribes inerme*	RIIN	RIIN2	N	FACU
wild ginger	*Asarum caudatum*	ASCA3	ASCA2	Y	FACW-
wild onion species	*Allium* spp.	ALLIU	ALLIU	N	FACU
wild sarsaparilla	*Aralia nudicaulis*	ARNU3	ARNU3	Y	FACW-
willow species	*Salix* spp.	SALIX	SALIX	Y	FACW
willow-weed species	*Epilobium* spp.	EPILO	EPILO	N	FAC
winter bentgrass	*Agrostis scabra*	AGSC	AGSC5	N	FAC+
wood horsetail	*Equisetum sylvaticum*	EQSY	EQSY	Y	FACW
wood reed-grass	*Cinna latifolia*	CILA2	CILA2	Y	FACW
wood fern	*Dryopteris carthusiana*	DRCA	DRCA11	Y	FACW
wood fern species	*Dryopteris* spp.	DRYOP	DRYOP	Y	FACW
woodnymph pyrola	*Pyrola uniflora*	PYUN	PYUN	N	FACW
woodreed species	*Cinna* spp.	CINNA	CINNA	N	FACW
wood reed-grass	*Cinna latifolia*	CILA2	CILA2	Y	FACW
woodrush sedge	*Carex luzulina*	CALU	CALU7	N	OBL
woods rose	*Rosa woodsii*	ROWO	ROWO	N	FAC
woods strawberry	*Fragaria vesca* var. *bracteata*	FRVEB	FRVEB3	N	FACU
woolly pussytoes	*Antennaria lanata*	ANLA	ANLA3	N	FACU
woolly sedge	*Carex lanuginosa*	CALA3	CALA30	Y	OBL
Wormskjold's speedwell	*Veronica wormskjoldii*	VEWO	VEWO2	N	FAC+
yellow sedge	*Carex flava*	CAFL	CAFL4	N	OBL

Appendix A-3—Insect Species Mentioned in This Classification

Common name	Scientific name
Alder flea beetle	*Altica ambiens*
Alder wooly sawfly	*Eriocampa ovata*
Aspen leaf-tier	*Sciaphila duplex*
Balsam woolly adelgid	*Adelges piceae*
Blue alder agrilus	*Agrilus burkei*
Bronze poplar borer	*Agrilus liragus*
Cedar gall midge	*Mayetiola thujae*
Cone maggot	*Earomyia abietum*
Douglas-fir beetle	*Dendroctonus pseudotsugae*
Douglas-fir cone moth	*Barbara colfaxiana*
Douglas-fir seed chalcid	*Megastigmus spermotrophus*

Appendix A-3—Insect Species Mentioned in This Classification (continued)

Common name	Scientific name
Douglas-fir tussock moth	*Orgyia pseudotsugata*
Fall webworm	*Hyphantria cunea*
Fir engraver	*Scolytus ventralis*
Forest tent caterpillar	*Malacosoma disstria*
Green-striped forest looper	*Melanolophia imitata*
Hemlock sawfly	*Neodiprion tsugae*
Large aspen tortrix	*Choristoneura conflictana*
Mountain pine beetle	*Dendroctonus ponderosae*
Pacific tent caterpillar	*Malacosoma constrictum*
Poplar borer	*Saperda calcarata*
Saddleback looper	*Ectropis crepuscularia*
Satin moth	*Leucoma salicis*
Silver fir beetle	*Pseudohylesinus sericeus*
Spruce beetle	*Dendroctonus rufipennis*
Steremnius weevil	*Stermnius* spp.
Striped alder sawfly	*Hemichroa crocea*
Western balsam bark beetle	*Dryocoetes confusus*
Western black-headed budworm	*Acleris gloverana*
Western cedar borer	*Trachykele blondeli*
Western hemlock looper	*Lambdina fiscellaria*
Western larch borer	*Tetropium velutinum*
Western oak looper	*Lambdina fiscellaria*
Western pine beetle	*Dendroctonus brevicomus*
Western spruce budworm	*Choristoneura occidentalis*
Western tent caterpillar	*Malacosoma californicum*
Wooly alder aphid	*Prociphilus tesselatus*

Appendix A-4—Diseases Mentioned in This Classification

Common name	Scientific name
Annosus root disease	*Heterobasidion (Fomes) annosum*
Armillaria root rot	*Armillaria ostoyae*
	A. sinapina—can cause root rot of hardwoods
Black canker	*Ceratocystis fimbriata*
Brown crumbly rot	*Fomitopsis (Fomes) pinicola*
Brown cubical rot	*Laetiporus (Polyporus) sulphureus*
Brown felt blight	*Herpotrichia juniperi*
Brown stringy rot	*Echinodontium tinctorium*
Brown trunk rot	*Fomitopsis (Fomes) officinalis*
Cytospora canker	*Cytospora chrysosperma*
Dwarf mistletoe	*Arceuthobium* species
False tinder fungus	*Phellinus tremulae (Fomes igniarius)*
Hypoxylon canker	*Entoleuca mammata (Hypoxylon mammatum)*
Indian paint fungus	*Echinodontium tinctorium*
Laminated root rot	*Phellinus weirii*
Long pocket rot	*Hericium abietis*
Melampsora rust	*Melampsora albertensis*—causes aspen-conifer rust
	Melampsora occidentalis—causes conifer-cottonwood rust
Mottled rot	*Pholiota adiposa*
Oak anthracnose	*Apiognomonia quercina*
Red belt fungus	*Fomitopsis (Fomes) pinicola*
Red heart rot	*Stereum sanguinolentum*
Red ring rot	*Phellinus (Fomes) pini*
Rust red stringy rot	*Echinodontium tinctorium*
Schweinitzii butt rot	*Phaeolus (Polyporus) schweinitzii*
Shepherd's crook	*Venturia macularis*
	V. populina—can cause shepherd's crook on cottonwood
Sooty-bark canker	*Encoelia pruinosa (Cenangium singulare)*
Spruce broom rust	*Chrysomyxa arctostaphyli*
Tomentosus root disease	*Inonotus tomentosus*
White heart rot	*Phellinus igniarius*
White juniper rust	*Gymnosporangium* species
White pine blister rust	*Cronartium ribicola*
White pocket rot	*Phellinus (Fomes) pini*
White spongy root rot	*Heterobasidion (Fomes) annosum*
Yellow root rot	*Perenniporia subacida*

Appendix A-5—Wildlife Species Mentioned in This Classification

Common name	Scientific name
American dipper	*Cinclus mexicanus*
American marten	*Martes americana*
American robin	*Turdus migratorius*
Bald eagle	*Haliaeetus leucocephalus*
Barred owl	*Strix varia*
Bats	*Myotis* spp.
Beaver	*Castor canadensis*
Bighorn sheep	*Ovis canadensis*
Black bear	*Ursus americanus*
Black-headed grosbeak	*Pheucticus melanocephalus*
Black-tailed deer	*Odocoileus hemionus* var. *columbianus*
Bluebirds	*Sialia* spp.
Blue grouse	*Dendragapus obscurus*
Blue heron	*Ardea herodias*
Bog lemming	*Synaptomys borealis*
Brown creeper	*Certhia americana*
Bushy-tailed wood rat	*Neotoma cinerea*
California quail	*Callipepla californica*
Caribou	*Rangifer tarandus*
Chestnut-backed chickadee	*Poecile rufescens*
Chickadee	*Poecile* spp.
Chipmunk	*Tamias* spp.
Chipping sparrow	*Spizella passerina*
Clark's nutcracker	*Nucifraga columbiana*
Common snipe	*Gallinago gallinago*
Common yellowthroat	*Geothlypis trichas*
Cottontail rabbit	*Sylvilagus nuttalli*
Coyote	*Canis latrans*
Crossbill	*Loxia* spp.
Crow	*Corvus brachyrhynchos*
Deer mice	*Peromyscus maniculatus*
Elk	*Cervus elaphus*
Field mice	*Microtus* spp.
Fisher	*Martes pennanti*
Flicker	*Colaptes auratus*
Flycatcher	*Empidonax* spp., *Contopus* spp.
Flying squirrel	*Glaucomys sabrinus*
Fox	*Vulpes fulva*
Franklin's grouse	*Falcipennis canadensis*
Golden-crowned kinglet	*Regulus satrapa*
Goldfinch	*Carduelis tristis*
Goshawks	*Accipiter gentilis*
Gray catbird	*Dumetella carolinensis*
Great gray owl	*Strix nebulosa*
Great horned owl	*Bubo virginianus*
Green-winged teal	*Anas crecca*
Grizzly bear	*Ursus arctos*
Ground squirrels	*Spermophilus* spp.
Hairy woodpecker	*Picoides villosus*
Hares	*Lepus* spp.
Harlequin duck	*Histrionicus histrionicus*
Hummingbird	*Selasphorus* spp., *Stellula* spp.
Kinglet	*Regulus* spp.
Lazuli bunting	*Passerina amoena*
Long-billed marsh wrens	*Cistothorus palustris*
Magpie	*Pica hudsonia*
Mallard	*Anas platyrhynchos*
Meadow vole	*Microtus pennsylvanicus*
Moose	*Alces alces*
Mountain beaver	*Aplodontia rufa*
Mountain goat	*Oreamnus americanus*
Mourning dove	*Zenaida macroura*
Mule deer	*Odocoileus hemionus*
Muskrat	*Ondatra zibethica*
Northern spotted owl	*Strix occidentalis*
Nuthatch	*Sitta* spp.
Oregon junco	*Junco hyemalis*
Osprey	*Pandion haliaetus*
Pika	*Ochotona princeps*
Pileated woodpecker	*Dryocopus pileatus*
Pine grosbeak	*Pinicola enucleator*
Pine siskin	*Carduelis pinus*

Appendix A-5—Wildlife Species Mentioned In This Classification (continued)

Common name	Scientific name
Pocket gopher	*Thomomys* spp.
Porcupine	*Erethizon dorsatum*
Ptarmigan	*Lagopus leucurus*
Quail	*Callipepla californica*
Raccoon	*Procyon lotor*
Raven	*Corvus corax*
Red-backed vole	*Clethrionomys* spp.
Red-breasted nuthatch	*Sitta canadensis*
Redhead duck	*Aythya americana*
Red-naped sapsucker	*Sphyrapicus nuchalis*
Redpoll	*Carduelis* spp.
Red squirrel	*Tamiasciurus hudsonicus*
Red tree vole	*Aborimus longicaudus*
Red-winged blackbird	*Agelaius phoeniceus*
Roosevelt elk	*Cervus canadensis* var. *roosevelti*
Ruffed grouse	*Bonasa umbellus*
Ruddy duck	*Oxyura jamaicensis*
Sandhill crane	*Grus canadensis*
Sheep	*Ovis* spp.
Shrew	*Sorex* spp.
Skunk	*Mephitis* spp.
Snowshoe hare	*Lepus americanus*
Song sparrow	*Melospiza melodia*
Spruce grouse	*Dendragapus canadensis*
Steller's jay	*Cyanocitta stelleri*
Thrush	*Catharus* spp.
Towhee	*Pipilo* spp.
Tree swallow	*Tachycineta bicolor*
Trout	*Oncoryhynchus* spp. *Salvelinus* spp.
Turkey	*Meleagris gallopavo*
Vagrant shrew	*Sorex vagrans*
Varied thrush	*Ixoreus naevius*
Vaux's swift	*Chaetura vauxi*
Warbler	*Dendroica* spp., *Phylloscopus* spp.
Weasel	*Mustela frenata*
White-footed mice	*Peromyscus leucopus*
White-tailed deer	*Odocoileus virginianus*
Williamson's sapsucker	*Sphyrapicus thyroideus*
Wood duck	*Aix sponsa*
Yellow-bellied sapsucker	*Sphyrapicus varius*
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*

APPENDIX B: Management Information for Selected Plant Species

APPENDIXES B-1 to B-5 contain the following management information on a species-by-species basis: (B-1) forage palatability for cattle, sheep, and horses; energy and protein value; (B-2) thermal or feeding cover and food values for elk, mule deer, and white-tailed deer; (B-3) thermal or feeding cover values for upland game birds, waterfowl, small nongame birds, and small mammals; (B-4) food value or degree of use for upland game birds, waterfowl, small nongame birds, and small mammals; and (B-5) potential biomass production, erosion control potential, short-term revegetation potential, and long-term revegetation potential.

Management information is from *The Plant Information Network (PIN) Database: Colorado, Montana, North Dakota, Utah, and Wyoming* by Dittberner and Olson (1983), with some modifications. In some instances, no management information was available for certain plant species. The author then used professional experience along with information that was available for species with similar morphological or physiological characteristics. Unfortunately, this is a partial list of the many species found in appendix A. Information for many of the indicator and common plant species is not available.

Appendix B-1: Forage Palatability for Cattle, Sheep, and Horses; Energy and Protein Value (Adapted from Hansen et al. 1995, Crowe and Clausnitzer 1997)

Palatability refers to the relish and degree of use shown by livestock for a plant or plant part:

- **G** (good) = highly relished and consumed to a high degree;
- **F** (fair) = moderately relished and consumed to a moderate degree;
- **P** (poor) = not relished and normally consumed to only a small degree or not at all.

Value refers to the energy and protein value of the plant as food source for livestock measured as high (**H**), medium (**M**), or low (**L**).

Scientific name	Common name	Cattle forage palatability	Sheep forage palatability	Horse forage palatability	Energy value	Protein value
Trees:						
Abies lasiocarpa	subalpine fir	P	P	P	M	L
Picea engelmann	Engelmann spruce	P	P	P	M	L
Picea glauca	white spruce	P	P	P	M	L
Pinus contorta	lodgepole pine	P	P	P	M	L
Pinus ponderosa	ponderosa pine	P	P	P	M	L
Populus tremuloides	quaking aspen	F	G	F	M	M
Populus trichocarpa	black cottonwood	P	F	P	M	M
Pseudotsuga menziesii	Douglas-fir	P	P	P	M	L
Shrubs:						
Acer glabrum var. *douglasii*	Douglas maple	P	F	P	M	L
Alnus incana	mountain alder	P	F	P	M	L
Amelanchier alnifolia	Saskatoon serviceberry	F	G	F	M	M
Arctostaphylos uva-ursi	bearberry	P	P	P		
Betula glandulosa	bog birch	P	F	P	L	L
Betula occidentalis	water birch	P	P	P	M	M
Cornus stolonifera	red-osier dogwood	F	F	P	M	L
Crataegus douglasii var. *douglasii*	black hawthorn	F	F	P	M	M
Kalmia microphylla	alpine laurel	P	P	P		
Ledum glandulosum	Labrador tea				M	M
Lonicera utahensis	Utah honeysuckle	F	F	P	L	L
Potentilla fruticosa	shrubby cinquefoil	P	F	P	M	L
Prunus virginiana	common chokecherry	F	G	P	H	M
Ribes lacustre	prickly currant				M	L
Rosa woodsii	woods rose	F	F	P	L	L
Rubus parviflorus	western thimbleberry	P	F	P		
Rubus parviflorus	western thimbleberry	P	F	P	L	L
Salix bebbiana	Bebb's willow	G	G	G	M	L
Salix boothii	Booth's willow	F	F	F	M	L
Salix commutata	undergreen willow				M	L
Salix drummondiana	Drummond's willow	P	F	P	M	L
Salix exigua	coyote willow	F	F	F	M	L
Salix geyeriana	Geyer's willow	F	G	G	M	L
Salix lasiandra	Pacific and whiplash willows	F	F	F	M	L
Salix planifolia var. *monica*	tea-leaved willow		M	L		
Salix rigida var. *mackenziana*	Mackenzie's willow	F	G	G	M	L
Spiraea betulifolia	shiny-leaf spiraea	P	F	P		
Symphoricarpos albus	common snowberry	F	F	P	M	M
Vaccinium caespitosum	dwarf huckleberry	P	F	P	L	M
Vaccinium scoparium	grouse huckleberry	P	F	P	L	M

Appendix B-1: Forage Palatability for Cattle, Sheep, and Horses, Energy and Protein Value (Adapted from Hansen et al. 1995, Crowe and Clausnitzer 1997) (continued)

Scientific name	Common name	Cattle forage palatability	Sheep forage palatability	Horse forage palatability	Energy value	Protein value
Graminoids:						
Agrostis alba	redtop	F	F	F	L	L
Bromus vulgaris	Columbia brome	G	F	G	M	L
Calamagrostis canadensis	bluejoint reedgrass	G	F	G	M	L
Calamagrostis rubescens	pinegrass	F	P	F	M	L
Carex aquatilis	Sitka and water sedges	G	G	G	M	M
Carex atherodes	awned sedge	G	F	G	M	L
Carex buxbaumii	Buxbaum's sedge	G	G	F	M	M
Carex lanuginosa	woolly sedge	G	G	F	M	L
Carex lasiocarpa	slender sedge	P	P	P	M	M
Carex lenticularis	lenticular sedge	F	F	F	M	M
Carex limosa	mud sedge	F	F	F	M	M
Carex nigricans	black alpine sedge	F	F	F	M	M
Carex scopulorum var. *bracteosa*	Holm's sedge	F	F	F	M	M
Carex scopulorum var. *prionophylla*	saw-leaved sedge	F	F	F	M	M
Carex utriculata	bladder sedge	F	F	G	M	L
Carex vesicaria	inflated sedge	F	F	F	M	L
Deschampsia cespitosa	tufted hairgrass	G	F	G	M	L
Eleocharis palustris	creeping spike-rush	P	P	P	M	L
Eleocharis pauciflora	few-flowered spike-rush	P	P	P	M	L
Elymus canadensis	Canada wildrye	F	F	G	H	L
Elymus cinereus	basin wildrye	G	F	G	H	L
Elymus glaucus	blue wildrye	G	F	G	H	L
Glyceria borealis	northern mannagrass	G	G	G	M	L
Glyceria grandis	reed mannagrass	G	G	G	M	L
Glyceria striata	fowl mannagrass	G	G	G	M	L
Juncus balticus	Baltic rush	F	P	F	M	L
Phalaris arundinacea	reed canarygrass	G	G	G	M	L
Phleum alpinum	alpine timothy	G	G	G	H	L
Phleum pratense	timothy	G	G	G	M	L
Poa palustris	fowl bluegrass	F	F	F	M	L
Poa pratensis	Kentucky bluegrass	G	G	G	M	L
Puccinellia pauciflora	weak alkaligrass and pale false mannagrass	F	F	F	M	L
Scirpus acutus	hardstem bulrush	F	P	F	M	L
Scirpus microcarpus	small-fruited bulrush	F	F	F	M	L
Scirpus validus	softstem bulrush	F	P	P	M	L
Forbs:						
Achillea millefolium	western yarrow	P	F	P	L	L
Actaea rubra	baneberry	P	F	P	L	L
Aralia nudicaulis	wild sarsaparilla				L	L
Arnica cordifolia	heart-leaf arnica	P	F	P	L	L
Aster foliaceus	alpine leafybract aster	F	G	G	L	L
Cirsium arvense	Canada thistle	P	P	P	L	L
Epilobium angustifolium	fireweed	F	G	F	L	L
Equisetum arvense	common horsetail	P	P	P	L	L
Equisetum fluviatile	water horsetail	P	P	P	L	L
Fragaria virginiana var. *platypetala*	broadpetal strawberry	P	G	P	L	L
Galium boreale	northern bedstraw	P	F	P	L	L
Geum triflorum	old man's whiskers	P	F	P	L	L
Heracleum lanatum	common cow-parsnip	G	G	G	L	L
Mertensia ciliata	mountain bluebells	F	G	F	L	L
Osmorhiza chilensis	mountain sweet-root	F	F	F	L	L
Pedicularis groenlandica	elephanthead pedicularis	P	F	P	L	L
Polygonum amphibium	water ladysthumb	F	F	F	L	L
Polygonum bistortoides	American bistort	P	F	P	L	L
Potentilla gracilis	northwest cinquefoil	P	F	P	L	L
Senecio triangularis	arrowleaf groundsel	F	G	F	L	L
Smilacina stellata	starry solomonplume	P	F	P	L	L
Solidago canadensis	Canada goldenrod	P	P	P	L	L
Thalictrum occidentale	western meadowrue	P	F	P	L	L
Trifolium repens	white clover	G	G	G	L	L
Typha latifolia	common cattail	P	P	P	L	L
Urtica dioica	stinging nettle	P	F	P	L	L
Viola canadensis	Canadian violet	F	G	P	L	L
Viola glabella	pioneer violet	F	G	P	L	L

Appendix B-2: Thermal or Feeding Cover and Food Values for Elk, Mule Deer, and White-Tailed Deer (Adapted from Hansen et al. 1995, Crowe and Clausnitzer 1997)

Thermal or feeding cover value refers to the degree to which a plant provides protection from the environment during one or more seasons.
- **G** (good) = readily utilized for cover when available;
- **F** (fair) = moderately utilized for cover when available;
- **P** (poor) = rarely or never utilized for cover when available.

Food value refers to the use shown by a wildlife species for a plant or plant part, as well as to the plant's availability throughout its range.
- **G** (good) = readily to moderately available in the plant's range and consumed to a high degree;
- **F** (fair) = readily to moderately available in the plant's range but consumed only to a moderate degree;
- **P** (poor) = available but the plant is consumed to only a small degree or not at all.

Scientific name	Common name	Elk cover value	Mule deer cover value	White-tailed deer cover value	Elk food value	Mule deer food value	White-tailed deer food value
Trees:							
Abies amabilis	Pacific silver fir	F	F	F	P	P	P
Abies grandis	grand fir	F	F	F	P	P	P
Abies lasiocarpa	subalpine fir	F	F	F	P	P	P
Alnus rubra	red alder	G	G	G	P	P	P
Picea engelmannii	Engelmann spruce	G	G	G	P	P	P
Picea glauca	white spruce	G	G	G	P	P	P
Pinus contorta	lodgepole pine	G	G	G	P	P	P
Pinus ponderosa	ponderosa pine	G	G	G	P	P	P
Populus tremuloides	quaking aspen	G	G	G	F	F	F
Populus trichocarpa	black cottonwood	F	F	G	P	P	P
Pseudotsuga menziesii	Douglas-fir	G	G	G	P	F	P
Thuja plicata	western redcedar	G	G	G	P	P	P
Tsuga heterophylla	western hemlock	G	G	G	P	P	P
Tsuga mertensiana	mountain hemlock	G	G	G	P	P	P
Shrubs:							
Acer glabrum var. *douglasii*	Douglas maple	F	F	F	F	G	F
Alnus incana	mountain alder	F	F	F	P	P	P
Alnus sinuata	Sitka alder	F	F	F	P	P	P
Amelanchier alnifolia	Saskatoon serviceberry	P	F	F	F	G	G
Betula glandulosa	bog birch	P	P	P	P	P	P
Betula occidentalis	water birch	F	G	G	F	P	F
Cornus stolonifera	red-osier dogwood	F	F	F	P	G	G
Crataegus douglasii var. *douglasii*	black hawthorn	F	G	G	F	F	F
Kalmia microphylla	alpine laurel	F	F	F	P	P	P
Lonicera utahensis	Utah honeysuckle	F	F	F			
Potentilla fruticosa	shrubby cinquefoil	P	P	P	F	F	F
Prunus virginiana	common chokecherry	F	G	G	F	G	G
Ribes lacustre	prickly currant	P	F	F	G	F	F
Rosa woodsii	woods rose	F	G	G	F	F	F
Salix bebbiana	Bebb's willow	G	G	G	G	F	F
Salix boothii	Booth's willow	G	G	G	F	F	F
Salix drummondiana	Drummond's willow	G	G	G	F	F	F
Salix exigua	coyote willow	G	G	G	F	F	F
Salix geyeriana	Geyer's willow	G	G	G	G	G	G
Salix lasiandra	Pacific and whiplash willows	G	G	G			
Salix planifolia monica	tea-leaved willow	F	F	F			
Spiraea betulifolia	shiny-leaf spiraea	P	P	P	P	F	F
Symphoricarpos albus	common snowberry	P	F	F	F	F	F
Vaccinium caespitosum	dwarf huckleberry	P	P	P	G	G	F
Vaccinium scoparium	grouse huckleberry	P	P	P	P	P	P
Graminoids:							
Agrostis alba	redtop	P	P	P	G	G	F
Bromus vulgaris	Columbia brome	P	P	P	F	F	F
Calamagrostis canadensis	bluejoint reedgrass	P	P	P	F	P	P
Calamagrostis rubescens	pinegrass	P	P	P	P	P	P
Carex aquatilis	Sitka and water sedges	P	P	P	F	F	F
Carex atherodes	awned sedge	P	P	P	F	F	F
Carex lanuginosa	woolly sedge	P	P	P	F	F	F
Carex lasiocarpa	slender sedge	P	P	P	P	P	P
Carex utriculata	bladder sedge	P	P	P	F	F	P
Carex vesicaria	inflated sedge	P	P	P	F	P	P
Deschampsia cespitosa	tufted hairgrass	P	P	P	G	F	F
Eleocharis palustris	creeping spike-rush	P	P	P	F	F	P
Eleocharis pauciflora	few-flowered spike-rush	P	P	P	F	F	P
Elymus canadensis	Canada wildrye	P	P	P	F	F	P
Elymus cinereus	basin wildrye	P	P	P	G	F	F
Elymus glaucus	blue wildrye	P	P	P	G	G	F

Appendix B-2: Thermal or Feeding Cover and Food Values for Elk, Mule Deer, and White-tailed Deer (Adapted from Hansen et al. 1995, Crowe and Clausnitzer 1997) (continued)

Scientific name	Common name	Elk cover value	Mule deer cover value	White-tailed deer cover value	Elk food value	Mule deer food value	White-tailed deer food value
Glyceria borealis	northern mannagrass	P	P	P	F	F	P
Glyceria grandis	reed mannagrass	P	P	P	F	F	P
Glyceria striata	fowl mannagrass	P	P	P	F	F	P
Juncus balticus	Baltic rush	P	P	P	F	P	P
Phalaris arundinacea	reed canarygrass	P	G	G	G	F	F
Phleum pratense	timothy	P	P	P	F	F	F
Poa palustris	fowl bluegrass	P	P	P	G	G	G
Poa pratensis	Kentucky bluegrass	P	P	P	G	F	G
Puccinellia pauciflora	weak alkaligrass and pale false mannagrass	P	P	P	G	F	P
Scirpus acutus	hardstem bulrush	P	F	P	P	P	P
Scirpus validus	softstem bulrush	P	G	G	P	P	P
Forbs:							
Achillea millefolium	western yarrow	P	P	P	P	P	P
Actaea rubra	baneberry	P	P	P	F	F	F
Arnica latifolia	mountain arnica	P	P	P	F	F	F
Aster foliaceus	alpine leafybract aster	P	P	P	G	G	F
Cirsium arvense	Canada thistle	P	P	P	P	F	P
Epilobium angustifolium	fireweed	P	P	P	F	F	F
Equisetum arvense	common horsetail	P	P	P	P	P	P
Fragaria virginiana var. *platypetala*	broadpetal strawberry	P	P	P	F	G	G
Galium boreale	northern bedstraw	P	P	P	P	F	P
Heracleum lanatum	common cow-parsnip	P	P	P	G	G	G
Mertensia ciliata	mountain bluebells	P	P	P	P	P	P
Pedicularis groenlandica	elephanthead pedicularis	P	P	P	F	F	P
Polygonum amphibium	water ladysthumb	P	P	P	P	P	P
Potentilla gracilis	northwest cinquefoil	P	P	P	P	P	P
Senecio triangularis	arrowleaf groundsel	P	P	P	G	F	F
Smilacina stellata	starry solomonplume	P	P	P	P	F	F
Solidago canadensis	Canada goldenrod	P	P	P	P	F	F
Thalictrum occidentale	western meadowrue	P	P	P	F	F	F
Typha latifolia	common cattail	P	F	G	P	P	P
Urtica dioica	stinging nettle	P	P	P	P	P	P
Viola glabella	pioneer violet	P	P	P	F	F	F

Appendix B-3: Thermal or Feeding Cover Values for Upland Game Birds, Waterfowl, Small Nongame Birds, and Small Mammals (Adapted from Hansen et al. 1995, Crowe and Clausnitzer 1997)

Thermal or feeding cover value refers to the degree to which a plant provides protection from the environment (e.g., thermal, nesting, brooding, or feeding cover), during one or more seasons.

- **G** (good) = readily utilized for cover when available;
- **F** (fair) = moderately utilized for cover when available;
- **P** (poor) = rarely or never utilized for cover when available.

Scientific name	Common name	Upland game bird cover value	Waterfowl cover value	Small nongame bird cover value	Small mammal cover value
Trees:					
Abies lasiocarpa	subalpine fir	G	P	F	G
Picea engelmannii	Engelmann spruce	G	P	G	G
Picea glauca	white spruce	G	P	G	G
Pinus contorta	lodgepole pine	G	P	G	G
Pinus ponderosa	ponderosa pine	G	P	G	G
Populus tremuloides	quaking aspen	G	F	G	G
Populus trichocarpa	black cottonwood	F	F	G	G
Pseudotsuga menziesii	Douglas-fir	G	P	G	G
Shrubs:					
Acer glabrum var. *douglasii*	Douglas maple	F	F	F	F
Alnus incana	mountain alder	F	G	F	F
Amelanchier alnifolia	Saskatoon serviceberry	F	G	F	F
Betula glandulosa	bog birch	F	G	F	F
Betula occidentalis	water birch	G	G	G	G
Cornus stolonifera	red-osier dogwood	F	F	F	F
Crataegus douglasii var. *douglasii*	black hawthorn	F	F	F	F
Kalmia microphylla	alpine laurel	F	P	F	F
Lonicera utahensis	Utah honeysuckle	F	P	F	F

Appendix B-3: Thermal or Feeding Cover Values for Upland Game Birds, Waterfowl, Small Nongame Birds, and Small Mammals (Adapted from Hansen et al. 1995, Crowe and Clausnitzer 1997) (continued)

Scientific name	Common name	Upland game bird cover value	Waterfowl cover value	Small nongame bird cover value	Small mammal cover value
Potentilla fruticosa	shrubby cinquefoil	F	P	P	P
Prunus virginiana	common chokecherry	G	G	G	G
Ribes lacustre	prickly currant	G	G	G	G
Rosa woodsii	woods rose	F	G	F	F
Salix bebbiana	Bebb's willow	G	F	G	G
Salix boothii	Booth's willow	G	F	G	G
Salix drummondiana	Drummond's willow	G	F	G	G
Salix exigua	coyote willow	G	G	G	G
Salix geyeriana	Geyer's willow	G	F	G	G
Salix lasiandra	Pacific and whiplash willows	G	F	G	G
Salix planifolia monica	tea-leaved willow	F	F	F	F
Spiraea betulifolia	shiny-leaf spiraea	P	G	P	P
Symphoricarpos albus	common snowberry	G	G	G	G
Vaccinium caespitosum	dwarf huckleberry	P	G	P	P
Vaccinium scoparium	grouse huckleberry	P	G	P	P
Graminoids:					
Agrostis alba	redtop	G	G	F	F
Bromus inermis	smooth brome	G	G	G	F
Calamagrostis canadensis	bluejoint reedgrass	P	G	P	P
Calamagrostis rubescens	pinegrass	F	G	P	P
Carex aquatilis	Sitka and water sedges	P	F	F	F
Carex lanuginosa	woolly sedge	P	F	F	F
Carex lasiocarpa	slender sedge	P	F	F	F
Carex lenticularis	lenticular sedge	P	F	F	F
Carex utriculata	bladder sedge	P	P	F	F
Carex vesicaria	inflated sedge	P	F	F	F
Deschampsia cespitosa	tufted hairgrass	P	G	P	P
Eleocharis palustris	creeping spike-rush	F	G	F	F
Eleocharis pauciflora	few-flowered spike-rush	F	G	F	F
Elymus cinereus	basin wildrye	F	G	P	P
Elymus glaucus	blue wildrye	F	G	P	P
Glyceria borealis	northern mannagrass	F	G	G	G
Glyceria grandis	reed mannagrass	F	G	G	G
Glyceria striata	fowl mannagrass	F	G	G	G
Juncus balticus	Baltic rush	F	G	F	F
Phalaris arundinacea	reed canarygrass	F	G	F	F
Phleum alpinum	alpine timothy	P	F	P	P
Phleum pratense	timothy	F	G	F	F
Poa pratensis	Kentucky bluegrass	G	G	G	G
Puccinellia pauciflora	weak alkaligrass and pale false mannagrass	F	G	F	G
Scirpus acutus	hardstem bulrush	G	G	G	F
Scirpus validus	softstem bulrush	G	G	G	G
Forbs—most forbs are generally poor to fair except for the following species:					
Typha latifolia	common cattail	G	G	G	F

Appendix B-4: Food Value or Degree of Use for Upland Game Birds, Waterfowl, Small Nongame Birds, and Small Mammals (Adapted from Hansen et al. 1995 and Crowe and Clausnitzer 1997)

Food value refers to the use shown by a wildlife species for a plant or plant part, as well as to the plant's availability throughout its range.

- **G** (good) = readily to moderately available in the plant's range and consumed to a high degree;
- **F** (fair) = readily to moderately available in the plant's range but consumed only to a moderate degree;
- **P** (poor) = available but the plant is consumed to only a small degree or not at all.

Scientific name	Common name	Upland game bird food species	Waterfowl food value	Small nongame bird food value	Small mammal food value
Trees:					
Abies lasiocarpa	subalpine fir	F	P	P	F
Picea engelmannii	Engelmann spruce	F	P	G	G
Picea glauca	white spruce	F	P	G	G
Pinus contorta	lodgepole pine	G	P	P	P
Pinus ponderosa	ponderosa pine	G	P	G	G
Populus tremuloides	quaking aspen	G	F	G	G
Populus trichocarpa	black cottonwood	G	F	G	G
Pseudotsuga menziesii	Douglas-fir	G	P	P	F
Shrubs:					
Acer glabrum var. *douglasii*	Douglas maple	F	P	F	F
Alnus incana	mountain alder	F	P	G	F

Appendix B-4: Food Value or Degree of Use for Upland Game Birds, Waterfowl, Small Nongame Birds, and Small Mammals (Adapted from Hansen et al. 1995 and Crowe and Clausnitzer 1997) (continued)

Scientific name	Common name	Upland game bird food species	Waterfowl food value	Small nongame bird food value	Small mammal food value
Amelanchier alnifolia	Saskatoon serviceberry	F	P	F	F
Betula glandulosa	bog birch	F	P	F	F
Betula occidentalis	water birch	G	F	F	G
Cornus stolonifera	red-osier dogwood	F	F	F	F
Crataegus douglasii var. *douglasii*	black hawthorn	F	P	F	F
Lonicera utahensis	Utah honeysuckle	F	F	G	F
Potentilla fruticosa	shrubby cinquefoil	P	P	F	F
Prunus virginiana	common chokecherry	G	P	G	G
Ribes lacustre	prickly currant	G	F	G	G
Rosa woodsii	woods rose	G	P	G	G
Rubus parviflorus	western thimbleberry	F	P	F	F
Salix bebbiana	Bebb's willow	G	F	G	G
Salix boothii	Booth's willow	G	F	G	G
Salix drummondiana	Drummond's willow	G	F	F	F
Salix exigua	coyote willow	G	F	G	G
Salix geyeriana	Geyer's willow	G	F	G	G
Spiraea betulifolia	shiny-leaf spiraea	P	P	P	P
Symphoricarpos albus	common snowberry	F	F	F	F
Vaccinium caespitosum	dwarf huckleberry	F	P	F	G
Vaccinium scoparium	grouse huckleberry	F	P	P	P
Graminoids:					
Agrostis alba	redtop	F	F	F	F
Bromus vulgaris	Columbia brome	G	F	G	G
Calamagrostis canadensis	bluejoint reedgrass	P	G	P	P
Carex aquatilis	Sitka and water sedges	P	F	F	F
Carex atherodes	awned sedge	P	F	F	F
Carex lanuginosa	woolly sedge	F	F	F	F
Carex lasiocarpa	slender sedge	F	F	F	F
Carex utriculata	bladder sedge	F	F	G	G
Carex vesicaria	inflated sedge	F	F	G	G
Deschampsia cespitosa	tufted hairgrass	F	G	P	P
Eleocharis palustris	creeping spike-rush	P	G	F	F
Eleocharis pauciflora	few-flowered spike-rush	P	G	F	F
Elymus cinereus	basin wildrye	F	F	P	P
Elymus glaucus	blue wildrye	F	F	P	P
Glyceria borealis	northern mannagrass	G	G	F	G
Glyceria grandis	reed mannagrass	G	G	F	G
Glyceria striata	fowl mannagrass	F	F	F	G
Juncus balticus	Baltic rush	G	G	F	F
Phalaris arundinacea	reed canarygrass	F	F	F	F
Phleum pratense	timothy	F	G	F	F
Poa palustris	fowl bluegrass	F	F	F	F
Poa pratensis	Kentucky bluegrass	F	G	F	F
Puccinellia pauciflora	weak alkaligrass and pale false mannagrass	F	F	F	F
Scirpus acutus	hardstem bulrush	G	G	G	F
Scirpus validus	softstem bulrush	G	G	G	G
Forbs:					
Achillea millefolium	western yarrow	P	P	P	P
Actaea rubra	baneberry	P	P	F	F
Arnica cordifolia	heart-leaf arnica	P	P	P	P
Aster foliaceus	alpine leafybract aster	F	F	G	G
Cirsium arvense	Canada thistle	F	P	F	P
Epilobium angustifolium	fireweed	F	P	F	P
Epilobium glaberrimum	smooth willow-weed	F	G	F	F
Equisetum arvense	common horsetail	P	P	P	P
Fragaria virginiana var. *platypetala*	broadpetal strawberry	P	P	P	F
Galium boreale	northern bedstraw	P	P	P	P
Galium trifidum	small bedstraw	P	P	P	P
Galium triflorum	sweetscented bedstraw	P	P	P	P
Heracleum lanatum	common cow-parsnip	F	F	P	P
Mertensia ciliata	mountain bluebells	F	P	F	F
Osmorhiza chilensis	mountain sweet-root	F	F	G	G
Polygonum amphibium	water ladysthumb	F	G	F	F
Potentilla gracilis	northwest cinquefoil	P	P	P	P
Senecio triangularis	arrowleaf groundsel	F	P	G	G
Smilacina stellata	starry solomonplume	F	P	F	F
Solidago canadensis	Canada goldenrod	F	P	F	F
Typha latifolia	common cattail	G	G	G	F
Viola adunca	hook violet	P	P	P	P

Appendix B-5: Potential Biomass Production, Erosion Control Potential, Short-Term Revegetation Potential, and Long-Term Revegetation Potential (Adapted from Hansen et al. 1995 and Crowe and Clausnitzer 1997)

Potential biomass production refers to the relative ability of a plant to produce plant material by weight on an annual basis. Species are rated as if they were growing on typical sites. Therefore, a plant may have a higher or lower biomass production than the rating given if it occurs on a site more favorable or less favorable than its normal site.

- **H** (high) = plant possesses ability to produce a greater yield of dry plant material than most other species of the same life form;
- **M** (medium) = plant produces an average yield of dry plant material compared with other species of the same life form;
- **L** (low) = plant produces a low yield of dry plant material compared with other species of the same life form;
- **V** (very low) = plant produces a very low yield of dry plant material compared with other species of the same life form.

Erosion control potential refers to a plant that commonly exhibits growth habit, plant structure, biomass, or root system that has the potential to reduce soil erosion.

- **H** (high) = plant that has aggressive growth habits, persistent plant structure, high potential biomass, or good soil-binding root-rhizome-runner system in established stands;
- **M** (medium) = plant that has moderately aggressive growth, moderately persistent plant structure, moderate potential biomass, or moderate soil-binding root-rhizome-runner system in established stands;
- **L** (low) = plant that has poor growth, persistence, biomass, or soil-binding root system that makes it generally inadequate for erosion control.

Short-term revegetation potential refers to the ability of a plant to become quickly established and exhibit rapid growth within 1 to 3 years (includes annuals).

- **H** (high) = plant demonstrates rapid growth, good cover, and good reproduction;
- **M** (medium) = plant demonstrates moderately rapid growth, fair cover, and fair reproduction;
- **L** (low) = plant demonstrates slow growth, poor cover, and poor reproduction.

Long-term revegetation potential refers to the ability of a plant to become established and persist over a period of more than 3 years.

- **H** (high) = plant demonstrates good growth, cover, reproduction, and stand maintenance characteristics;
- **M** (medium) = plant demonstrates fair growth, cover, reproduction, and stand maintenance characteristics;
- **L** (low) = plant demonstrates poor growth, cover, reproduction, and stand maintenance characteristics.

Scientific name	Common name	Potential biomass production	Erosion control potential	Short-term revegetation potential	Long-term revegetation potential
Trees:					
Abies lasiocarpa	subalpine fir	H	M	L	M
Picea engelmannii	Engelmann spruce	H	M	L	M
Picea glauca	white spruce	H	M	L	M
Pinus contorta	lodgepole pine	H	L	L	M
Pinus ponderosa	ponderosa pine	H	M	L	M
Populus tremuloides	quaking aspen	M	H	L	H
Populus trichocarpa	black cottonwood	H	H	L	M
Pseudotsuga menziesii	Douglas-fir	H	M	L	H
Thuja plicata	western redcedar	H	M	L	M
Shrubs:					
Acer glabrum var. *douglasii*	Douglas maple	M	M	L	M
Alnus incana	mountain alder	M	H	L	M
Amelanchier alnifolia	Saskatoon serviceberry	M	M	L	M
Betula glandulosa	bog birch	M	H	L	H
Betula occidentalis	water birch	M	H	L	M
Cornus stolonifera	red-osier dogwood	M	H	L	H
Crataegus douglasii var. *douglasii*	black hawthorn	M	M	L	M
Kalmia microphylla	alpine laurel	L	M	L	M
Ledum glandulosum	Labrador tea	L	M	L	M
Lonicera utahensis	Utah honeysuckle	M	M	L	M
Potentilla fruticosa	shrubby cinquefoil	H	M	L	M
Prunus virginiana	common chokecherry	H	M	L	H
Ribes lacustre	prickly currant	M	M	L	M
Rosa woodsii	woods rose	M	H	L	M
Rubus parviflorus	western thimbleberry	M	M	L	M
Salix bebbiana	Bebb's willow	M	H	L	M
Salix boothii	Booth's willow	H	H	L	M
Salix candida	hoary willow	M	H	L	M
Salix commutata	undergreen willow	M	H	L	M
Salix drummondiana	Drummond's willow	H	H	L	M
Salix exigua	coyote willow	M	H	L	M
Salix geyeriana	Geyer's willow	H	H	L	M
Salix lasiandra	Pacific and whiplash willows	H	H	L	M
Salix planifolia var. *monica*	tea-leaved willow	M	H	L	M
Salix rigida	Mackenzie's willow	H	H	L	M
Spiraea betulifolia	shiny-leaf spiraea	M	M	L	M
Symphoricarpos albus	common snowberry	M	M	L	M
Vaccinium caespitosum	dwarf huckleberry	M	M	L	M
Vaccinium scoparium	grouse huckleberry	M	M	L	M
Graminoids:					
Agrostis alba	redtop	M	H	H	H

Appendix B-5: Potential Biomass Production, Erosion Control Potential, Short-Term Revegetation Potential, and Long-Term Revegetation Potential (Adapted from Hansen et al. 1995 and Crowe and Clausnitzer 1997) (continued)

Scientific name	Common name	Potential biomass production	Erosion control potential	Short-term revegetation potential	Long-term revegetation potential
Bromus vulgaris	Columbia brome	M	M	M	H
Calamagrostis canadensis	bluejoint reedgrass	M	H	L	H
Calamagrostis rubescens	pinegrass	M	M	L	M
Carex aquatilis	Sitka and water sedges	H	H	M	M
Carex atherodes	awned sedge	H	H	M	M
Carex buxbaumii	Buxbaum's sedge	M	M	L	M
Carex lanuginosa	woolly sedge	M	H	M	M
Carex lasiocarpa	slender sedge	M	H	M	M
Carex lenticularis	lenticular sedge	H	H	M	M
Carex limosa	mud sedge	M	M	L	M
Carex scopulorum var. *bracteosa*	Holm's sedge	M	H	L	M
Carex scopulorum var. *prionophylla*	saw-leaved sedge	M	H	L	M
Carex utriculata	bladder sedge	H	H	M	H
Carex vesicaria	inflated sedge	H	H	M	H
Deschampsia cespitosa	tufted hairgrass	M	L	L	M
Eleocharis palustris	creeping spike-rush	M	H	H	M
Eleocharis pauciflora	few-flowered spike-rush	M	H	H	M
Elymus canadensis	Canada wildrye	H	M	M	M
Elymus cinereus	basin wildrye	H	H	M	H
Elymus glaucus	blue wildrye	M	M	M	H
Glyceria borealis	northern mannagrass	M	M	M	M
Glyceria grandis	reed mannagrass	H	M	M	M
Glyceria striata	fowl mannagrass	L	M	L	M
Juncus balticus	Baltic rush	M	M	L	M
Phalaris arundinacea	reed canarygrass	H	H	M	H
Phleum alpinum	alpine timothy	M	M	L	M
Phleum pratense	timothy	M	M	M	H
Poa palustris	fowl bluegrass	M	M	M	M
Poa pratensis	Kentucky bluegrass	M	L	M	H
Puccinellia pauciflora	weak alkaligrass and pale false mannagrass	M	M	L	M
Scirpus acutus	hardstem bulrush	H	M	M	M
Scirpus microcarpus	small-fruited bulrush	M	M	L	M
Scirpus validus	softstem bulrush	H	M	M	M
Forbs:					
Achillea millefolium	western yarrow	L	L	H	M
Actaea rubra	baneberry	M	L	L	L
Aralia nudicaulis	wild sarsaparilla	M	M	L	M
Arnica cordifolia	heart-leaf arnica	L	L	L	L
Arnica latifolia	mountain arnica	L	L	L	L
Caltha biflora	twinflower marshmarigold	M	M	L	L
Cirsium arvense	Canada thistle	M	M	L	M
Epilobium angustifolium	fireweed	H	L	H	M
Epilobium glaberrimum	smooth willow-weed	L	L	M	M
Equisetum arvense	common horsetail	L	M	H	M
Equisetum fluviatile	water horsetail	M	M	H	M
Fragaria virginiana var. *platypetala*	broadpetal strawberry	L	L	L	L
Galium boreale	northern bedstraw	L	L	L	L
Galium trifidum	small bedstraw	L	L	L	L
Galium triflorum	sweetscented bedstraw	L	L	L	L
Geum macrophyllum	largeleaf avens	M	L	L	L
Heracleum lanatum	common cow-parsnip	H	M	L	L
Mertensia ciliata	mountain bluebells	M	M	L	M
Mertensia paniculata	panicle bluebells	M	M	L	M
Pedicularis groenlandica	elephanthead pedicularis	L	L	L	L
Polygonum amphibium	water ladysthumb	M	M	M	M
Polygonum bistortoides	American bistort	L	L	L	L
Potentilla diversifolia	diverse-leaved cinquefoil	L	M	M	M
Potentilla gracilis	northwest cinquefoil	M	L	M	M
Senecio triangularis	arrowleaf groundsel	M	M	L	L
Smilacina stellata	starry solomonplume	L	L	L	L
Solidago canadensis	Canada goldenrod	M	M	M	M
Sparganium emersum	simplestem bur-reed	M	M	L	L
Thalictrum occidentale	western meadowrue	M	L	L	L
Typha latifolia	common cattail	H	H	L	H
Urtica dioica	stinging nettle	H	M	L	L
Viola adunca	hook violet	L	L	L	L
Viola orbiculata	round-leaved violet	L	L	L	L

APPENDIX C: Productivity Information

Appendix C contains the following information on a species-by-species basis for trees in the deciduous and conifer series: (C-1a) basal area (sq. ft./acre) by series and species; (C-1b) basal area (sq. ft./acre) by series; (C-2) site index (50-, 80- and 100-year base age, depending on species); (C-3) down log attributes by condition class and series (including tons/acre, cu. ft./acre, linear ft./acre, sq. ft./acre, and percentage of cover/acre); (C-4) number of snags/acre by d.b.h. class (inches) by series.

Appendix C-1a: Basal Area by Species by Series

	Basal area (sq. ft./acre)															
	Coniferous series										Deciduous series					
Species code	ABAM	ABGR	ABLA2	LALY	PICO	PIEN	PSME	THPL	TSHE	TSME	BEPA	ACMA	ALRU	POTR	POTR2	QUGA
ABAM	100	—	Tr	—	—	—	—	—	1	58	—	—	—	—	—	—
ABGR	2	83	2	—	—	—	—	20	25	—	—	—	7	1	1	—
ABPR	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ABLA2	28	—	51	24	—	13	—	6	6	27	—	—	—	—	—	—
ACMA	—	2	—	—	—	—	—	Tr	—	—	—	155	—	—	—	—
ALRU	—	—	—	—	—	—	—	1	—	—	—	20	111	—	—	—
BEPA	—	—	—	—	—	1	—	1	Tr	—	94	—	—	4	4	—
CHNO	18	1	—	—	—	2	—	—	Tr	6	—	—	—	—	—	—
LALY	—	—	—	45	—	—	—	—	—	—	—	—	—	—	—	—
LAOC	2	13	6	—	—	11	6	5	14	—	20	—	—	—	1	—
PIAL	—	—	Tr	—	—	—	—	—	—	3	—	—	—	—	—	—
PICO	1	4	14	—	133	18	2	1	3	—	6	—	—	—	1	—
PIEN	49	19	109	42	—	125	—	48	19	24	—	—	—	—	6	—
PIMO	1	—	Tr	—	—	—	—	Tr	6	—	—	—	—	—	—	—
PIPO	—	5	Tr	—	—	3	23	4	Tr	—	3	—	6	3	3	40
POTR	—	—	Tr	—	—	2	4	1	—	—	3	—	—	181	2	8
POTR2	2	23	2	—	—	5	6	7	1	—	—	—	—	9	135	—
QUGA	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	104
PSME	13	91	15	—	—	32	249	31	23	5	3	—	6	6	9	28
THPL	27	—	—	—	—	1	—	162	103	1	—	—	14	1	2	—
TSHE	35	—	Tr	—	—	Tr	—	1	61	9	—	—	4	—	—	—
TSME	2	—	—	—	—	—	—	—	1	26	—	—	—	—	—	—
Total	281	240	203	111	133	212	282	286	263	157	131	175	148	205	169	180

Note: Tr = trace.

Appendix C-1b: Basal Area by Series

	Total basal area (sq. ft./acre)		
Series	Range	Mean	Number of plots
Coniferous forest:			
ABAM	20–520	281	43
ABGR	20–640	240	24
ABLA2	20–520	203	114
LALY	80–144	111	3
PICO	60–220	133	3
PIEN	20–400	212	91
PSME	140–480	282	10
THPL	60–640	286	75
TSHE	60–533	263	83
TSME	40–320	157	23
Deciduous forest:			
BEPA	80–200	131	7
ACMA	80–360	175	4
ALRU	40–360	148	10
POTR	80–400	205	31
POTR2	20–340	169	46
QUGA	100–300	180	5

Appendix C-2: Site Index (feet) by Species by Series

		Coniferous series																	
		ABAM		ABGR		ABLA2		LALY		PICO		PIEN		PSME		THPL		TSHE		TSME	
Species code	Base age	#	SI	#	SI	#	SI	#	SI	#	SI	#	SI	#	SI	#	SI	#	SI	#	SI
ABAM	100	63	97	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	27	56
ABGR	50	3	104	24	82	—	—	—	—	—	—	—	—	—	—	22	75	32	77	—	—
ABLA2	50	10	56	—	—	115	55	2	18	—	—	23	43	—	—	4	65	14	65	12	26
ABPR	100	3	118	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ACMA	80	—	—	2	55	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ALRU	50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
BEPA	80	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CHNO	100	3	75	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	58	—	—
LALY	50	—	—	—	—	—	—	4	17	—	—	—	—	—	—	—	—	—	—	—	—
LAOC	50	—	—	5	74	38	64	—	—	—	—	27	68	—	—	12	76	37	75	—	—
PIAL	100	—	—	—	—	2	44	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PICO	100	—	—	—	—	43	66	—	—	3	82	18	68	—	—	—	—	3	109	—	—
PIEN	50	39	78	4	78	194	63	3	34	—	—	127	63	—	—	51	78	31	71	12	38
PIMO	50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	69	—	—
PIPO	100	—	—	5	107	—	—	—	—	—	—	5	109	4	115	3	122	4	129	—	—
POTR	80	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
POTR2	80	—	—	2	80	—	—	—	—	—	—	3	122	—	—	2	142	—	—	—	—
PSME	50	6	86	20	82	22	60	—	—	—	—	50	68	19	83	53	77	41	82	—	—
QUGA	80	—	—	—	—	—	—	—	—	—	—	—	—	—	—	86	87	—	—	—	—
THPL	100	11	85	—	—	—	—	—	—	—	—	—	—	—	—	—	—	81	76	—	—
TSHE	50	13	65	—	—	—	—	—	—	—	—	—	—	—	—	—	—	45	60	2	50
TSME	50	2	56	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	24	49

Note: # = number of site index (SI) trees.

Appendix C-2: Site Index (feet) by Species by Series (continued)

		Deciduous series											
		ACMA		ALRU		BEPA		POTR		POTR2		QUGA	
Species code	Base age	#	SI	#	SI	#	SI	#	SI	#	SI	#	SI
ABAM	100	—	—	—	—	—	—	—	—	—	—	—	—
ABGR	50	—	—	—	—	2	90	—	—	—	—	—	—
ABLA2	50	—	—	—	—	—	—	—	—	—	—	—	—
ABPR	100	—	—	—	—	—	—	—	—	—	—	—	—
ACMA	80	5	64	—	—	—	—	—	—	—	—	—	—
ALRU	50	—	—	11	82	—	—	—	—	—	—	—	—
BEPA	80	—	—	—	—	2	88	2	65	2	79	—	—
CHNO	100	—	—	—	—	—	—	—	—	—	—	—	—
LALY	50	—	—	—	—	—	—	—	—	—	—	—	—
LAOC	50	—	—	—	—	3	84	—	—	—	—	—	—
PIAL	100	—	—	—	—	—	—	—	—	—	—	—	—
PICO	100	—	—	—	—	—	—	—	—	2	105	—	—
PIEN	50	—	—	—	—	—	—	—	—	4	81	—	—
PIMO	50	—	—	—	—	—	—	—	—	—	—	—	—
PIPO	100	—	—	—	—	—	—	3	88	4	88	3	80
POTR	80	—	—	—	—	—	—	38	67	—	—	—	—
POTR2	80	—	—	—	—	—	—	3	122	32	106	—	—
PSME	50	—	—	—	—	2	55	4	72	12	72	—	—
QUGA	80	—	—	—	—	—	—	—	—	—	—	—	—
THPL	100	—	—	2	121	—	—	—	—	2	79	—	—
TSHE	50	—	—	—	—	—	—	—	—	—	—	—	—
TSME	50	—	—	—	—	—	—	—	—	—	—	—	—

Note: # = number of site index (SI) trees.

Appendix C-3: Down Log Attributes by Decomposition, Class, and Series

Series	Number of plots	Log decomposition	Down log attributes				
			Tons/acre	Cu. ft./acre	Linear ft./acre	Sq. ft./acre	% cover/acre
ABAM	29	Class 1	3.14	265	182	222	0.5
		Class 2	4.30	724	605	534	1.2
		Class 3	11.87	1,519	1,012	1,288	3.0
		Class 4	5.00	1,604	1,487	1,585	3.6
		Class 5	7.06	2,261	1,302	1,771	4.1
		Series total	31.37	6,373	4,587	5,400	12.4
ABGR	24	Class 1	1.01	84	210	109	0.3
		Class 2	5.24	552	700	561	1.3
		Class 3	2.17	271	682	421	1.0
		Class 4	1.06	341	611	456	1.0
		Class 5	7.88	2,526	1,098	1,742	4.0
		Series total	17.36	3,774	3,301	3,289	7.6
ABLA2	90	Class 1	2.57	216	321	252	0.6
		Class 2	5.23	552	1,109	777	1.8
		Class 3	6.94	889	2,095	1,308	3.0
		Class 4	3.18	1,020	1,433	1,182	2.7
		Class 5	2.67	857	912	897	2.1
		Series total	20.59	3,534	5,870	4,416	10.1
PIEN	74	Class 1	0.74	62	205	113	0.3
		Class 2	3.29	353	843	509	1.2
		Class 3	6.73	853	1,965	1,279	2.9
		Class 4	2.56	812	1,094	960	2.2
		Class 5	1.91	612	429	531	1.2
		Series total	15.23	2,692	4,536	3,392	7.8
PSME	7	Class 1	0	0	0	0	0
		Class 2	.90	111	499	254	.6
		Class 3	9.53	1,056	1,389	1,118	2.6
		Class 4	2.01	645	268	445	1.0
		Class 5	.04	12	244	61	.1
		Series total	12.48	1,824	2,400	1,878	4.3
THPL	62	Class 1	1.21	109	301	182	0.4
		Class 2	7.62	837	1,018	850	2.0
		Class 3	20.82	2,735	2,862	2,697	6.2
		Class 4	3.15	799	1,033	938	2.2
		Class 5	33.52	1,753	916	1,269	2.0
		Series total	66.32	6,233	6,130	5,936	13.6
TSHE	51	Class 1	2.33	213	456	304	0.7
		Class 2	3.53	374	659	498	1.1
		Class 3	15.22	1,931	3,473	1,803	4.1
		Class 4	5.86	1,606	1,639	1,592	3.7
		Class 5	5.54	1,776	1,352	1,584	3.6
		Series total	32.48	5,900	7,579	5,781	13.3
TSME	24	Class 1	1.18	100	188	149	0.3
		Class 2	8.48	905	686	794	1.8
		Class 3	3.71	475	1,023	677	1.6
		Class 4	1.98	636	849	760	1.7
		Class 5	1.43	459	760	603	1.4
		Series total	16.78	2,575	3,506	2,983	6.8
POTR2	51	Class 1	0.50	49	79	59	0.1
		Class 2	1.87	248	420	252	.6
		Class 3	4.48	604	1,219	777	1.8
		Class 4	2.75	831	737	700	1.6
		Class 5	.47	153	171	166	.4
		Series total	12.05	1,885	2,626	1,954	4.5
POTR	32	Class 1	0.84	77	168	124	0.3
		Class 2	.96	109	488	232	.5
		Class 3	8.56	1,097	2,697	1,647	3.8
		Class 4	1.71	368	967	621	1.4
		Class 5	.05	18	85	41	.1
		Series total	12.12	1,669	4,405	2,665	6.1

Appendix C-3: Down Log Attributes by Decomposition, Class, and Series (continued)

Series	Number of plots	Log decomposition	Down log attributes				
			Tons/acre	Cu. ft./acre	Linear ft./acre	Sq. ft./acre	% cover/acre
BEPA	6	Class 1	0	0	0	0	0
		Class 2	9.06	836	725	706	1.6
		Class 3	45.08	5,776	2,544	3,738	8.6
		Class 4	2.74	501	810	621	1.4
		Class 5	.80	258	185	246	.6
		Series total	57.68	7,371	4,264	5,311	12.2
ALRU	12	Class 1	0.13	11	227	57	0.1
		Class 2	.22	24	334	98	.2
		Class 3	.90	115	739	279	.6
		Class 4	.55	176	568	317	.7
		Class 5	.19	62	320	154	.4
		Series total	1.99	388	2,188	905	2.1
ACCI	12	Class 1–5	13.16	1,842	1,983	1,947	4.5
ALIN	190	Class 1	0.72	58	203	111	0.3
		Class 2	1.08	111	422	219	.5
		Class 3	4.48	544	867	631	1.4
		Class 4	1.71	493	573	521	1.2
		Class 5	.45	144	154	151	.3
		Series total	8.44	1,351	2,219	1,634	3.8
ALSI	122	Class 1	0.11	9	41	19	0
		Class 2	2.26	240	382	299	.7
		Class 3	7.10	898	844	800	1.8
		Class 4	2.30	726	853	808	1.9
		Class 5	1.47	470	349	404	.9
		Series total	13.24	2,343	2,469	2,330	5.3
COST	40	Class 1	1.16	117	90	95	0.2
		Class 2	.97	102	401	219	.5
		Class 3	10.23	1,266	1,168	1,164	2.7
		Class 4	4.08	1,201	601	826	1.9
		Class 5	1.22	412	158	260	.6
		Series total	17.66	3,098	2,418	2,564	5.9
HEATH	18	Class 1–5	0.22	67	407	174	0.4
OPHO	13	Class 1	1.68	179	52	109	0.3
		Class 2	5.71	726	1,397	1,025	2.4
		Class 3	5.09	1,631	1,135	1,323	3.0
		Class 4	1.99	638	498	603	1.4
		Class 5	14.47	3,174	3,082	3,060	7.0
		Series total	28.94	6,348	6,164	6,120	14.0
SALIX	156	Class 1	0.06	4	9	7	0
		Class 2	.94	218	155	184	.4
		Class 3	4.11	595	456	472	1.1
		Class 4	.94	301	219	248	.6
		Class 5	.08	26	67	45	.1
		Series total	6.13	1,144	906	956	2.2
SPDO	22	Class 1	9.82	1,505	1,438	1,404	3.2
		Class 2	5.05	647	318	430	1.0
		Class 3	1.13	362	605	473	1.1
		Class 4	.04	14	11	12	0
		Class 5	16.04	2,528	2,372	2,319	5.3
		Series total	32.08	5,056	4,744	4,638	10.6
AQUATIC	62	Class 1	0.33	35	92	57	0.1
		Class 2	.26	34	113	64	.1
		Class 3	.23	42	98	64	.1
		Class 4	.12	37	55	50	.1
		Class 5	.94	148	358	235	.5
		Series total	1.88	296	716	470	1.1

Appendix C-3: Down Log Attributes by Decomposition, Class, and Series (continued)

Series	Number of plots	Log decomposition	Down log attributes				
			Tons/acre	Cu. ft./acre	Linear ft./acre	Sq. ft./acre	% cover/acre
FORB	34	Class 1	0.27	22	166	66	0.2
		Class 2	3.91	379	421	389	.9
		Class 3	2.48	313	567	425	1.0
		Class 4	2.48	795	953	890	2.0
		Class 5	.49	157	248	186	.4
		Series total	9.63	1,666	2,355	1,956	4.5
MEADOW	260	Class 1	0.05	4	7	5	0
		Class 2	.23	25	71	40	.1
		Class 3	.55	71	186	112	.3
		Class 4	.69	197	267	219	.5
		Class 5	0	1	2	1	0
		Series total	1.52	298	533	377	.9

Note: Definitions of the log decomposition classes can be found on page 15.

Appendix C-4: Snag Attributes by Series

Series	Number of plots	Snag condition	Snags/acre by d.b.h. class (inches)				
			5–9.9	10–15.5	15.6–21.5	21.6+	Total
ABAM	29	Class 1	5.1	3.1	3.2	2.3	13.7
		Class 2	9.2	4.4	2.0	1.0	16.6
		Class 3	.7	5.0	1.2	.9	7.8
		Class 4	1.0	4.3	1.0	1.5	7.8
		Class 5	2.3	2.1	1.2	2.0	7.6
		Series total	18.3	18.9	8.6	7.7	53.5
ABGR	24	Class 1	17.0	5.7	3.3	2.8	28.8
		Class 2	2.4	.4	2.1	—	4.9
		Class 3	—	—	—	—	0
		Class 4	—	—	.5	.2	.7
		Class 5	—	—	.5	.7	1.2
		Series total	19.4	6.1	6.4	3.7	35.6
ABLA2	96	Class 1	23.5	4.1	1.2	1.0	29.8
		Class 2	7.0	3.1	.8	.4	11.3
		Class 3	3.1	.8	.1	.1	4.1
		Class 4	1.2	2.7	.8	.3	5.0
		Class 5	2.1	1.3	.5	.2	4.1
		Series total	36.9	12.0	3.4	2.0	54.3
PIEN	76	Class 1	18.4	3.6	2.1	0.5	24.6
		Class 2	—	5.1	1.3	—	6.4
		Class 3	1.3	1.5	.9	—	3.7
		Class 4	—	2.8	.2	.3	3.3
		Class 5	1.9	.6	.3	.5	3.3
		Series total	21.6	13.6	4.8	1.3	41.3
POTR	33	Class 1	10.6	2.3	0.9	—	13.8
		Class 2	8.9	.6	—	—	9.5
		Class 3	1.3	—	—	—	1.3
		Class 4	2.3	.9	—	.4	3.6
		Class 5	2.3	.9	1.6	.9	5.7
		Series total	25.4	4.7	2.5	1.3	33.9
POTR2	43	Class 1	—	1.3	.3	.5	2.1
		Class 2	1.7	—	.2	.1	2.0
		Class 3	—	—	—	—	0
		Class 4	—	—	.3	.1	.4
		Class 5	—	2.1	.8	.7	3.6
		Series total	1.7	3.4	1.6	1.4	8.1
THPL	69	Class 1	4.4	2.6	1.2	0.5	8.7
		Class 2	13.3	1.8	.5	.2	15.8
		Class 3	.1	.8	1.4	.4	2.7
		Class 4	3.8	4.5	—	1.1	9.4
		Class 5	1.6	2.3	—	.4	4.3
		Series total	23.2	12.0	3.1	2.6	40.9
TSHE	53	Class 1	5.5	1.9	1.1	0.4	8.9
		Class 2	—	1.2	.3	1.0	2.5
		Class 3	1.1	3.8	1.3	.2	6.4
		Class 4	2.9	1.9	1.2	.1	6.1
		Class 5	1.8	.2	1.0	.6	3.6
		Series total	11.3	9.0	4.9	2.3	27.5
TSME	26	Class 1	—	2.4	1.6	1.1	5.1
		Class 2	14.3	5.7	2.6	1.2	23.8
		Class 3	2.2	2.8	.4	.4	5.8
		Class 4	—	.7	.3	.1	1.1
		Class 5	—	—	.4	.8	1.2
		Series total	16.5	11.6	5.3	3.6	37.0

Note: Definitions of the snag condition classes can be found on page 15.

APPENDIX D: Occurrences of Threatened and Sensitive Species by Series

Scientific name	Common name	ABLA2	ALIN	AQUATIC	BEPA	FORB	MEADOW	OPHO	PIEN	POTR	POTR2	SALIX	TSHE	Total
Agoseris elata	tall agoseris	—	—		—	—	1	—	2	—	—	4	—	7
Aster sibiricus	arctic aster	—	—		—	—		—	—	—	—	1	—	1
Carex flava	yellow sedge	—	—		—	—	4	—	—	—	—	1	—	5
Carex proposita	Smoky Mountain sedge	—	—		—	1	1	—	—	—	—	—	—	2
Carex rostrata	beaked sedge	—	—	2	—	—	4	—	—	—	—	—	—	6
Carex saxatilis var. *major*	russet sedge	—	—	—	—	—	11	—	—	—	—	1	—	12
Carex scirpoidea var. *scirpoidea*	western singlespike sedge	—	—	—	—	—	1	—	—	—	—	—	—	1
Cicuta bulbifera	bulbed water-hemlock	—	—	—	—	—	2	—	—	—	—	—	—	2
Delphinium viridescens	Wenatchee larkspur	—	1	—	—	—		—	—	—	—	—	—	1
Dryopteris cristata	crested shield fern	—	3	—	—	—	1	—	—	—	—	1	—	5
Eriophorum viridicarinatum	green-keeled cotton-grass	—	—	—	—	—	20	—	—	—	—	4	—	24
Gaultheria hispidula	moxieplum	—	—	—	—	—		—	1	—	—	—	—	1
Galium kamtschaticum	boreal bedstraw	—	—	—	—	—		1	—	—	—	—	—	1
Geum rivale	water avens	—	—	—	—	—	4	—	—	—	—	2	—	6
Luzula arcuata	curved woodrush	—	—	—	—	—	1	—	—	—	—	—	—	1
Montia diffusa	branching montia	—	1	—	—	—		—	—	—	—	—	—	1
Muhlenbergia glomerata	marsh muhly	—	—	—	—	—	1	—	—	—	—	—	—	1
Salix candida	hoary willow	—	—	2	—	—	2	—	—	—	—	4	—	8
Salix glauca	glaucous willow	—	—	—	—	—		—	1	—	—	1	—	2
Salix maccalliana	McCalla's willow	—	1	2	—	—	1	—	—	—	—	1	—	5
Salix pedicellaris	bog willow	—	1	—	—	—	—	—	—	—	—	2	—	3
Salix pseudomonticola	false mountain willow	—	—	—	—	—	—	—	—	—	—	3	—	3
Salix tweedyi	Tweedy's willow	2	—	—	—	—	—	—	—	—	—	—	—	2
Sanicula marilandica	black snake-root	—	—	—	2	—	—	—	—	2	—	6	2	12
	Total	2	7	6	2	1	54	1	4	2	0	31	2	112

APPENDIX E: Comparisons for Important Sedges (*Carex*) in Eastern Washington

Comparison for Important Sedges (*Carex*) in Eastern Washington

Scientific name	Common name	Plants	Leaves	Floral bracts	Pistillate spikes	Pistillate scales	Perigynia	Achene
Carex amplifolia	bigleaf sedge	Stout, robust, to 3 feet tall, low to moderate elevation	Flat, large, 8–20 mm wide, well distributed	Leaflike, lowest bract exceeds the inflorescence	Cylindrical, 4–10 cm long, 5 mm wide, on short erect peduncle	Dark, scarious margins and pale, greenish midstripe	Crowded, inflated, 2.6–3.3 mm long, prominant beak	Trigonous, 3 stigmas
Carex aperta	Columbia sedge	Loosely tufted on short rhizomes, to 2.5 feet tall	Flat, 2–6 mm wide	Leaflike, from shorter to longer than the inflorescence	Cylindric, 1–4 cm long, sessile or the lowest ones pedunculate	Narrow, tapering to a narrow point, more than the perigynia, brown-black	Somewhat loose, 2.1–3 mm long, somewhat inflated, pale coppery	Lenticular, 3 stigmas
Carex aquatilis var. *aquatilis*	water sedge	1.5–3 feet tall, moist to wet soils, moderate elevation	Elongate, flat, 2–7 mm on lower 1/3 stem	Leaflike, lowest bract exceeds the inflorescence	Cylindrical, sessile or nearly so, 1.5–4.5 cm long, 3–5 mm wide	Reddish- to purplish-black, generally shorter than perigynia	Lens-shaped, 2–3.3 mm long, face nerveless	Lenticular, 3 stigmas
Carex aquatilis var. *sitchensis*	Sitka sedge	Stout, to 5 feet tall, wet soil to shallow water, low to moderate elevation	Flat, blue-glaucous, to 1 cm wide, basal sheaths brownish	Leaflike, lowest bract exceeds the inflorescence	Cylindrical, 3–10 cm long, on a long peduncle	Reddish- to purplish-black, generally shorter than perigynia	Lens-shaped, 3–5 mm long, face nerveless	Lenticular, 3 stigmas
Carex atherodes	awned sedge	Stout, robust, from creeping rhizomes, to 3.5 feet tall	Flat, 4–10 mm wide, sheaths villous-hirsute	Leaflike, lowest bract exceeds the inflorescence	Cylindrical, sessile or nearly so, 2–10 cm long, 10 mm wide	Narrow, lanceolate, 1–5 mm awn, pale green or scarious	Crowded, inflated, abruptly beaked, 4–7 mm long, strongly spreading, nerved	Trigonous, 3 stigmas
Carex buxbaumii	Buxbaum's sedge	1.5–3 feet tall, creeping rhizomes, moderate elevation	Elongate, flat, 2–4 mm wide, well distributed	Leaflike, lowest bract shorter to slightly exceeds the inflorescence	2–5, somewhat remote and cylindrical, sessile or nearly so, 1–3 cm long, 0+ above 0->in the terminal spike	Lanceolate, brown to purplish with a paler midrib, awn 0.5–3 mm long	Lens-shaped but not strongly flattened, elliptic-ovate, nerved	Trigonous, 3 stigmas
Carex cusickii	Cusick's sedge	Coarse, densely tufted, eared, 0.5–3.5 feet tall, low to moderate elevation	Elongate, flat, 3–5 mm wide, well distributed sheaths red dotted	Very reduced and scalelike	Small, the flowers closely aggregated in several wide-spread heads	Lanceolate, pale to brownish, hyaline-scarious, mid-rib sometimes awned	Planoconvex, 2.5–3.5 mm long, with a prominent, coarse, serrulate, pale or greenish beak	Lenticular, 2 stigmas
Carex integra	smooth-beaked sedge	Tufted, rhizomes absent, otherwise plants much like *C. iliota*	Clustered near the base, flat, 1–3 mm wide	Very reduced and scalelike	3–6 spikes in a somewhat crowded head, paler and looser than *C. illota*	Brownish, shorter and narrower than the perigynia, hyaline-scarious, midrib	Planoconvex, plump, appressed-ascending, 2.5–3.2 mm long, widest below middle	Lenticular, 2 stigmas

Comparisons for Important Sedges (*Carex*) in Eastern Washington (continued)

Scientific name	Common name	Plants	Leaves	Floral bracts	Pistillate spikes	Pistillate scales	Perigynia	Achene
Carex lanuginosa	woolly sedge	Loose, slender, to 3 feet tall, moist soils, low to moderate elevation	Flat, 2–5 mm wide, well distributed, sheaths reddish filamentous	Leaflike, lowest bract exceeds the inflorescence	Cylindrical, sessile or nearly so, 1–4 cm long	Brownish with pale midstripe, acute to awn-tipped, narrower than perigynia	Turgid, greenish, densely short-hairy, obscurely nerved, 3–3.3 mm long	Trigonous, 3 stigmas
Carex lasiocarpa	slender sedge	Stiff, wiry, to 3 feet tall, wet, flat sites and floating root mats, moderate elevation	Folded, 1–1.5 mm, well distibuted, sheaths brownish and filamentous	Leaflike, lowest bract exceeds the inflorescence	Cylindrical, sessile or nearly so, 1–4 cm long	Brownish with pale midstripe, acute to awn-tipped, narrower than perigynia	Turgid, brownish, densely short-hairy, obscurely nerved, 2.8–4.3 cm long	Trigonous, 3 stigmas
Carex lenticularis	lenticular sedge	Strongly tufted, to 2 feet tall, stream-banks, lakeshores, shallowly flooded ponds at high elevation	Elongate, flat, 2–4 mm wide, mostly basal	Leaflike, lowest bract exceeds the inflorescence	Cylindrical, sessile or the lowest pedunculate, 1.5–5 cm long	Scarious and blackish to dark brown, paler greenish midstripe, white hyaline margins	Lens-shaped, 1.9–3 mm long, face nerved	Lenticular, 3 stigmas
Carex limosa	mud sedge	Singly from long creeping rhizomes, to 1 foot tall, roots covered with yellow-brown tomentum	Leaves few, 1–2 mm, tending to be channeled rather than flat	Lowest leafy bract 2–10 cm long	Somewhat cylindrical, 0-> spike solitary, 0+ spikes 1–2.5 cm long on long peduncles	Light to dark brown, about as long and wide as the perigynia	Pale, ovate, marginally nerved, nerved on faces, 2.3–4.2 mm long	Trigonous, 3 stigmas
Carex nigricans	black alpine sedge	Loosely tufted to sod-forming, 6–12 inches tall, moist soil, high elevation	Firm, flat, crowded near the base, 4–13 cm long and 1–5.3 mm wide	Bractless	Single, oblong terminal spikelet, 1–2 mm long, 6–10 mm wide	Dark brown to blackish, soon spreading and deciduous at maturity	Lanceolate, 3–4.5 mm long, lower perigynia reflexed at maturity	Trigonous, 3 stigmas
Carex paupercula	poor sedge	Loosely tufted from rhizomes, to 1 foot tall, roots covered with yellow-brown tomentum	Leaves numerous, flat, 1–3 mm wide	Lowest leafy bract 2–10 cm long	Somewhat cylindrical, 0-> spike solitary, 0+ spikes 7–15 mm long on long peduncles	Light to dark brown, longer and narrower than the perigynia and with narrow point	Pale, ovate, marginally nerved, nerved on faces, 2.3–4.2 mm long	Trigonous, 3 stigmas
Carex rostrata	beaked sedge	Similar to *C. utriculata*, stout and robust from long rhizomes, 2–3 feet tall, quaking or floating peat	Strongly glaucous on upper surface, dark green below, 1.5–4 mm wide	Leaflike, the lowest bract exceeds the inflorescence	Cylindrical, <4 cm long, about 0.5 cm wide on relatively short peduncles	Straminous, narrower and shorter than the perigynia, acuminate or short awned	Crowded, inflated, abruptly beaked, 3.5–4.5 mm long, strongly spreading, nerved	Trigonous, 3 stigmas
Carex saxatilis	russet sedge	Turf-forming from rhizomes, to 2 feet tall, high elevation	Leaves largely basal, flat, 2–4 mm wide	Leaflike, 3–15 cm long	Cylindrical, 1–3 cm long, generally erect, short pedunculate	Slightly shorter and narrower than perigynia, pale, hyaline, with an erose tip	Gray- to red- brown, body elliptic-ovate, 3.5–5 mm long, +/- lenticular and inflated	Lenticular, 2 (3) stigmas

Comparisons for Important Sedges (*Carex*) in Eastern Washington (continued)

Scientific name	Common name	Plants	Leaves	Floral bracts	Pistillate spikes	Pistillate scales	Perigynia	Achene
Carex scopulorum var. *bracteosa*	Holm's sedge	Sod-forming from rhizomes, 1–2 feet tall, upper subalpine and alpine zones	Firm, generally flat, 2–6 mm wide, largely basal	Lowest leaflike bract much shorter than the inflorescence	Short and stout, erect, short-cylindrical, 1–2.5 cm long and 5–10 mm wide	Narrower and +/- the length of the perigynia	Lenticular, faces nerveless, 1.8–3.3 mm long	Lenticular, 2 stigmas
Carex scopulorum var. *prionophylla* (was *C. prionophylla*)	saw-leaved sedge	Densely tufted from very short rhizomes, 2–3 feet tall, upper subalpine zones	Loose, generally flat, 2–5 mm wide, largely basal	Lowest leaflike bract much shorter than the inflorescence	Long and slender, erect, long-cylindrical, 1–3 cm long, short-pedunculate	Reddish-brown to purplish-black, generally shorter and narrower than perigynia	Lenticular, the faces nerveless, 2.0–3.4 mm long	Lenticular, 2 stigmas
Carex spectabilis	showy sedge	Sod-forming to loosely tufted, 1–2 feet tall, shallow water, upper subalpine to alpine	Flat, 2–7 mm wide, usually well distributed but sometimes largely basal	Lowest leaflike bract shorter to equalling the inflorescence	Short-cylindrical, lower spikes often nodding on elongate peduncles, 1–3 cm long	Red-brown to black, pale midvein often with an awn tip to 1 mm long	Lenticular, elliptic, the faces nerveless, 2.9–5.0 mm long	Trigonous, 3 stigmas
Carex utriculata (erroneously *C. rostrata* in Hitchcock and Cronquist 1973)	bladder sedge	Stout and robust from long stout rhizomes, 2–4 feet tall, wet sites, low to high elevations	Stout, flat, 4–12 mm, well distributed, scabrous	Leaflike, the lowest bract exceeds the inflorescence	Cylindrical, 2–10 cm long and 1 cm wide, like a "corncob," short peduncle	Usually narrower and shorter than perigynia, accuminate or short awned	Crowded, inflated, abruptly beaked, 4–7 mm long, strongly spreading, nerved	Trigonous, 3 stigmas
Carex vesicaria	inflated sedge	Loosely tufted on short rhizomes, to 3 feet tall, tall, wet soils, low to moderate elevation	Flat, stout, 3–8 mm, well-distributed	Leaflike, lowest bract exceeds the inflorescence	Cylindrical, 2–7 cm long and 1 cm wide, short peduncle	Usually narrower and shorter than perigynia, accuminate or short awned	Ascending, inflated, beak gradually tapering, 5–11 mm long, nerved	Trigonous, 3 stigmas

APPENDIX F: Comparisons for Willow (*Salix*) Species in Eastern Washington

Comparisons for Willow (*Salix*) Species in Eastern Washington

Scientific name	Common name	Life form habitat	Twigs	Leaf shape and margin	Leaf color and pubescens	Pistilate aments	Floral branchlets	Capsules and stamens	Floral bracts
Salix bebbiana	Bebb's willow	Many-stemmed shrub to 25 feet tall, moist soil, moderate elevation	Reddish-brown, not glaucous, young twigs with fine wavy hair	Elliptic to elliptic-ovate, entire to slightly serrate	Green above, glaucous below, appressed hairs or glabrate on either side	Expanding with the leaves, 1.5–4 cm long	Small–leaved, branchlets 3–15 mm long	Long–beaked, 5–9 mm long, short hairy, 2 stamens	Narrow, yellow, to light brown, sparse to densely hairy
S. boothii	Booth's willow	Many-stemmed shrub to 12 feet tall, moderate to moderate-high elevation.	Young twigs glabrous to pubescent, glabrous by second year	Broadly elliptic to lanceolate, finely toothed to entire, 2.5–6 cm long	Green above, slightly paler below but not glaucous	Expanding with the leaves, 2–4 mm long	Small–leaved, 1–3 mm long	Glabrous, 2 stamens	Brown to black, long curly hairs
S. brachycarpa	short-fruited willow	Erect shrub to 4 feet tall, variety of sites including alkali, low to high elevation	Dark to reddish, moderate tomentum, hairy into third year, not glaucous	Broadly elliptic to obovate, rounded base, acute tip, entire	Green above and glaucous below, fine loose tomentum	Expanding with the leaves, 1.5–2 cm long	Leafy, 3–5 mm long	Densely pubescent, sessile, 3–5 mm long, 2 stamens	Yellow, brown, or greenish, pubescent throughout, persistent
S. candida	hoary willow	Erect low shrub to 5 or 6 feet tall, bogs and swamps	White-tomentum persisent into second year	Narrowly oblong, 4.5–8.5 cm long, margins revolute and entire	Glabrous to thin tomentose above and white-tomentose below	Expanding with the leaves, 1–3 cm long	Leafy bracts to 1.5 cm long, branchlets only 1–5 mm long	Tomentose, 5–7.5 mm long, 2 stamens	Pale to brown, woolly villous, persistent
S. cascadensis	Cascade willow	Creeping, rhizomatous shrub to 6 inches tall, mostly alpine	Thick and woody	Firm, elliptic, entire, acute, 1–1.5 cm long	Glabrous except when young	Expanding with the leaves, 1–2 cm long	Short, leafy branchlets	Tomentose, 4–5 mm long	Dark, long-hairy, persistent
S. commutata	undergreen willow	Many-stemmed shrub to 5 or 6 feet tall, high subalpine to alpine	Young twigs dense pubescent into the second year	Broad elliptic to obovate, entire to glandular	Gray-green, covered with loose erect silky hairs	Expanding with leaves, 3–5 cm long	Leafy branchlets 1–2.5 cm long	Generally glabrous, 3–6 mm long, 2 stamens	Light to dark brown, long wavy hairs, persistent
S. drummondiana	Drummond's willow	Many-stemmed shrub to 12 feet tall, moderate to moderate-high elevation	Green-purple, glabrous or sparse-hairy, glaucous for 2 years	Elliptic to lance-elliptic, rolled margins, entire	Dark green above, white silvery pubescent below	Expanding before the leaves, sessile, 1.5–4 cm long	Aments sessile, if present, branchlets to 2 mm long	Brown to blackish, long-hairy, persistent	
S. exigua var. *exigua*	coyote willow	Colonial shrubs to 15 feet tall, streambanks and gravel bars, low to moderate elevation	Young twigs pubescent, glabrous and brownish second year	Linear–lanceolate, entire to serrulate-dentate, gland-toothed	Gray-green to silver, pubescent, not glaucous below	Expanding after leaves, 3–5 cm long	Branchlets very leafy, 1–20 cm long	Sessile, usually hairy, 3–5 mm long	Yellow, brown, often hairy, narrow and pointed, deciduous
S. farriae	Farr's willow	Low branched shrub to 3 feet tall, moderately high to high elevation	Young twigs pubescent, older twigs brownish and glabrous	Oblanceolate, entire or minutely serrate, 3–5 cm long and 1–2 cm wide	Green above and glaucous below, sparse hairy but soon glabrous, net veined	Expanding with leaves, 1–2.5 cm long	Leafy branchlets up to 1.5 cm long	Glabrous, 4–6 mm long, stipes 0.2–1 mm long, 2 stamens	Brown or black, from nearly glabrous to long–silky hairy on both surfaces

Comparisons for Willow (*Salix*) Species in Eastern Washington (continued)

Scientific name	Common name	Life form habitat	Twigs	Leaf shape and margin	Leaf color and pubescens	Pistilate aments	Floral branchlets	Capsules and stamens	Floral bracts
S. geyeriana var. *geyeriana*	Geyer's willow	Many-stemmed shrubs to 15 feet tall, east of Cascades, moderate elevation	Young twigs dense-hairy, glaucous for 2 or more years	Narrow–elliptic, entire, 2–4.5 cm long and 8–12 mm wide	Gray-green above and paler and glaucous below, hairy on both sides	Expanding with the leaves, only 1–1.5 cm long	Leafy, up to 1 cm long	Short-hairy, 3–6 mm long, 2 stamens	Yellow to pale brown, short-hairy
S. geyeriana var. *meleiana*	Geyer's willow	Similar to SAGEG but in and west of Cascades	Similar to SAGEG but less glaucous	Similar to SAGEG	Similar to SAGEG but less pubescent, hairs rusty in color	Similar to SAGEG	Similar to SAGEG	Similar to SAGEG	Similar to SAGEG
S. glauca	glaucous willow	Branching shrubs to 5 or 6 feet tall, moderate elevation	Twigs dark brown or reddish, villous-tomentose	Oblanceolate, entire, 2.5–4.5 cm long and 1–2 cm wide	Villous-tomentose on both sides and glaucous below	Expanding with leaves, 1.2–3 cm long	Leafy branchlets 0.5–2 cm long	Hairy, 4–8 mm long	Light brown, short-hairy
S. lasiandra var. *caudata*	whiplash willow	Shrub or small tree 18–45 feet tall, streambanks, low to moderate elevation	Lustrous red to olive, young twigs pubescent into second year	Lanceolate, long-accuminate, serrate, 5–11 cm long, glands on the petiole	Shiny green on both sides, paler below, initially hairy but later glabrate	Expanding with leaves, 2–4.5 cm long	Large–leaved, 10–35 mm long	Glabrous, 4–8 mm long, 2 stamens	Yellow, hairy on the lower portions
S. lasiandra var. *lasiandra*	Pacific willow	Similar to SALAC but in and west of the Cascade mountains	Similar to SALAC	Similar to SALAC	Similar to SALAC but glaucous below	Similar to SALAC	Similar to SALAC	Similar to SALAC	Similar to SALAC
S. lemmonii	Lemmon's willow	Many-stemmed shrubs to 15 feet tall, low to moderate elevation	Young twigs sparse-hairy, very glaucous into second year	Lanceolate-elliptic, entire, larger than SAGE	Green above and pale-glaucous below, glabrate	Expanding with leaves, 1.5–2.5 cm long	Leafy, to 1 cm long	Thinly short-hairy, 3–6 mm long	Brown to black, short-hairy
S. maccalliana	McCalla's willow	Shrubs to 9 feet tall, rare moderate elevation	Twigs brown to yellowish, glabrous to sparsely hairy	Lanceolate to oblong, leathery, the margins coarsely toothed	Green above and paler below, not glaucous, hairy only when young	Large	Long leafy branchlets	Tomentose, 6–8 mm long, 2 stamens	Pale, densely hairy
S. melanopsis	dusky willow	Similar to *s. exigua*	Similar to *s. exigua*	Similar to *s. exigua* but leaves usually less narrow and with callus to glandular teeth	Similar to *s. exigua* but less hairy and soon glabrate	Similar to *s. exigua*	Similar to *s. exigua*	Similar to *s. exigua* except glabrous	Similar to *s. exigua* but glabrous, broad and blunt
S. nivalis	snow willow	Matted, spreading shrub 4 inches tall	Twigs stout and hairless except just below	Elliptic to obovate, reticulate-veiny below	Dark green above and glaucous below	Serotinous, terminating shoots of the season	Slender pedunculate but leafless	Villous–puberulent, 3–5 mm long, style very short	Green to yellow, glabrous outside but hairy within
S. pedicellaris	bog willow	Branched shrub to 5 feet tall, bogs at moderate elevations	Twigs dark, glabrous	Oblanceolate, entire, acute to obtuse, 3.5–6 cm long and 0.5–2 cm broad	At first silky but soon glabrous, glaucous below	Expanding with the leaves, rather short and 1–3 cm long	Short leafy branchlets 1–2 cm long, leaves somewhat reduced	Glabrous, 4–6.5 mm long, style almost obsolete, pedicle 1–3 mm long	Persistent, yellowish, long-hairy within

Comparisons for Willow (Salix) Species in Eastern Washington (continued)

Scientific name	Common name	Life form habitat	Twigs	Leaf shape and margin	Leaf color and pubescens	Pistilate aments	Floral branchlets	Capsules and stamens	Floral bracts
S. piperi	Piper's willow	Many-stemmed shrub to 8 feet tall, moderate elevation in strong maritime climate	Twigs brown, villous at first but soon glabrate	Oblanceolate, entire or crenate-serrate	Shiny green above and strongly glaucous below, hairy when young, soon glabrous	Expand before leaves, large and thick, 4–12 cm long and 1.5 cm wide	Subsessile or up to 1 cm long with small bracts to 1 cm long	Glabrous, 4–6 mm long, 2 stamens	Dark brown to black, densely long-villous, persistent
S. planifolia var. *monica*	tea–leaved willow	Low branched shrub to 3 feet tall, moderately high to high elevation	Young twigs glabrous or sparsely hairy, older twigs brown or reddish, glabrous	Oblanceolate, entire or minutely serrate, 2.5–3.5 cm long and 0.8–1.5 cm wide	Green above and glaucous below, sparse hairy but soon glabrous, partially parallel-veined.	Expanding with or before the leaves, 2–4 cm long	Short leafy branchlets just 1–3 mm long	Short-hairy, 3.5–5.5 mm long, stipes to 1 mm long, 2 stamens	Dark brown to black, long-hairy, persistent
S. pseudomonticola	false mountain willow	Rounded shrub up to 12 feet tall, moderate elevation	Young twigs sparsely to densely hairy, older twigs dark brown to red sometimes hairy	Widely oblanceolate, thick and leathery, fine-toothed	Green above and glaucous below, at first pubescent below but soon glabrous	Expanding before the leaves, 1–5 cm long	Floral branchlets up to 5 mm long, usually without bracts	Glabrous, 4–7 mm long, stipes 0.5–2 mm long, 2 stamens	Brown to black, sparsely to densely long-hairy
S. rigida var. *mackenzieana*	Mackenzie's willow	Sparingly–branched shrub to 12 feet tall, streambanks, low to moderate elevation	Reddish-brown, slender, not glaucous, glabrous	Lanceolate, usually cordate base, acuminate, fine-toothed, entire, 5–10 cm long	Shiny green above and glaucous below, glabrous or soon glabrate	Expanding with or before the leaves, 3–6 mm long	Leafy, long	Glabrous, 3–7 mm long, stipes 2–4.5 mm long, 2 stamens	Minute, brown to blackish, glabrous, persistent
S. scouleriana	Scouler's willow	Shrub or small tree 13–30 feet tall, uplands, streambanks, moderate elevation	Young twigs short-hairy, stripped bark has a skunky odor	Obovate to oblanceolate, broadest below the tip, entire, 3.5–8 cm long	Green above and glaucous below, sparse reddish hairs on lower surface	Expanding before the leaves, soon deciduous, 1.5–6 cm long	More or less sessile, if present, minute and leaflets to 5 mm long	Somewhat long-beaked, densely short-hairy, 5–8 mm long	Brown to black, short-hairy
S. sitchensis	Sitka willow	Branched shrub to 15 feet tall, Cascades and Selkirks, moderate to moderate-high elevation	Dark brown, dense-velvety	Obovate, widest just below the tip, entire 4–9 cm long	Dark green above and dense velvety-white below	Expanding with leaves, 3–8 cm long	Small leaved, to 1 cm long	Densely short-hairy, 3.5–5 mm long, 1 stamen	Brown to black, long-hairy
S. tweedyii	Tweedy's willow	Shrub to 12 feet tall, rare in eastern Washington, moderate elevation	Stout, young twigs with long, dense pubescence that persists into second year	Elliptic ovate, finely serrate with gland–tipped teeth	Green on both sides, not glaucous, upper surface with loose tomentum, especially along the ribs, less so above	Expanding with or before leaves, 3–9 cm long	Sessile on twigs of the previous year	Glabrous, nearly sessile, glabrous, 4.5–7 mm long, 2 stamens	Dark brown to black, densely to sparsely long–hairy, persistent

APPENDIX G: Species Comparisons by Series

Species Comparisons by Series—Part 1

Species	Code	ABAM 62 plots		ABGR 36 plots		ABLA2 139 plots		PICO 3 plots		PIEN 100 plots		LALY 6 plots		PSME 11 plots	
		CON[a]	COV[b]	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV
Tree overstory:															
Pacific silver fir	ABAM	97	28	—	—	2	1	—	—	1	3	—	—	—	—
grand fir	ABGR	6	7	92	38	3	10	—	—	—	—	—	—	—	—
subalpine fir	ABLA2	29	14	6	10	93	16	—	—	46	9	33	9	—	—
bigleaf maple	ACMA	—	—	17	6	—	—	—	—	—	—	—	—	9	20
red alder	ALRU	—	—	—	—	—	—	—	—	—	—	—	—	—	—
paper birch	BEPA	—	—	—	—	1	8	—	—	5	10	—	—	9	3
Alaska yellow-cedar	CHNO	23	14	6	3	1	3	—	—	2	20	—	—	—	—
subalpine larch	LALY	—	—	—	—	1	3	—	—	—	—	67	5	—	—
western larch	LAOC	6	5	11	2	22	12	—	—	22	14	—	—	9	15
Engelmann spruce	PIEN	48	16	31	12	96	30	33	Tr[c]	95	35	33	13	9	Tr
whitebark pine	PIAL	—	—	—	—	2	11	—	—	—	—	17	Tr	—	—
lodgepole pine	PICO	5	6	3	35	35	12	100	55	28	16	—	—	9	10
ponderosa pine	PIPO	2	5	14	3	1	2	—	—	7	11	—	—	27	16
quaking aspen	POTR	2	2	—	—	—	—	—	—	10	11	—	—	18	7
black cottonwood	POTR2	3	3	22	13	4	5	—	—	8	10	—	—	18	7
Douglas-fir	PSME	24	10	75	25	37	13	—	—	40	21	—	—	100	56
Oregon white oak	QUGA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
western redcedar	THPL	42	13	3	5	1	2	—	—	—	—	—	—	9	1
western hemlock	TSHE	69	21	6	1	1	5	—	—	3	4	—	—	—	—
mountain hemlock	TSME	16	4	—	—	1	Tr	—	—	—	—	—	—	—	—
Shrubs:															
vine maple	ACCI	11	22	25	39	—	—	—	—	1	2	—	—	—	—
Douglas maple	ACGLD	5	1	44	14	13	6	—	—	30	7	—	—	73	16
mountain alder	ALIN	2	3	22	7	24	6	—	—	40	9	—	—	27	6
Sitka alder	ALSI	16	8	—	—	28	10	—	—	10	6	—	—	—	—
Saskatoon serviceberry	AMAL	—	—	44	1	24	2	—	—	42	2	—	—	82	8
bog birch	BEGLG	—	—	—	—	—	—	—	—	4	10	—	—	—	—
red-osier dogwood	COST	5	1	22	2	16	4	—	—	46	19	—	—	36	9
California hazel	COCO2	2	5	6	12	—	—	—	—	1	2	—	—	—	—
black hawthorn	CRDOD	—	—	—	—	—	—	—	—	1	2	—	—	27	2
oceanspray	HODI	—	—	22	13	—	—	—	—	5	3	—	—	36	3
rusty menziesia	MEFE	42	9	—	—	7	16	—	—	3	10	—	—	—	—
devil's club	OPHO	40	21	6	1	4	9	—	—	1	1	—	—	—	—
common chokecherry	PRVI	—	—	3	Tr	—	—	—	—	1	Tr	—	—	18	4
Cascade azalea	RHAL	24	11	—	—	22	22	—	—	3	8	—	—	—	—
stink currant	RIBR	2	1	—	—	—	—	—	—	—	—	—	—	—	—
Hudsonbay currant	RIHU	10	4	6	3	11	2	—	—	9	2	—	—	—	—
prickly currant	RILA	39	3	53	3	70	4	33	2	58	3	—	—	36	3
western thimbleberry	RUPA	32	4	67	5	37	4	—	—	42	3	—	—	55	8
salmonberry	RUSP	39	5	6	1	2	2	—	—	2	Tr	—	—	—	—
Bebb's willow	SABE	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Booth's willow	SABO2	—	—	—	—	2	3	—	—	1	2	—	—	—	—
Cascade willow	SACA6	—	—	—	—	—	—	—	—	—	—	—	—	—	—
undergreen willow	SACO2	—	—	—	—	—	—	—	—	3	3	—	—	—	—
Drummond's willow	SADR	—	—	—	—	1	10	33	3	6	6	—	—	—	—
coyote willow	SAEX	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Farr's willow	SAFA	—	—	—	—	1	9	—	—	9	7	17	Tr	—	—
Geyer's willow	SAGEG	—	—	—	—	—	—	33	3	—	—	—	—	—	—
Geyer's willow	SAGEM	—	—	—	—	—	—	33	2	—	—	—	—	—	—
Pacific willow	SALAL	—	—	—	—	—	—	—	—	—	—	—	—	—	—
dusky willow	SAME2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Piper's willow	SAPI	—	—	—	—	—	—	—	—	1	2	—	—	—	—
tea-leaved willow	SAPLM2	—	—	—	—	1	Tr	—	—	—	—	—	—	—	—
Mackenzie's willow	SARIM2	—	—	—	—	1	4	—	—	—	—	—	—	—	—
Scouler's willow	SASC	—	—	6	5	8	4	—	—	8	3	—	—	36	2
Sitka willow	SASI2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Douglas spiraea	SPDO	2	20	3	Tr	1	20	—	—	3	7	—	—	—	—
common snowberry	SYAL	8	5	72	12	21	4	—	—	53	9	—	—	100	50
Alaska huckleberry	VAAL	32	5	—	—	—	—	—	—	2	15	—	—	—	—
big huckleberry	VAME	84	13	17	6	36	8	—	—	15	3	—	—	—	—
oval-leaf huckleberry	VAOV	6	13	—	—	—	—	—	—	—	—	—	—	—	—
Low shrubs and subshrubs:															
bearberry	ARUV	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Merten's moss-heather	CAME	—	—	—	—	—	—	—	—	1	Tr	50	35	—	—

Species Comparisons by Series—Part 1 (continued)

Species	Code	ABAM 62 plots		ABGR 36 plots		ABLA2 139 plots		PICO 3 plots		PIEN 100 plots		LALY 6 plots		PSME 11 plots	
		CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV
four-angled moss-heather	CATE2	—	—	—	—	3	Tr	—	—	—	—	50	63	—	—
bunchberry dogwood	COCA	34	13	—	—	34	7	—	—	56	7	—	—	—	—
Labrador tea	LEGL	5	22	—	—	25	13	—	—	22	14	83	8	—	—
twinflower	LIBOL	40	6	33	8	43	7	33	3	58	9	—	—	9	25
myrtle pachistima	PAMY	29	2	78	3	40	7	—	—	21	7	—	—	73	3
red mountain-heath	PHEM	—	—	—	—	13	4	—	—	2	1	100	13	—	—
shrubby cinquefoil	POFR	—	—	—	—	—	—	100	14	1	Tr	—	—	—	—
five-leaved bramble	RUPE	35	5	—	—	18	6	—	—	12	4	—	—	—	—
dwarf huckleberry	VACA	—	—	—	—	7	4	67	12	17	4	83	6	—	—
Cascade huckleberry	VADE	—	—	—	—	1	3	—	—	—	—	—	—	—	—
low huckleberry	VAMY	13	3	3	3	26	6	—	—	18	3	—	—	—	—
grouse huckleberry	VASC	10	3	6	4	39	15	—	—	19	11	50	13	—	—
Perennial forbs:															
deerfoot vanillaleaf	ACTR	35	14	56	25	1	10	—	—	1	1	—	—	—	—
baneberry	ACRU	34	1	31	1	28	1	—	—	24	1	—	—	18	1
wild sarsaparilla	ARNU3	—	—	—	—	1	18	—	—	6	6	—	—	—	—
heart-leaf arnica	ARCO	10	1	22	1	35	2	—	—	29	2	—	—	36	3
mountain arnica	ARLA	23	5	6	1	22	6	—	—	2	2	17	2	—	—
wild ginger	ASCA3	18	4	11	9	1	2	—	—	1	2	—	—	—	—
alpine aster	ASAL	—	—	—	—	—	—	—	—	—	—	17	2	—	—
twinflower marshmarigold	CABI	3	1	—	—	4	1	—	—	3	2	50	3	—	—
twinflower marshmarigold	CABIR	—	—	—	—	1	1	—	—	1	15	—	—	—	—
queencup beadlily	CLUN	76	6	33	5	26	5	—	—	22	4	—	—	—	—
old man's whiskers	GETR	34	1	44	1	45	1	—	—	47	2	—	—	36	1
ballhead waterleaf	HYCA	—	—	3	Tr	—	—	—	—	—	—	—	—	9	Tr
water lentil	LEMI	—	—	—	—	—	—	—	—	—	—	—	—	—	—
partridgefoot	LUPE	2	Tr	—	—	3	14	—	—	—	—	67	10	—	—
broadleaf lupine	LULA	—	—	—	—	9	8	—	—	3	Tr	17	Tr	—	—
bigleaf lupine	LUPO	3	4	—	—	9	1	33	2	13	1	—	—	—	—
skunk cabbage	LYAM	—	—	—	—	—	—	—	—	1	2	—	—	—	—
northern bluebells	MEPAB	10	1	8	1	2	Tr	—	—	3	Tr	—	—	—	—
Lewis' monkey-flower	MILE	5	Tr	—	—	1	Tr	—	—	1	Tr	—	—	—	—
littleleaf montia	MOPAP	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Indian water-lily	NUPO	—	—	—	—	—	—	—	—	—	—	—	—	—	—
cow-lily	NUVA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
grass-leaved pondweed	POGR3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
floatingleaf pondweed	PONA2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
fanleaf cinquefoil	POFL2	2	Tr	—	—	2	1	—	—	—	—	50	1	—	—
dotted saxifrage	SAPU	8	1	3	Tr	12	4	—	—	8	1	—	—	—	—
arrowleaf groundsel	SETR	11	1	14	Tr	41	2	—	—	31	2	—	—	—	—
western solomonplume	SMRA	21	2	67	1	15	1	—	—	20	1	—	—	27	1
starry solomonplume	SMST	40	4	61	4	28	2	—	—	55	2	—	—	64	1
simplestem bur-reed	SPEM	—	—	—	—	—	—	—	—	—	—	—	—	—	—
small bur-reed	SPMI	—	—	—	—	—	—	—	—	—	—	—	—	—	—
bur-reed species	SPARG	—	—	—	—	—	—	—	—	—	—	—	—	—	—
claspleaf twisted-stalk	STAM	26	1	11	Tr	50	1	—	—	52	1	—	—	—	—
rosy twisted-stalk	STRO	47	3	6	Tr	8	Tr	—	—	4	Tr	—	—	—	—
coolwort foamflower	TITRU	71	7	14	2	35	5	—	—	21	2	—	—	—	—
false bugbane	TRCA3	18	7	11	2	25	11	—	—	18	7	—	—	—	—
globeflower	TRLA4	3	Tr	3	2	18	4	—	—	13	1	33	3	—	—
common cattail	TYLA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sitka valerian	VASI	44	4	6	3	34	7	—	—	12	7	33	5	—	—
Canadian violet	VICA	—	—	—	—	3	3	—	—	11	2	—	—	9	3
pioneer violet	VIGL	50	2	50	1	26	2	—	—	22	2	—	—	27	3
round-leaved violet	VIOR2	27	2	—	—	23	1	—	—	9	Tr	—	—	—	—
marsh violet	VIPA2	—	—	—	—	2	Tr	—	—	3	Tr	—	—	9	Tr
Grass or grasslike:															
redtop	AGAL	—	—	—	—	—	—	—	—	1	Tr	—	—	—	—
spike bentgrass	AGEX	—	—	—	—	—	—	33	3	—	—	—	—	—	—
Idaho bentgrass	AGID	—	—	—	—	—	—	—	—	2	Tr	—	—	—	—
Oregon bentgrass	AGOR	—	—	—	—	—	—	33	Tr	—	—	—	—	—	—
winter bentgrass	AGSC	—	—	—	—	—	—	33	3	4	Tr	—	—	—	—
bluejoint reedgrass	CACA	3	Tr	—	—	10	1	100	30	36	5	—	—	—	—
slimstem reedgrass	CANE3	—	—	—	—	—	—	67	3	—	—	—	—	—	—
bigleaf sedge	CAAM	—	—	—	—	—	—	—	—	1	Tr	—	—	—	—
Columbia sedge	CAAP3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
water sedge	CAAQA	—	—	—	—	—	—	33	2	2	4	—	—	—	—
Sitka sedge	CAAQS	—	—	—	—	—	—	—	—	2	5	—	—	—	—

Species Comparisons by Series—Part 1 (continued)

Species	Code	ABAM 62 plots		ABGR 36 plots		ABLA2 139 plots		PICO 3 plots		PIEN 100 plots		LALY 6 plots		PSME 11 plots	
		CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV
awned sedge	CAAT2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Buxbaum's sedge	CABU2	—	—	—	—	—	—	33	5	—	—	—	—	—	—
Cusick's sedge	CACU2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
lesser panicled sedge	CADI2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
woolly sedge	CALA3	—	—	—	—	—	—	33	3	—	—	—	—	—	—
slender sedge	CALA4	—	—	—	—	—	—	—	—	—	—	—	—	—	—
lenticular sedge	CALE5	2	Tr	—	—	—	—	—	—	—	—	—	—	—	—
mud sedge	CALI	—	—	—	—	—	—	—	—	—	—	—	—	—	—
black alpine sedge	CANI2	—	—	—	—	7	2	—	—	1	15	83	4	—	—
beaked sedge	CARO2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
russet sedge	CASA2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Holm's sedge	CASCB	—	—	—	—	4	3	—	—	2	45	33	Tr	—	—
saw-leaved sedge	CASCP2	2	3	—	—	19	2	—	—	31	29	—	—	—	—
showy sedge	CASP	—	—	—	—	—	—	—	—	—	—	17	1	—	—
bladder sedge	CAUT	2	Tr	—	—	—	—	33	20	8	4	—	—	—	—
inflated sedge	CAVE	—	—	—	—	—	—	33	5	—	—	—	—	—	—
wood reed-grass	CILA2	10	Tr	6	Tr	19	1	33	2	16	2	—	—	9	Tr
timber oatgrass	DAIN	—	—	—	—	—	—	67	9	1	Tr	—	—	—	—
tufted hairgrass	DECE	—	—	—	—	—	—	67	4	—	—	—	—	—	—
creeping spike-rush	ELPA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
few-flowered spike-rush	ELPA2	—	—	—	—	—	—	—	—	1	2	—	—	—	—
blue wildrye	ELGL	2	Tr	11	Tr	5	2	33	2	22	3	—	—	18	1
Chamisso cotton-grass	ERCH2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
many-spiked cotton-grass	ERPO2	—	—	—	—	—	—	—	—	1	Tr	—	—	—	—
green-keeled cotton-grass	ERVI	—	—	—	—	—	—	—	—	—	—	—	—	—	—
sheep fescue	FEOVR	—	—	—	—	1	Tr	—	—	2	Tr	—	—	—	—
tall mannagrass	GLEL	—	—	6	Tr	4	Tr	33	2	11	1	—	—	9	Tr
reed mannagrass	GLGR	—	—	—	—	—	—	—	—	—	—	—	—	—	—
western mannagrass	GLOC	—	—	—	—	—	—	—	—	—	—	—	—	—	—
fowl mannagrass	GLST	—	—	—	—	1	1	33	3	2	1	—	—	—	—
smooth woodrush	LUHI	3	Tr	—	—	11	2	—	—	1	1	83	3	—	—
reed canarygrass	PHAR	—	—	—	—	—	—	—	—	—	—	—	—	—	—
timothy	PHPR	—	—	—	—	1	1	67	2	1	1	—	—	—	—
Kentucky bluegrass	POPR	—	—	3	Tr	1	2	67	4	1	Tr	—	—	9	2
pale false mannagrass	PUPAM	—	—	—	—	1	Tr	—	—	—	—	—	—	—	—
small-fruited bulrush	SCMI	2	3	—	—	—	—	—	—	3	5	—	—	—	—
softstem bulrush	SCVA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ferns and fern allies:															
alpine lady fern	ATDI	—	—	—	—	1	Tr	—	—	1	3	—	—	—	—
lady fern	ATFI	48	6	14	2	24	4	—	—	20	1	—	—	9	Tr
wood fern species	DRYOP	—	—	—	—	1	25	—	—	1	20	—	—	—	—
common horsetail	EQAR	15	2	11	Tr	27	1	67	2	55	13	—	—	—	—
water horsetail	EQFL	—	—	—	—	—	—	—	—	4	1	—	—	—	—
common scouring-rush	EQHY	—	—	3	Tr	1	Tr	33	Tr	11	2	—	—	18	4
marsh horsetail	EQPA	—	—	—	—	—	—	—	—	1	3	—	—	—	—
wood horsetail	EQSY	—	—	—	—	—	—	—	—	—	—	—	—	—	—
oak fern	GYDR	58	11	8	1	23	15	—	—	12	8	—	—	—	—

[a] CON = percentage of plots in which the species occurred.
[b] COV = average canopy cover in plots in which the species occurred.
[c] Tr = trace cover, less than 1 percent canopy cover.

Species Comparisons by Series—Part 2

Species	Code	THPL 90 plots		TSHE 117 plots		TSME 25 plots		ACMA 4 plots		ALRU 13 plots		BEPA 7 plots		POTR 33 plots	
		CON[a]	COV[b]	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV
Tree overstory:															
Pacific silver fir	ABAM	2	3	3	3	84	24	—	—	—	—	—	—	—	—
grand fir	ABGR	46	15	56	16	—	—	—	—	23	5	43	2	12	2
subalpine fir	ABLA2	13	6	23	5	40	11	—	—	—	—	14	3	—	—
bigleaf maple	ACMA	1	2	—	—	—	—	100	49	8	8	—	—	—	—
red alder	ALRU	6	15	3	6	—	—	25	20	100	66	—	—	—	—
paper birch	BEPA	10	8	8	4	—	—	—	—	—	—	100	36	18	15
Alaska yellow-cedar	CHNO	—	—	1	15	8	18	—	—	—	—	—	—	—	—
subalpine larch	LALY	—	—	—	—	—	—	—	—	—	—	—	—	—	—
western larch	LAOC	23	6	21	10	—	—	—	—	—	—	57	11	9	3
Engelmann spruce	PIEN	61	18	38	10	36	9	—	—	—	—	14	3	6	Tr[c]
whitebark pine	PIAL	—	—	—	—	12	6	—	—	—	—	—	—	—	—
lodgepole pine	PICO	12	2	9	7	—	—	—	—	—	—	57	4	18	3
ponderosa pine	PIPO	7	18	1	5	—	—	25	Tr	8	5	—	—	12	10
quaking aspen	POTR	2	2	—	—	—	—	—	—	—	—	43	7	100	54
black cottonwood	POTR2	21	6	6	5	—	—	25	5	8	2	14	Tr	24	9
Douglas-fir	PSME	58	16	50	15	—	—	25	1	31	8	71	2	30	6
Oregon white oak	QUGA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
western redcedar	THPL	98	41	86	29	12	8	—	—	15	5	57	5	3	Tr
western hemlock	TSHE	13	2	96	24	20	14	—	—	15	2	57	3	—	—
mountain hemlock	TSME	—	—	—	—	96	15	—	—	—	—	—	—	—	—
Shrubs:															
vine maple	ACCI	18	23	26	19	—	—	—	—	54	36	—	—	3	50
Douglas maple	ACGLD	47	5	23	3	—	—	75	2	31	6	71	4	27	25
mountain alder	ALIN	31	8	9	3	—	—	25	47	15	27	71	10	52	13
Sitka alder	ALSI	20	3	9	6	20	15	—	—	46	15	29	2	—	—
Saskatoon serviceberry	AMAL	39	1	21	1	—	—	100	1	31	Tr	71	2	61	3
bog birch	BEGLG	1	5	—	—	—	—	—	—	—	—	—	—	—	—
red-osier dogwood	COST	42	4	15	4	—	—	75	44	38	19	71	10	67	36
California hazel	COCO	6	2	8	2	—	—	—	—	15	14	29	5	9	5
black hawthorn	CRDOD	1	Tr	—	—	—	—	—	—	—	—	—	—	6	5
oceanspray	HODI	7	8	2	1	—	—	100	15	54	3	29	Tr	12	8
rusty menziesia	MEFE	11	3	17	5	36	17	—	—	—	—	—	—	—	—
devil's club	OPHO	30	14	39	10	32	8	—	—	31	22	29	2	—	—
common chokecherry	PRVI	—	—	—	—	—	—	—	—	—	—	14	Tr	12	17
Cascade azalea	RHAL	6	1	7	4	64	31	—	—	—	—	—	—	—	—
stink currant	RIBR	2	1	1	Tr	8	4	—	—	15	1	—	—	—	—
Hudsonbay currant	RIHU	6	1	2	Tr	16	6	—	—	15	27	—	—	12	2
prickly currant	RILA	56	2	40	2	8	2	25	Tr	54	2	86	2	36	5
western thimbleberry	RUPA	66	5	49	2	8	1	25	Tr	62	9	86	3	42	3
salmonberry	RUSP	9	4	10	2	32	9	—	—	38	15	—	—	—	—
Bebb's willow	SABE	1	3	—	—	—	—	—	—	—	—	14	3	12	4
Booth's willow	SABO2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cascade willow	SACA6	—	—	—	—	—	—	—	—	—	—	—	—	—	—
undergreen willow	SACO2	—	—	—	—	4	5	—	—	—	—	—	—	—	—
Drummond's willow	SADR	—	—	—	—	—	—	—	—	—	—	14	Tr	—	
coyote willow	SAEX	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Farr's willow	SAFA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Geyer's willow	SAGEG	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Geyer's willow	SAGEM	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pacific willow	SALAL	—	—	—	—	—	—	—	—	—	—	—	—	—	—
dusky willow	SAME2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Piper's willow	SAPI	—	—	—	—	4	35	—	—	—	—	—	—	—	—
tea-leaved willow	SAPLM2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mackenzie's willow	SARIM2	—	—	—	—	4	1	—	—	—	—	—	—	—	—
Scouler's willow	SASC	7	2	1	Tr	—	—	25	Tr	—	—	—	—	33	7
Sitka willow	SASI2	1	1	—	—	12	3	—	—	8	3	—	—	—	—
Douglas spiraea	SPDO	1	5	1	2	4	15	—	—	—	—	29	11	6	Tr
common snowberry	SYAL	37	3	15	2	—	—	75	22	23	14	100	4	88	42
Alaska huckleberry	VAAL	—	—	1	2	44	21	—	—	—	—	—	—	—	—
big huckleberry	VAME	21	4	67	3	88	21	—	—	8	Tr	—	—	—	—
oval-leaf huckleberry	VAOV	—	—	—	—	—	—	—	—	8	Tr	—	—	—	—
Low shrubs and subshrubs:															
bearberry	ARUV														
Merten's moss-heather	CAME	—	—	—	—	12	2	—	—	—	—	—	—	—	—
four-angled moss-heather	CATE2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
bunchberry dogwood	COCA	27	4	23	5	12	3	—	—	—	—	43	7	9	1
Labrador tea	LEGL	—	—	—	—	16	1	—	—	—	—	—	—	—	—

Species Comparisons by Series—Part 2 (continued)

Species	Code	THPL 90 plots		TSHE 117 plots		TSME 25 plots		ACMA 4 plots		ALRU 13 plots		BEPA 7 plots		POTR 33 plots	
		CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV
twinflower	LIBOL	54	7	70	6	4	Tr	—	—	8	Tr	57	17	24	4
myrtle pachistima	PAMY	49	4	59	3	8	1	100	1	38	4	43	2	27	13
red mountain-heath	PHEM	—	—	—	—	48	8	—	—	—	—	—	—	—	—
shrubby cinquefoil	POFR	—	—	—	—	—	—	—	—	—	—	—	—	—	—
five-leaved bramble	RUPE	4	4	20	6	64	5	—	—	—	—	—	—	—	—
dwarf huckleberry	VACA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cascade huckleberry	VADE	—	—	—	—	32	22	—	—	—	—	—	—	—	—
low huckleberry	VAMY	10	1	9	1	12	12	—	—	—	—	14	2	—	—
grouse huckleberry	VASC	1	1	3	1	8	4	—	—	—	—	—	—	—	—
Perennial forbs:															
deerfoot vanillaleaf	ACTR	7	7	26	15	8	3	—	—	38	7	—	—	—	—
baneberry	ACRU	47	2	35	1	—	—	25	Tr	31	4	14	Tr	33	1
wild sarsaparilla	ARNU3	23	9	10	9	—	—	—	—	—	—	57	3	12	9
heart-leaf arnica	ARCO	4	1	7	2	—	—	25	Tr	8	1	—	—	6	Tr
mountain arnica	ARLA	3	Tr	1	4	52	2	—	—	8	1	—	—	—	—
wild ginger	ASCA3	34	6	38	4	—	—	—	—	46	1	14	15	—	—
alpine aster	ASAL	—	—	—	—	—	—	—	—	—	—	—	—	—	—
twinflower marshmarigold	CABI	1	Tr	—	—	12	1	—	—	—	—	—	—	—	—
twinflower marshmarigold	CABIR	—	—	—	—	8	7	—	—	—	—	—	—	—	—
queencup beadlily	CLUN	58	3	86	4	36	7	—	—	15	3	86	2	3	Tr
old man's whiskers	GETR	53	2	59	1	4	2	25	Tr	38	Tr	57	1	21	2
ballhead waterleaf	HYCA	—	—	—	—	—	—	50	Tr	8	Tr	—	—	—	—
water lentil	LEMI	—	—	—	—	—	—	—	—	—	—	—	—	—	—
partridgefoot	LUPE	—	—	—	—	12	2	—	—	—	—	—	—	—	—
broadleaf lupine	LULA	—	—	—	—	4	Tr	—	—	—	—	—	—	—	—
bigleaf lupine	LUPO	—	—	—	—	12	1	—	—	—	—	—	—	—	—
skunk cabbage	LYAM	8	1	8	4	—	—	—	—	—	—	—	—	3	3
northern bluebells	MEPAB	8	Tr	5	1	8	Tr	—	—	15	Tr	—	—	3	25
Lewis' monkey-flower	MILE	1	Tr	—	—	4	1	—	—	15	1	—	—	—	—
littleleaf montia	MOPAP	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Indian water-lily	NUPO	—	—	—	—	—	—	—	—	—	—	—	—	—	—
cow-lily	NUVA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
grass-leaved pondweed	POGR3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
floatingleaf pondweed	PONA2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
fanleaf cinquefoil	POFL2	—	—	—	—	20	Tr	—	—	—	—	—	—	—	—
dotted saxifrage	SAPU	4	Tr	3	Tr	32	1	—	—	8	Tr	—	—	—	—
arrowleaf groundsel	SETR	14	1	22	1	40	1	—	—	—	—	14	1	6	2
western solomonplume	SMRA	31	1	14	1	—	—	75	1	62	1	29	1	18	2
starry solomonplume	SMST	62	4	62	3	16	3	75	1	15	Tr	57	1	70	3
simplestem bur-reed	SPEM	—	—	—	—	—	—	—	—	—	—	—	—	—	—
small bur-reed	SPMI	—	—	—	—	—	—	—	—	—	—	—	—	—	—
bur-reed species	SPARG	—	—	—	—	—	—	—	—	—	—	—	—	—	—
claspleaf twisted-stalk	STAM	49	1	49	1	40	1	—	—	38	Tr	71	1	12	Tr
rosy twisted-stalk	STRO	7	3	9	1	44	3	—	—	15	Tr	29	Tr	3	1
coolwort foamflower	TITRU	51	4	79	4	44	4	—	—	15	3	29	4	12	1
false bugbane	TRCA3	13	4	15	2	4	2	—	—	15	3	—	—	—	—
globeflower	TRLA4	—	—	3	1	4	1	—	—	—	—	—	—	—	—
common cattail	TYLA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sitka valerian	VASI	4	Tr	3	11	64	3	—	—	—	—	—	—	—	—
Canadian violet	VICA	6	2	4	2	—	—	—	—	—	—	14	3	12	6
pioneer violet	VIGL	46	2	26	2	28	1	50	Tr	62	1	—	—	27	1
round-leaved violet	VIOR2	12	2	35	3	16	Tr	—	—	8	Tr	—	—	—	—
marsh violet	VIPA2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Grass or grasslike:															
redtop	AGAL	1	Tr	—	—	—	—	—	—	8	1	29	2	15	2
spike bentgrass	AGEX	—	—	—	—	8	1	—	—	—	—	43	4	6	6
Idaho bentgrass	AGID	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Oregon bentgrass	AGOR	—	—	—	—	—	—	—	—	—	—	—	—	—	—
winter bentgrass	AGSC	—	—	—	—	—	—	—	—	—	—	14	10	6	6
bluejoint reedgrass	CACA	3	1	1	1	8	2	—	—	—	—	14	3	15	12
slimstem reedgrass	CANE3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
bigleaf sedge	CAAM	1	40	1	Tr	—	—	—	—	—	—	—	—	—	—
Columbia sedge	CAAP3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
water sedge	CAAQA	—	—	—	—	—	—	—	—	8	Tr	—	—	3	2
Sitka sedge	CAAQS	1	3	1	1	—	—	—	—	—	—	—	—	—	—
awned sedge	CAAT2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Buxbaum's sedge	CABU2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cusick's sedge	CACU2	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Species Comparisons by Series—Part 2 (continued)

Species	Code	THPL 90 plots		TSHE 117 plots		TSME 25 plots		ACMA 4 plots		ALRU 13 plots		BEPA 7 plots		POTR 33 plots	
		CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV
lesser panicled sedge	CADI2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
woolly sedge	CALA3	—	—	—	—	—	—	—	—	—	—	—	—	15	18
slender sedge	CALA4	—	—	—	—	—	—	—	—	—	—	—	—	—	—
lenticular sedge	CALE5	—	—	1	Tr	—	—	—	—	—	—	—	—	3	Tr
mud sedge	CALI	—	—	—	—	—	—	—	—	—	—	—	—	—	—
black alpine sedge	CANI2	—	—	—	—	8	1	—	—	—	—	—	—	—	—
beaked sedge	CARO2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
russet sedge	CASA2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Holm's sedge	CASCB	—	—	—	—	—	—	—	—	—	—	—	—	—	—
saw-leaved sedge	CASCP2	1	Tr	—	—	32	1	—	—	—	—	—	—	—	—
showy sedge	CASP	—	—	—	—	8	1	—	—	—	—	—	—	—	—
bladder sedge	CAUT	—	—	—	—	—	—	—	—	—	—	—	—	6	7
inflated sedge	CAVE	—	—	—	—	—	—	—	—	—	—	—	—	3	3
wood reed-grass	CILA2	26	1	17	Tr	8	Tr	—	—	31	2	29	Tr	12	1
timber oatgrass	DAIN	—	—	—	—	—	—	—	—	—	—	—	—	—	—
tufted hairgrass	DECE	—	—	—	—	—	—	—	—	—	—	—	—	6	1
creeping spike-rush	ELPA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
few-flowered spike-rush	ELPA2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
blue wildrye	ELGL	8	2	3	1	4	1	50	Tr	23	Tr	43	3	30	2
Chamisso cotton-grass	ERCH2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
many-spiked cotton-grass	ERPO2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
green-keeled cotton-grass	ERVI	—	—	—	—	—	—	—	—	—	—	—	—	—	—
sheep fescue	FEOVR	—	—	—	—	—	—	—	—	—	—	—	—	—	—
tall mannagrass	GLEL	11	2	3	1	—	—	—	—	31	Tr	—	—	12	Tr
reed mannagrass	GLGR	—	—	—	—	—	—	—	—	8	1	—	—	—	—
western mannagrass	GLOC	—	—	—	—	—	—	—	—	—	—	—	—	—	—
fowl mannagrass	GLST	2	Tr	2	Tr	4	Tr	—	—	—	—	14	10	9	9
smooth woodrush	LUHI	—	—	—	—	12	1	—	—	—	—	—	—	—	—
reed canarygrass	PHAR	1	Tr	—	—	—	—	—	—	—	—	—	—	—	—
timothy	PHPR	—	—	—	—	—	—	—	—	—	—	14	2	6	2
Kentucky bluegrass	POPR	1	3	—	—	—	—	—	—	—	—	14	3	15	3
pale false mannagrass	PUPAM	—	—	—	—	—	—	—	—	—	—	—	—	—	—
small-fruited bulrush	SCMI	1	Tr	—	—	—	—	—	—	—	—	—	—	3	Tr
softstem bulrush	SCVA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ferns and fern allies:															
alpine lady fern	ATDI	1	7	—	—	—	—	—	—	—	—	—	—	—	—
lady fern	ATFI	52	10	61	7	24	10	—	—	46	24	29	1	15	1
wood fern species	DRYOP	—	—	1	Tr	—	—	—	—	—	—	—	—	—	—
common horsetail	EQAR	34	5	10	1	20	1	—	—	38	1	57	1	39	1
water horsetail	EQFL	—	—	—	—	—	—	—	—	—	—	—	—	—	—
common scouring-rush	EQHY	6	Tr	1	Tr	—	—	25	2	15	1	29	1	21	1
marsh horsetail	EQPA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
wood horsetail	EQSY	—	—	—	—	—	—	—	—	—	—	—	—	—	—
oak fern	GYDR	40	7	59	10	24	7	—	—	8	Tr	14	2	3	3

[a] CON = percentage of plots in which the species occurred.
[b] COV = average canopy cover in plots in which the species occurred.
[c] Tr = trace cover, less than 1 percent canopy cover.

Species Comparisons by Series—Part 3

Species	Code	POTR2 50 plots		QUGA 6 plots		ACCI 12 plots		ACGL 7 plots		ALIN 190 plots		ALSI 121 plots		COST 40 plots	
		CON[a]	COV[b]	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV
Tree overstory:															
Pacific silver fir	ABAM	2	Tr[c]	—	—	8	Tr	—	—	—	—	12	5	5	5
grand fir	ABGR	10	5	—	—	42	1	—	—	6	7	5	3	13	4
subalpine fir	ABLA2	2	7	—	—	—	—	—	—	13	3	29	4	13	4
bigleaf maple	ACMA	—	—	—	—	8	5	—	—	2	9	—	—	—	—
red alder	ALRU	2	Tr	—	—	17	3	—	—	—	—	1	15	—	—
paper birch	BEPA	22	15	—	—	—	—	—	—	3	9	—	—	8	5
Alaska yellow-cedar	CHNO	—	—	—	—	—	—	—	—	1	3	4	3	—	—
subalpine larch	LALY	—	—	—	—	—	—	—	—	—	—	—	—	—	—
western larch	LAOC	2	5	—	—	—	—	—	—	5	4	2	2	—	—
Engelmann spruce	PIEN	24	8	—	—	—	—	—	—	29	5	32	6	23	5
whitebark pine	PIAL	—	—	—	—	—	—	—	—	—	—	—	—	—	—
lodgepole pine	PICO	8	4	—	—	—	—	—	—	9	4	6	4	3	Tr
ponderosa pine	PIPO	26	4	67	20	—	—	14	Tr	4	3	—	—	—	—
quaking aspen	POTR	28	7	17	20	—	—	—	—	5	3	1	Tr	5	8
black cottonwood	POTR2	100	45	17	2	17	4	14	7	17	6	8	4	23	4
Douglas-fir	PSME	48	6	67	17	17	3	29	4	15	5	9	5	15	8
Oregon white oak	QUGA	—	—	83	50	—	—	—	—	—	—	—	—	—	—
western redcedar	THPL	18	6	—	—	42	5	—	—	16	4	12	7	18	4
western hemlock	TSHE	4	Tr	—	—	25	1	—	—	2	Tr	7	5	3	Tr
mountain hemlock	TSME	—	—	—	—	—	—	—	—	—	—	2	3	—	—
Shrubs:															
vine maple	ACCI	6	28	—	—	100	66	—	—	1	1	4	7	8	10
Douglas maple	ACGLD	48	9	50	4	—	—	86	43	29	6	21	8	35	14
mountain alder	ALIN	66	26	—	—	33	66	29	11	100	56	9	22	53	9
Sitka alder	ALSI	14	14	—	—	25	47	—	—	8	6	100	67	15	2
Saskatoon serviceberry	AMAL	44	2	33	3	8	Tr	57	7	28	1	7	1	15	1
bog birch	BEGLG	—	—	—	—	—	—	—	—	2	5	—	—	—	—
red-osier dogwood	COST	84	31	—	—	42	40	57	9	79	14	18	17	100	77
California hazel	COCO	16	19	83	17	—	—	14	2	4	6	2	1	8	7
black hawthorn	CRDOD	10	19	—	—	—	—	14	4	5	6	1	1	3	7
oceanspray	HODI	14	8	50	3	—	—	43	6	14	4	3	2	10	3
rusty menziesia	MEFE	—	—	—	—	—	—	—	—	1	Tr	12	18	—	—
devil's club	OPHO	6	27	—	—	50	20	—	—	3	2	23	15	10	2
common chokecherry	PRVI	10	1	67	8	—	—	43	14	3	4	—	—	3	1
Cascade azalea	RHAL	—	—	—	—	—	—	—	—	1	1	15	4	—	—
stink currant	RIBR	—	—	—	—	—	—	—	—	—	—	2	5	—	—
Hudsonbay currant	RIHU	6	1	—	—	17	5	14	5	20	6	14	3	35	4
prickly currant	RILA	46	5	—	—	17	3	57	2	58	4	63	7	58	4
western thimbleberry	RUPA	64	4	—	—	50	1	86	5	44	4	40	5	63	2
salmonberry	RUSP	4	2	—	—	50	10	—	—	2	6	26	14	18	14
Bebb's willow	SABE	4	3	—	—	—	—	—	—	9	3	—	—	3	10
Booth's willow	SABO2	—	—	—	—	—	—	—	—	2	3	—	—	—	—
Cascade willow	SACA6	—	—	—	—	—	—	—	—	—	—	—	—	—	—
undergreen willow	SACO2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drummond's willow	SADR	2	Tr	—	—	—	—	—	—	6	2	1	3	—	—
coyote willow	SAEX	—	—	—	—	—	—	—	—	1	Tr	—	—	—	—
Farr's willow	SAFA	—	—	—	—	—	—	—	—	1	3	1	Tr	—	—
Geyer's willow	SAGEG	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Geyer's willow	SAGEM	—	—	—	—	—	—	—	—	2	6	—	—	3	5
Pacific willow	SALAL	—	—	—	—	—	—	—	—	1	1	—	—	—	—
dusky willow	SAME2	—	—	—	—	—	—	—	—	4	2	1	3	3	3
Piper's willow	SAPI	—	—	—	—	—	—	—	—	—	—	—	—	—	—
tea-leaved willow	SAPLM2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mackenzie's willow	SARIM2	4	2	—	—	—	—	—	—	4	3	—	—	8	4
Scouler's willow	SASC	30	4	—	—	8	10	43	2	10	9	17	11	25	15
Sitka willow	SASI2	4	2	—	—	8	Tr	—	—	6	5	17	8	10	3
Douglas spiraea	SPDO	8	17	17	Tr	—	—	14	10	13	27	2	10	5	4
common snowberry	SYAL	64	29	83	47	8	Tr	57	40	55	15	7	4	68	10
Alaska huckleberry	VAAL	—	—	—	—	—	—	—	—	1	2	5	15	—	—
big huckleberry	VAME	2	Tr	—	—	8	Tr	14	Tr	4	1	41	2	3	Tr
oval-leaf huckleberry	VAOV	—	—	—	—	—	—	—	—	—	—	2	3	—	—
Low shrubs and subshrubs:															
bearberry	ARUV														
Merten's moss-heather	CAME	—	—	—	—	—	—	—	—	—	—	—	—	—	—
four-angled moss-heather	CATE2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
bunchberry dogwood	COCA	6	2	—	—	17	Tr	—	—	16	3	6	2	8	Tr
Labrador tea	LEGL	—	—	—	—	—	—	—	—	3	14	2	2	—	—

Species Comparisons by Series—Part 3 (continued)

		POTR2 50 plots		QUGA 6 plots		ACCI 12 plots		ACGL 7 plots		ALIN 190 plots		ALSI 121 plots		COST 40 plots	
Species	Code	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV
twinflower	LIBOL	4	4	—	—	—	—	14	20	19	4	12	2	13	4
myrtle pachistima	PAMY	34	2	33	1	50	18	57	13	25	2	45	5	23	2
red mountain-heath	PHEM	—	—	—	—	—	—	—	—	—	—	2	1	—	—
shrubby cinquefoil	POFR	—	—	—	—	—	—	—	—	—	—	—	—	—	—
five-leaved bramble	RUPE	—	—	—	—	—	—	—	—	7	1	11	2	—	—
dwarf huckleberry	VACA	—	—	—	—	—	—	—	—	1	1	—	—	—	—
Cascade huckleberry	VADE	—	—	—	—	—	—	—	—	—	—	—	—	—	—
low huckleberry	VAMY	—	—	—	—	8	Tr	—	—	4	2	7	6	—	—
grouse huckleberry	VASC	—	—	—	—	—	—	—	—	—	—	9	1	—	—
Perennial forbs:															
deerfoot vanillaleaf	ACTR	—	—	—	—	—	—	—	—	5	26	6	17	5	1
baneberry	ACRU	30	1	—	—	42	Tr	29	2	29	1	21	2	58	1
wild sarsaparilla	ARNU3	10	3	—	—	—	—	—	—	7	2	—	—	3	Tr
heart-leaf arnica	ARCO	4	1	—	—	—	—	29	5	12	1	11	2	15	1
mountain arnica	ARLA	—	—	—	—	8	Tr	—	—	2	2	17	2	—	—
wild ginger	ASCA3	12	2	—	—	25	2	—	—	11	2	4	2	8	3
alpine aster	ASAL	—	—	—	—	—	—	—	—	—	—	1	Tr	—	—
twinflower marshmarigold	CABI	—	—	—	—	—	—	—	—	2	Tr	4	1	—	—
twinflower marshmarigold	CABIR	—	—	—	—	—	—	—	—	—	—	1	8	—	—
queencup beadlily	CLUN	12	4	—	—	42	Tr	14	Tr	15	1	30	2	13	6
old man's whiskers	GETR	46	1	—	—	33	Tr	71	1	51	1	50	1	55	1
ballhead waterleaf	HYCA	2	Tr	—	—	—	—	—	—	3	Tr	1	Tr	—	—
water lentil	LEMI	—	—	—	—	—	—	—	—	1	1	—	—	—	—
partridgefoot	LUPE	—	—	—	—	—	—	—	—	—	—	1	3	—	—
broadleaf lupine	LULA	—	—	—	—	—	—	—	—	—	—	1	1	—	—
bigleaf lupine	LUPO	—	—	—	—	—	—	—	—	2	Tr	2	1	—	—
skunk cabbage	LYAM	—	—	—	—	—	—	—	—	10	17	1	Tr	—	—
northern bluebells	MEPAB	8	2	—	—	—	—	14	Tr	14	3	18	1	15	10
Lewis' monkey-flower	MILE	—	—	—	—	—	—	—	—	2	1	9	1	—	—
littleleaf montia	MOPAP	—	—	—	—	—	—	14	Tr	1	10	2	1	—	—
Indian water-lily	NUPO	—	—	—	—	—	—	—	—	—	—	—	—	—	—
cow-lily	NUVA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
grass-leaved pondweed	POGR3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
floatingleaf pondweed	PONA2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
fanleaf cinquefoil	POFL2	—	—	—	—	—	—	—	—	—	—	5	1	—	—
dotted saxifrage	SAPU	—	—	—	—	8	Tr	—	—	10	3	36	1	5	Tr
arrowleaf groundsel	SETR	10	1	—	—	8	Tr	—	—	37	3	42	1	15	1
western solomonplume	SMRA	26	1	—	—	75	Tr	57	1	19	1	24	1	40	1
starry solomonplume	SMST	50	4	17	10	83	3	29	2	54	2	17	1	65	2
simplestem bur-reed	SPEM	—	—	—	—	—	—	—	—	—	—	—	—	—	—
small bur-reed	SPMI	—	—	—	—	—	—	—	—	—	—	—	—	—	—
bur-reed species	SPARG	—	—	—	—	—	—	—	—	1	Tr	—	—	—	—
claspleaf twisted-stalk	STAM	8	2	—	—	8	Tr	29	1	33	1	45	1	28	2
rosy twisted-stalk	STRO	2	Tr	—	—	—	—	—	—	3	Tr	28	1	5	1
coolwort foamflower	TITRU	4	2	—	—	33	Tr	—	—	21	2	49	2	20	1
false bugbane	TRCA3	8	2	—	—	—	—	—	—	14	4	12	5	18	2
globeflower	TRLA4	2	5	—	—	—	—	—	—	1	1	6	1	—	—
common cattail	TYLA	—	—	—	—	—	—	—	—	3	3	—	—	—	—
Sitka valerian	VASI	—	—	—	—	—	—	—	—	2	1	34	2	10	1
Canadian violet	VICA	10	4	—	—	—	—	14	3	10	3	2	2	10	2
pioneer violet	VIGL	22	2	—	—	58	Tr	14	Tr	35	3	43	2	35	1
round-leaved violet	VIOR2	2	Tr	—	—	8	Tr	—	—	2	Tr	7	2	3	Tr
marsh violet	VIPA2	—	—	—	—	—	—	—	—	1	1	1	Tr	—	—
Grass or grasslike:															
redtop	AGAL	6	6	—	—	—	—	14	Tr	10	3	1	Tr	3	2
spike bentgrass	AGEX	2	4	—	—	8	Tr	—	—	4	1	6	Tr	3	Tr
Idaho bentgrass	AGID	—	—	—	—	—	—	—	—	1	Tr	2	Tr	—	—
Oregon bentgrass	AGOR	—	—	—	—	—	—	—	—	2	1	—	—	—	—
winter bentgrass	AGSC	—	—	—	—	—	—	—	—	4	2	1	Tr	5	1
bluejoint reedgrass	CACA	12	3	—	—	8	Tr	—	—	25	11	7	1	5	2
slimstem reedgrass	CANE3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
bigleaf sedge	CAAM	4	3	—	—	—	—	—	—	8	3	—	—	5	1
Columbia sedge	CAAP3	2	5	—	—	—	—	—	—	—	—	—	—	3	3
water sedge	CAAQA	—	—	—	—	—	—	—	—	1	Tr	—	—	3	Tr
Sitka sedge	CAAQS	—	—	—	—	—	—	—	—	3	12	—	—	—	—
awned sedge	CAAT2	—	—	—	—	—	—	—	—	2	21	—	—	—	—
Buxbaum's sedge	CABU2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cusick's sedge	CACU2	—	—	—	—	—	—	—	—	2	18	—	—	—	—

Species Comparisons by Series—Part 3 (continued)

Species	Code	POTR2 50 plots		QUGA 6 plots		ACCI 12 plots		ACGL 7 plots		ALIN 190 plots		ALSI 121 plots		COST 40 plots	
		CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV
lesser panicled sedge	CADI2	2	Tr	—	—	—	—	—	—	—	—	—	—	—	—
woolly sedge	CALA3	2	3	—	—	—	—	—	—	1	2	—	—	—	—
slender sedge	CALA4	—	—	—	—	—	—	—	—	1	1	—	—	—	—
lenticular sedge	CALE5	2	2	—	—	8	Tr	—	—	5	1	2	Tr	5	1
mud sedge	CALI	—	—	—	—	—	—	—	—	—	—	—	—	—	—
black alpine sedge	CANI2	—	—	—	—	—	—	—	—	—	—	2	Tr	—	—
beaked sedge	CARO2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
russet sedge	CASA2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Holm's sedge	CASCB	—	—	—	—	—	—	—	—	—	—	—	—	—	—
saw-leaved sedge	CASCP2	—	—	—	—	—	—	—	—	4	14	12	1	—	—
showy sedge	CASP	—	—	—	—	—	—	—	—	—	—	2	2	—	—
bladder sedge	CAUT	4	2	—	—	—	—	—	—	17	14	1	1	3	Tr
inflated sedge	CAVE	2	5	—	—	—	—	—	—	2	1	—	—	—	—
wood reed-grass	CILA2	14	1	—	—	8	Tr	29	1	40	3	47	1	40	1
timber oatgrass	DAIN	—	—	—	—	—	—	—	—	—	—	—	—	—	—
tufted hairgrass	DECE	—	—	—	—	—	—	—	—	—	—	1	2	—	—
creeping spike-rush	ELPA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
few-flowered spike-rush	ELPA2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
blue wildrye	ELGL	42	2	83	1	—	—	57	Tr	31	3	16	1	18	Tr
Chamisso cotton-grass	ERCH2	—	—	—	—	—	—	—	—	1	Tr	—	—	—	—
many-spiked cotton-grass	ERPO2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
green-keeled cotton-grass	ERVI	—	—	—	—	—	—	—	—	—	—	—	—	—	—
sheep fescue	FEOVR	—	—	—	—	—	—	—	—	—	—	—	—	—	—
tall mannagrass	GLEL	16	1	—	—	17	Tr	14	Tr	53	5	11	1	30	1
reed mannagrass	GLGR	—	—	—	—	—	—	—	—	2	1	—	—	—	—
western mannagrass	GLOC	—	—	—	—	—	—	—	—	—	—	—	—	—	—
fowl mannagrass	GLST	4	1	—	—	8	Tr	14	1	11	2	1	1	5	6
smooth woodrush	LUHI	—	—	—	—	—	—	—	—	—	—	2	1	—	—
reed canarygrass	PHAR	2	Tr	—	—	—	—	—	—	5	20	—	—	—	—
timothy	PHPR	2	Tr	—	—	—	—	—	—	3	1	—	—	—	—
Kentucky bluegrass	POPR	10	1	50	1	—	—	—	—	7	5	1	Tr	3	2
pale false mannagrass	PUPAM	—	—	—	—	8	Tr	—	—	4	1	1	Tr	—	—
small-fruited bulrush	SCMI	2	Tr	—	—	—	—	—	—	12	7	1	Tr	5	1
softstem bulrush	SCVA	—	—	—	—	—	—	—	—	1	3	—	—	—	—
Ferns and fern allies:															
alpine lady fern	ATDI	—	—	—	—	—	—	—	—	1	1	2	1	3	7
lady fern	ATFI	18	2	—	—	50	11	14	2	49	11	51	9	38	5
wood fern species	DRYOP	—	—	—	—	—	—	—	—	—	—	—	—	—	—
common horsetail	EQAR	48	1	—	—	8	Tr	29	Tr	68	8	30	1	40	9
water horsetail	EQFL	—	—	—	—	—	—	—	—	7	10	—	—	—	—
common scouring-rush	EQHY	40	3	—	—	—	—	29	1	19	4	1	1	18	2
marsh horsetail	EQPA	—	—	—	—	—	—	—	—	—	—	1	10	—	—
wood horsetail	EQSY	—	—	—	—	—	—	—	—	—	—	—	—	—	—
oak fern	GYDR	6	Tr	—	—	25	2	14	1	21	7	44	9	13	7

[a] CON = percentage of plots in which the species occurred.
[b] COV = average canopy cover in plots in which the species occurred.
[c] Tr = trace cover, less than 1 percent canopy cover.

Species Comparisons by Series—Part 4

Species	Code	HEATH 18 plots		OPHO 13 plots		POFR 2 plots		RHAL 2 plots		RUSP 8 plots		SALIX 152 plots		SPDO 22 plots	
		CON[a]	COV[b]	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV
Tree overstory:															
Pacific silver fir	ABAM	6	Tr[c]	23	7	—	—	—	—	38	1	1	Tr	5	5
grand fir	ABGR	—	—	—	—	—	—	—	—	—	—	—	—	5	7
subalpine fir	ABLA2	11	Tr	—	—	—	—	100	8	13	15	7	3	9	4
bigleaf maple	ACMA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
red alder	ALRU	—	—	—	—	—	—	—	—	—	—	—	—	—	—
paper birch	BEPA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alaska yellow-cedar	CHNO	—	—	—	—	—	—	—	—	—	—	1	Tr	—	—
subalpine larch	LALY	6	Tr	—	—	—	—	—	—	—	—	—	—	—	—
western larch	LAOC	—	—	8	Tr	—	—	—	—	—	—	—	—	—	—
Engelmann spruce	PIEN	22	1	8	15	—	—	—	—	—	—	24	4	—	—
whitebark pine	PIAL	6	Tr	—	—	—	—	—	—	—	—	—	—	—	—
lodgepole pine	PICO	—	—	—	—	100	2	—	—	—	—	16	3	—	—
ponderosa pine	PIPO	—	—	—	—	—	—	—	—	—	—	—	—	9	1
quaking aspen	POTR	—	—	—	—	—	—	—	—	—	—	1	1	—	—
black cottonwood	POTR2	—	—	8	Tr	—	—	—	—	—	—	2	2	—	—
Douglas-fir	PSME	—	—	—	—	—	—	—	—	—	—	1	5	5	7
Oregon white oak	QUGA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
western redcedar	THPL	—	—	8	1	—	—	—	—	—	—	1	10	—	—
western hemlock	TSHE	—	—	8	5	—	—	50	2	25	8	—	—	—	—
mountain hemlock	TSME	11	Tr	15	4	—	—	—	—	25	3	1	3	14	3
Shrubs:															
vine maple	ACCI	—	—	15	7	—	—	—	—	—	—	1	Tr	—	—
Douglas maple	ACGLD	—	—	23	14	—	—	—	—	—	—	3	2	—	—
mountain alder	ALIN	—	—	8	5	—	—	—	—	—	—	26	10	32	5
Sitka alder	ALSI	—	—	46	4	—	—	—	—	63	6	15	10	9	8
Saskatoon serviceberry	AMAL	—	—	—	—	—	—	—	—	—	—	5	1	5	3
bog birch	BEGLG	—	—	—	—	—	—	—	—	—	—	16	20	—	—
red-osier dogwood	COST	—	—	8	15	—	—	—	—	—	—	13	6	27	2
California hazel	COCO	—	—	—	—	—	—	—	—	—	—	—	—	5	2
black hawthorn	CRDOD	—	—	—	—	—	—	—	—	—	—	—	—	32	27
oceanspray	HODI	—	—	—	—	—	—	—	—	—	—	1	2	—	—
rusty menziesia	MEFE	—	—	15	3	—	—	50	15	38	3	—	—	5	1
devil's club	OPHO	—	—	100	45	—	—	—	—	13	Tr	1	Tr	—	—
common chokecherry	PRVI	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cascade azalea	RHAL	22	1	23	7	—	—	100	29	50	11	5	4	5	Tr
stink currant	RIBR	—	—	8	25	—	—	—	—	13	15	1	9	—	—
Hudsonbay currant	RIHU	—	—	38	2	—	—	—	—	63	25	7	1	5	6
prickly currant	RILA	—	—	38	2	—	—	50	2	38	2	12	3	—	—
western thimbleberry	RUPA	—	—	69	8	—	—	50	1	38	4	7	6	5	Tr
salmonberry	RUSP	—	—	62	18	—	—	—	—	88	33	5	8	14	3
Bebb willow	SABE	—	—	—	—	—	—	—	—	—	—	7	15	5	2
Booth's willow	SABO2	—	—	—	—	—	—	—	—	—	—	9	26	5	2
Cascade willow	SACA6	11	6	—	—	—	—	—	—	—	—	2	15	—	—
undergreen willow	SACO2	22	3	—	—	—	—	50	1	—	—	14	31	—	—
Drummond's willow	SADR	—	—	—	—	—	—	—	—	—	—	24	42	5	2
coyote willow	SAEX	—	—	—	—	—	—	—	—	—	—	1	30	—	—
Farr's willow	SAFA	6	2	—	—	—	—	—	—	13	1	22	33	—	—
Geyer's willow	SAGEG	—	—	—	—	—	—	—	—	—	—	1	60	—	—
Geyer's willow	SAGEM	—	—	—	—	50	2	—	—	—	—	7	22	—	—
Pacific willow	SALAL	—	—	—	—	—	—	—	—	—	—	3	12	—	—
dusky willow	SAME2	—	—	—	—	—	—	—	—	—	—	7	36	—	—
Piper's willow	SAPI	—	—	—	—	—	—	—	—	—	—	3	47	5	3
tea-leaved willow	SAPLM2	—	—	—	—	—	—	—	—	—	—	11	37	—	—
Mackenzie's willow	SARIM2	—	—	—	—	—	—	—	—	—	—	5	23	—	—
Scouler's willow	SASC	—	—	—	—	—	—	—	—	—	—	6	58	—	—
Sitka willow	SASI2	—	—	8	10	—	—	—	—	25	8	30	47	14	2
Douglas spiraea	SPDO	—	—	—	—	—	—	—	—	—	—	17	25	100	68
common snowberry	SYAL	—	—	8	10	—	—	—	—	—	—	4	2	27	16
Alaska huckleberry	VAAL	6	3	15	8	—	—	—	—	38	4	—	—	9	3
big huckleberry	VAME	6	5	38	3	—	—	100	5	88	2	3	3	9	Tr
oval-leaf huckleberry	VAOV	—	—	8	10	—	—	—	—	13	5	—	—	—	—
Low shrubs and subshrubs:															
bearberry	ARUV														
Merten's moss-heather	CAME	67	17	—	—	—	—	—	—	—	—	1	7	—	—
four-angled moss-heather	CATE2	6	35	—	—	—	—	—	—	—	—	1	1	—	—
bunchberry dogwood	COCA	—	—	8	Tr	—	—	—	—	—	—	3	1	5	5
Labrador tea	LEGL	22	15	—	—	—	—	—	—	13	1	9	4	—	—

Species Comparisons by Series—Part 4 (continued)

Species	Code	HEATH 18 plots		OPHO 13 plots		POFR 2 plots		RHAL 2 plots		RUSP 8 plots		SALIX 152 plots		SPDO 22 plots	
		CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV
twinflower	LIBOL	—	—	15	1	—	—	—	—	—	—	5	2	—	—
myrtle pachistima	PAMY	—	—	8	Tr	—	—	—	—	—	—	6	19	—	—
red mountain-heath	PHEM	100	27	—	—	—	—	50	12	13	Tr	7	1	—	—
shrubby cinquefoil	POFR	—	—	—	—	100	33	—	—	—	—	2	16	—	—
five-leaved bramble	RUPE	6	Tr	15	2	—	—	50	1	38	1	1	3	—	—
dwarf huckleberry	VACA	22	23	—	—	—	—	—	—	—	—	14	7	—	—
Cascade huckleberry	VADE	72	18	—	—	—	—	50	3	—	—	5	2	—	—
low huckleberry	VAMY	—	—	—	—	—	—	50	Tr	—	—	3	1	—	—
grouse huckleberry	VASC	6	2	—	—	—	—	50	10	—	—	5	5	—	—
Perennial forbs:															
deerfoot vanillaleaf	ACTR	—	—	8	Tr	—	—	—	—	25	13	1	5	—	—
baneberry	ACRU	—	—	38	1	—	—	—	—	—	—	4	Tr	5	Tr
wild sarsaparilla	ARNU3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
heart-leaf arnica	ARCO	—	—	8	Tr	—	—	—	—	13	Tr	1	7	—	—
mountain arnica	ARLA	39	1	8	Tr	—	—	50	2	25	Tr	4	1	—	—
wild ginger	ASCA3	—	—	15	14	—	—	—	—	—	—	—	—	—	—
alpine aster	ASAL	11	2	—	—	—	—	50	2	—	—	1	Tr	—	—
twinflower marshmarigold	CABI	22	6	8	1	—	—	50	1	13	1	2	4	5	6
twinflower marshmarigold	CABIR	—	—	—	—	—	—	—	—	—	—	1	1	—	—
queencup beadlily	CLUN	—	—	69	2	—	—	50	Tr	38	Tr	—	—	9	Tr
old man's whiskers	GETR	—	—	31	1	—	—	50	Tr	63	1	13	2	18	Tr
ballhead waterleaf	HYCA	—	—	—	—	—	—	—	—	—	—	1	Tr	—	—
water lentil	LEMI	—	—	—	—	—	—	—	—	—	—	1	1	5	15
partridgefoot	LUPE	67	3	—	—	—	—	—	—	—	—	1	1	—	—
broadleaf lupine	LULA	—	—	—	—	—	—	—	—	—	—	3	4	—	—
bigleaf lupine	LUPO	—	—	—	—	50	1	—	—	—	—	7	2	5	5
skunk cabbage	LYAM	—	—	—	—	—	—	—	—	—	—	2	5	5	5
northern bluebells	MEPAB	—	—	15	2	—	—	—	—	25	1	9	6	23	2
Lewis' monkey-flower	MILE	11	2	—	—	—	—	—	—	25	1	3	1	—	—
littleleaf montia	MOPAP	—	—	8	Tr	—	—	—	—	—	—	—	—	—	—
Indian water-lily	NUPO	—	—	—	—	—	—	—	—	—	—	—	—	—	—
cow-lily	NUVA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
grass-leaved pondweed	POGR3	—	—	—	—	—	—	—	—	—	—	1	Tr	5	1
floatingleaf pondweed	PONA2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
fanleaf cinquefoil	POFL2	78	4	8	1	—	—	50	5	—	—	14	4	5	4
dotted saxifrage	SAPU	28	6	31	Tr	—	—	50	1	75	1	14	3	—	—
arrowleaf groundsel	SETR	44	1	15	Tr	—	—	100	2	50	Tr	29	3	—	—
western solomonplume	SMRA	—	—	23	5	—	—	—	—	13	5	3	2	—	—
starry solomonplume	SMST	—	—	38	Tr	—	—	—	—	13	Tr	9	1	9	2
simplestem bur-reed	SPEM	—	—	—	—	—	—	—	—	—	—	—	—	5	Tr
small bur-reed	SPMI	—	—	—	—	—	—	—	—	—	—	1	Tr	—	—
bur-reed species	SPARG	—	—	—	—	—	—	—	—	—	—	—	—	—	—
claspleaf twisted-stalk	STAM	—	—	62	1	—	—	50	Tr	38	Tr	3	1	—	—
rosy twisted-stalk	STRO	6	Tr	31	1	—	—	—	—	63	1	2	1	5	Tr
coolwort foamflower	TITRU	—	—	92	5	—	—	50	1	75	2	3	6	5	Tr
false bugbane	TRCA3	—	—	8	5	—	—	—	—	—	—	2	1	—	—
globeflower	TRLA4	17	5	—	—	—	—	50	15	—	—	10	6	—	—
common cattail	TYLA	—	—	—	—	—	—	—	—	—	—	1	2	9	3
Sitka valerian	VASI	56	3	23	1	—	—	50	10	63	3	14	10	5	Tr
Canadian violet	VICA	—	—	—	—	—	—	—	—	—	—	1	7	—	—
pioneer violet	VIGL	—	—	77	1	—	—	—	—	63	1	18	4	9	1
round-leaved violet	VIOR2	6	Tr	—	—	—	—	50	Tr	13	Tr	1	Tr	5	60
marsh violet	VIPA2	—	—	—	—	—	—	—	—	—	—	3	2	5	30
Grass or grasslike:															
redtop	AGAL	—	—	—	—	—	—	—	—	—	—	4	2	—	—
spike bentgrass	AGEX	—	—	—	—	—	—	50	1	13	Tr	8	1	9	1
Idaho bentgrass	AGID	11	Tr	—	—	—	—	—	—	—	—	3	2	5	20
Oregon bentgrass	AGOR	—	—	—	—	100	2	—	—	—	—	1	Tr	—	—
winter bentgrass	AGSC	—	—	—	—	100	2	—	—	—	—	10	2	5	5
bluejoint reedgrass	CACA	17	2	—	—	50	7	—	—	—	—	50	10	50	31
slimstem reedgrass	CANE3	—	—	—	—	50	3	—	—	—	—	1	3	—	—
bigleaf sedge	CAAM	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Columbia sedge	CAAP3	—	—	—	—	—	—	—	—	—	—	2	22	—	—
water sedge	CAAQA	—	—	—	—	—	—	50	2	—	—	5	11	—	—
Sitka sedge	CAAQS	—	—	—	—	50	2	—	—	—	—	7	32	5	1
awned sedge	CAAT2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Buxbaum's sedge	CABU2	—	—	—	—	—	—	—	—	—	—	1	10	—	—
Cusick's sedge	CACU2	—	—	—	—	—	—	—	—	—	—	1	9	5	2

Species Comparisons by Series—Part 4 (continued)

Species	Code	HEATH 18 plots		OPHO 13 plots		POFR 2 plots		RHAL 2 plots		RUSP 8 plots		SALIX 152 plots		SPDO 22 plots	
		CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV
lesser panicled sedge	CADI2	—	—	—	—	—	—	—	—	—	—	1	20	—	—
woolly sedge	CALA3	—	—	—	—	50	2	—	—	—	—	2	Tr	14	1
slender sedge	CALA4	—	—	—	—	—	—	—	—	—	—	3	21	—	—
lenticular sedge	CALE5	—	—	8	Tr	—	—	—	—	—	—	9	7	9	10
mud sedge	CALI	—	—	—	—	—	—	—	—	—	—	3	9	—	—
black alpine sedge	CANI2	83	10	—	—	—	—	50	2	13	1	11	11	—	—
beaked sedge	CARO2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
russet sedge	CASA2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Holm's sedge	CASCB	6	1	—	—	—	—	—	—	—	—	9	18	5	1
saw-leaved sedge	CASCP2	22	1	—	—	—	—	—	—	—	—	26	28	5	Tr
showy sedge	CASP	50	3	—	—	—	—	50	1	—	—	8	9	—	—
bladder sedge	CAUT	—	—	—	—	100	19	—	—	—	—	37	21	9	9
inflated sedge	CAVE	—	—	—	—	—	—	—	—	—	—	5	9	9	13
wood reed-grass	CILA2	—	—	23	1	—	—	50	Tr	38	Tr	10	3	—	—
timber oatgrass	DAIN	17	6	—	—	100	4	—	—	—	—	5	7	—	—
tufted hairgrass	DECE	6	Tr	—	—	100	23	—	—	—	—	4	1	—	—
creeping spike-rush	ELPA	—	—	—	—	—	—	—	—	—	—	1	1	—	—
few-flowered spike-rush	ELPA2	6	Tr	—	—	—	—	—	—	—	—	2	16	—	—
blue wildrye	ELGL	—	—	—	—	—	—	50	1	13	Tr	10	1	5	Tr
Chamisso cotton-grass	ERCH2	—	—	—	—	—	—	—	—	—	—	2	1	—	—
many-spiked cotton-grass	ERPO2	11	3	—	—	—	—	—	—	—	—	4	12	5	1
green-keeled cotton-grass	ERVI	—	—	—	—	—	—	—	—	—	—	3	3	—	—
sheep fescue	FEOVR	—	—	—	—	—	—	—	—	—	—	2	5	—	—
tall mannagrass	GLEL	—	—	—	—	—	—	—	—	13	1	10	5	—	—
reed mannagrass	GLGR	—	—	—	—	—	—	—	—	—	—	2	27	—	—
western mannagrass	GLOC	—	—	—	—	—	—	—	—	—	—	—	—	—	—
fowl mannagrass	GLST	—	—	—	—	—	—	—	—	—	—	2	2	5	1
smooth woodrush	LUHI	56	3	8	1	—	—	—	—	13	Tr	3	1	—	—
reed canarygrass	PHAR	—	—	—	—	—	—	—	—	—	—	3	1	14	2
timothy	PHPR	—	—	—	—	100	2	—	—	—	—	2	1	—	—
Kentucky bluegrass	POPR	—	—	—	—	100	4	—	—	—	—	3	Tr	5	Tr
pale false mannagrass	PUPAM	—	—	—	—	—	—	—	—	—	—	3	Tr	5	2
small-fruited bulrush	SCMI	—	—	—	—	—	—	—	—	—	—	11	5	23	12
softstem bulrush	SCVA	—	—	—	—	—	—	—	—	—	—	1	7	—	—
Ferns and fern allies:															
alpine lady fern	ATDI	—	—	—	—	—	—	—	—	13	Tr	—	—	—	—
lady fern	ATFI	6	Tr	92	12	—	—	50	Tr	75	27	11	1	9	3
wood fern species	DRYOP	—	—	—	—	—	—	—	—	—	—	—	—	—	—
common horsetail	EQAR	17	Tr	8	Tr	50	1	50	7	13	1	33	5	32	2
water horsetail	EQFL	—	—	—	—	—	—	—	—	—	—	8	2	5	5
common scouring-rush	EQHY	—	—	8	Tr	—	—	—	—	—	—	1	Tr	—	—
marsh horsetail	EQPA	6	Tr	—	—	—	—	—	—	—	—	1	2	—	—
wood horsetail	EQSY	—	—	—	—	—	—	—	—	—	—	—	—	—	—
oak fern	GYDR	—	—	85	18	—	—	50	5	88	7	4	1	5	Tr

[a] CON = percentage of plots in which the species occurred.
[b] COV = average canopy cover in plots in which the species occurred.
[c] Tr = trace cover, less than 1 percent canopy cover.

Species Comparisons by Series—Part 5

Species	Code	SYAL 2 plots		AQUATIC 61 plots		FORB 29 plots		MEADOW 256 plots	
		CON[a]	COV[b]	CON	COV	CON	COV	CON	COV
Tree overstory:									
Pacific silver fir	ABAM	—	—	—	—	10	5	—	—
grand fir	ABGR	—	—	—	—	—	—	—	—
subalpine fir	ABLA2	—	—	—	—	17	5	4	2
bigleaf maple	ACMA	—	—	—	—	—	—	—	—
red alder	ALRU	—	—	—	—	—	—	—	—
paper birch	BEPA	—	—	—	—	—	—	—	—
Alaska yellow-cedar	CHNO	—	—	—	—	—	—	—	—
subalpine larch	LALY	—	—	—	—	—	—	—	—
western larch	LAOC	—	—	—	—	—	—	—	—
Engelmann spruce	PIEN	—	—	—	—	17	4	6	3
whitebark pine	PIAL	—	—	—	—	—	—	—	—
lodgepole pine	PICO	—	—	—	—	—	—	3	2
ponderosa pine	PIPO	—	—	—	—	—	—	Tr[c]	Tr
quaking aspen	POTR	—	—	—	—	—	—	—	—
black cottonwood	POTR2	—	—	—	—	3	10	—	—
Douglas-fir	PSME	—	—	—	—	—	—	—	—
Oregon white oak	QUGA	—	—	—	—	—	—	—	—
western redcedar	THPL	—	—	—	—	—	—	Tr	3
western hemlock	TSHE	—	—	—	—	—	—	—	—
mountain hemlock	TSME	—	—	—	—	3	3	Tr	Tr
Shrubs:									
vine maple	ACCI	—	—	—	—	3	1	—	—
Douglas maple	ACGLD	50	5	—	—	7	13	—	—
mountain alder	ALIN	—	—	11	3	17	1	13	4
Sitka alder	ALSI	—	—	2	1	21	6	1	4
Saskatoon serviceberry	AMAL	50	5	—	—	3	Tr	1	Tr
bog birch	BEGLG	—	—	3	3	—	—	4	5
red-osier dogwood	COST	100	3	7	1	7	5	5	1
California hazel	COCO	50	35	—	—	—	—	—	—
black hawthorn	CRDOD	50	1	—	—	—	—	—	—
oceanspray	HODI	—	—	—	—	—	—	—	—
rusty menziesia	MEFE	—	—	—	—	17	5	Tr	Tr
devil's club	OPHO	—	—	—	—	7	2	—	—
common chokecherry	PRVI	—	—	—	—	—	—	—	—
Cascade azalea	RHAL	—	—	—	—	21	4	5	1
stink currant	RIBR	—	—	—	—	3	1	—	—
Hudsonbay currant	RIHU	—	—	2	1	—	—	2	Tr
prickly currant	RILA	—	—	2	1	34	4	2	3
western thimbleberry	RUPA	—	—	—	—	24	1	Tr	5
salmonberry	RUSP	—	—	—	—	3	15	Tr	7
Bebb's willow	SABE	—	—	7	Tr	—	—	7	1
Booth's willow	SABO2	—	—	2	Tr	—	—	2	3
Cascade willow	SACA6	—	—	—	—	—	—	2	4
undergreen willow	SACO2	—	—	—	—	10	7	4	2
Drummond's willow	SADR	—	—	2	2	—	—	10	2
coyote willow	SAEX	—	—	—	—	—	—	Tr	3
Farr's willow	SAFA	—	—	—	—	3	17	13	4
Geyer's willow	SAGEG	—	—	2	2	—	—	—	—
Geyer's willow	SAGEM	—	—	—	—	—	—	2	1
Pacific willow	SALAL	—	—	2	2	—	—	Tr	2
dusky willow	SAME2	—	—	—	—	—	—	1	1
Piper's willow	SAPI	—	—	—	—	—	—	1	2
tea-leaved willow	SAPLM2	—	—	—	—	—	—	6	5
Mackenzie's willow	SARIM2	50	15	3	1	—	—	2	1
Scouler's willow	SASC	—	—	—	—	—	—	1	Tr
Sitka willow	SASI2	—	—	3	1	3	1	4	2
Douglas spiraea	SPDO	50	2	5	4	—	—	6	2
common snowberry	SYAL	100	65	—	—	7	1	1	3
Alaska huckleberry	VAAL	—	—	2	Tr	14	2	1	1
big huckleberry	VAME	—	—	—	—	28	2	4	1
oval-leaf huckleberry	VAOV	—	—	—	—	—	—	—	—
Low shrubs and subshrubs:									
bearberry	ARUV								
Merten's moss-heather	CAME	—	—	—	—	3	Tr	7	2
four-angled moss-heather	CATE2	—	—	—	—	—	—	2	2
bunchberry dogwood	COCA	—	—	—	—	7	1	Tr	Tr
Labrador tea	LEGL	—	—	—	—	7	1	6	2

Species Comparisons by Series—Part 5 (continued)

		SYAL 2 plots		AQUATIC 61 plots		FORB 29 plots		MEADOW 256 plots	
Species	Code	CON	COV	CON	COV	CON	COV	CON	COV
twinflower	LIBOL	—	—	—	—	7	Tr	1	1
myrtle pachistima	PAMY	—	—	—	—	14	Tr	Tr	1
red mountain-heath	PHEM	—	—	—	—	14	3	16	3
shrubby cinquefoil	POFR	—	—	—	—	—	—	1	3
five-leaved bramble	RUPE	—	—	2	Tr	3	1	1	Tr
dwarf huckleberry	VACA	—	—	—	—	3	1	13	6
Cascade huckleberry	VADE	—	—	—	—	7	4	8	4
low huckleberry	VAMY	—	—	2	Tr	7	1	2	1
grouse huckleberry	VASC	—	—	—	—	10	2	4	2
Perennial forbs:									
deerfoot vanillaleaf	ACTR	—	—	—	—	3	1	—	—
baneberry	ACRU	—	—	—	—	17	1	1	Tr
wild sarsaparilla	ARNU3	—	—	—	—	—	—	Tr	1
heart-leaf arnica	ARCO	50	2	—	—	17	1	—	—
mountain arnica	ARLA	—	—	—	—	41	3	4	1
wild ginger	ASCA3	—	—	2	Tr	—	—	Tr	2
alpine aster	ASAL	—	—	—	—	10	5	1	3
twinflower marshmarigold	CABI	—	—	—	—	21	12	10	4
twinflower marshmarigold	CABIR	—	—	—	—	7	37	Tr	3
queencup beadlily	CLUN	—	—	—	—	17	4	—	—
old man's whiskers	GETR	—	—	5	1	28	1	2	Tr
ballhead waterleaf	HYCA	—	—	—	—	—	—	—	—
water lentil	LEMI	—	—	25	15	—	—	4	6
partridgefoot	LUPE	—	—	—	—	10	7	7	3
broadleaf lupine	LULA	—	—	—	—	7	58	2	2
bigleaf lupine	LUPO	—	—	—	—	7	Tr	3	2
skunk cabbage	LYAM	—	—	2	5	—	—	Tr	2
northern bluebells	MEPAB	50	1	—	—	10	Tr	2	1
Lewis' monkey-flower	MILE	—	—	—	—	21	17	2	4
littleleaf montia	MOPAP	—	—	—	—	—	—	—	—
indian water-lily	NUPO	—	—	20	24	—	—	2	1
cow-lily	NUVA	—	—	5	11	—	—	—	—
grass-leaved pondweed	POGR3	—	—	3	38	—	—	Tr	7
floatingleaf pondweed	PONA2	—	—	10	27	—	—	2	2
fanleaf cinquefoil	POFL2	—	—	—	—	24	4	20	3
dotted saxifrage	SAPU	—	—	—	—	59	7	5	3
arrowleaf groundsel	SETR	50	Tr	—	—	66	5	13	3
western solomonplume	SMRA	50	2	—	—	10	1	—	—
starry solomonplume	SMST	100	2	—	—	10	Tr	2	1
simplestem bur-reed	SPEM	—	—	23	14	—	—	2	2
small bur-reed	SPMI	—	—	18	23	—	—	1	Tr
bur-reed species	SPARG	—	—	5	25	—	—	1	1
claspleaf twisted-stalk	STAM	—	—	2	Tr	59	2	2	1
rosy twisted-stalk	STRO	—	—	2	Tr	28	7	1	3
coolwort foamflower	TITRU	—	—	—	—	41	8	1	1
false bugbane	TRCA3	—	—	2	Tr	7	2	1	1
globeflower	TRLA4	—	—	—	—	21	13	6	6
common cattail	TYLA	—	—	31	36	—	—	6	2
Sitka valerian	VASI	—	—	—	—	62	9	9	5
Canadian violet	VICA	50	1	—	—	—	—	1	2
pioneer violet	VIGL	—	—	2	Tr	59	2	4	6
round-leaved violet	VIOR2	—	—	—	—	10	1	2	6
marsh violet	VIPA2	—	—	—	—	—	—	1	1
Grass and grasslike:									
redtop	AGAL	—	—	—	—	3	Tr	4	11
spike bentgrass	AGEX	—	—	2	Tr	10	2	2	Tr
Idaho bentgrass	AGID	—	—	—	—	—	—	1	1
Oregon bentgrass	AGOR	—	—	—	—	—	—	4	8
winter bentgrass	AGSC	—	—	2	Tr	—	—	6	2
bluejoint reedgrass	CACA	—	—	3	Tr	7	5	36	12
slimstem reedgrass	CANE3	—	—	—	—	—	—	1	2
bigleaf sedge	CAAM	—	—	—	—	—	—	1	3
Columbia sedge	CAAP3	—	—	—	—	—	—	2	28
water sedge	CAAQA	—	—	5	17	—	—	4	21
Sitka sedge	CAAQS	—	—	3	4	—	—	7	25
awned sedge	CAAT2	—	—	3	5	—	—	2	31
Buxbaum's sedge	CABU2	—	—	—	—	—	—	3	18
Cusick's sedge	CACU2	—	—	10	6	—	—	5	18

Species Comparisons by Series—Part 5 (continued)

Species	Code	SYAL 2 plots		AQUATIC 61 plots		FORB 29 plots		MEADOW 256 plots	
		CON[a]	COV[b]	CON	COV	CON	COV	CON	COV
lesser panicled sedge	CADI2	—	—	2	2	—	—	2	3
woolly sedge	CALA3	—	—	—	—	—	—	Tr	3
slender sedge	CALA4	—	—	13	3	—	—	7	28
lenticular sedge	CALE5	50	Tr	7	1	7	1	10	10
mud sedge	CALI	—	—	—	—	—	—	6	10
black alpine sedge	CANI2	—	—	—	—	24	4	24	30
beaked sedge	CARO2	—	—	3	2	—	—	2	45
russet sedge	CASA2	—	—	—	—	—	—	4	20
Holm's sedge	CASCB	—	—	—	—	7	2	17	26
saw-leaved sedge	CASCP2	—	—	2	Tr	10	2	18	24
showy sedge	CASP	—	—	—	—	14	5	9	27
bladder sedge	CAUT	—	—	48	6	—	—	43	33
inflated sedge	CAVE	—	—	11	10	—	—	9	34
wood reed-grass	CILA2	—	—	—	—	31	3	—	—
timber oatgrass	DAIN	—	—	—	—	—	—	8	10
tufted hairgrass	DECE	—	—	—	—	3	Tr	7	17
creeping spike-rush	ELPA	—	—	33	14	—	—	7	2
few-flowered spike-rush	ELPA2	—	—	—	—	—	—	13	26
blue wildrye	ELGL	100	2	—	—	—	—	2	2
Chamisso cotton-grass	ERCH2	—	—	—	—	—	—	2	10
many-spiked cotton-grass	ERPO2	—	—	—	—	—	—	18	14
green-keeled cotton-grass	ERVI	—	—	—	—	—	—	7	11
sheep fescue	FEOVR	—	—	—	—	—	—	1	29
tall mannagrass	GLEL	50	Tr	10	2	14	Tr	6	9
reed mannagrass	GLGR	—	—	2	50	—	—	2	9
western mannagrass	GLOC	—	—	2	35	—	—	1	1
fowl mannagrass	GLST	—	—	2	Tr	7	2	5	5
smooth woodrush	LUHI	—	—	—	—	21	Tr	10	2
reed canarygrass	PHAR	50	Tr	10	1	—	—	2	21
timothy	PHPR	—	—	—	—	—	—	5	4
Kentucky bluegrass	POPR	—	—	—	—	—	—	5	7
pale false mannagrass	PUPAM	50	Tr	10	19	—	—	4	2
small-fruited bulrush	SCMI	—	—	7	3	—	—	7	23
softstem bulrush	SCVA	—	—	8	32	—	—	1	4
Ferns and fern allies:									
alpine lady fern	ATDI	—	—	—	—	7	25	Tr	1
lady fern	ATFI	—	—	2	Tr	38	35	4	3
wood fern species	DRYOP	—	—	—	—	—	—	—	—
common horsetail	EQAR	50	1	2	Tr	17	7	18	2
water horsetail	EQFL	—	—	38	23	—	—	9	4
common scouring-rush	EQHY	50	1	—	—	—	—	4	2
marsh horsetail	EQPA	—	—	—	—	7	3	1	1
wood horsetail	EQSY								
oak fern	GYDR	—	—	2	Tr	31	33	Tr	3

[a] CON = percentage of plots in which the species occurred.
[b] COV = average canopy cover in plots in which the species occurred.
[c] Tr = trace cover, less than 1 percent canopy cover.

APPENDIX H: Aquatic, Riparian, and Wetland Field Form

General Location _____

_____

Observer _____ Plot# _____ Date _____/_____/_____

Forest _____ District _____ Watershed _____ Northing _____ Easting _____

Elevation ___ feet Valley Aspect _____ degrees

Crown Cover Class	Valley Shape	Valley Gradient	Valley Width	Valley Side Slope
Trace = 1 or 2 plants	1000 = U-shaped	100 = <1%	10 = >300 m	1 = <30%
Scarce = <1%	2000 = V-shaped	200 = 1–3%	20 = 100–300 m	2 = 30–60%
Common = 1–5%	5000 = canyon	300 = 4–5%	30 = 30–100 m	3 = >60%
Well represented = 5–25%		400 = 6–8%	40 = 10–30 m	
Abundant = 25–50%		500 = >8%	50 = <10 m	
Dominant = 50–75%				
Pure = >75%				

Valley, stream, fluvial surface, and plant association cross-section sketch_____

Trees	% Cover OS	% Cover US		% Cover OS	% Cover US
(ABAM) Pacific silver fir	_____	_____	(POTR) Quaking aspen	_____	_____
(ABGR) Grand fir	_____	_____	(POTR2) Black cottonwood	_____	_____
(ABLA2) Subalpine fir	_____	_____	(PSME) Douglas-fir	_____	_____
(ACMA) Bigleaf maple	_____	_____	(QUGA) Oregon white oak	_____	_____
(ALRU) Red alder	_____	_____	(THPL) Western redcedar	_____	_____
(BEPA) Paper birch	_____	_____	(TSHE) Western hemlock	_____	_____
(LALY) Subalpine larch	_____	_____	(TSME) Mountain hemlock	_____	_____
(PICO) Lodgepole pine	_____	_____	Other trees _____	_____	_____
(PIPO) Ponderosa pine	_____	_____	Other trees _____	_____	_____
(PIEN) Engelmann spruce	_____	_____	Overhanging trees _____	_____	_____

Shrubs and Subshrubs	**% Cover**
(ACCI) Vine maple	_____
(ACGLD) Douglas maple	_____
(ALIN) Mountain alder	_____
(ALSI) Sitka alder	_____
(AMAL) Serviceberry	_____
(CAME) Merten's moss-heather+	_____
(COCA) Bunchberry dogwood	_____
(COCO2) California hazel	_____
(COST) Red-osier dogwood	_____
(CRDOD) Douglas hawthorn	_____
(LEGL) Labrador tea	_____
(LIBOL) Twinflower	_____
(PAMY) Myrtle pachistima	_____
(PHEM) Red mountain-heath+	_____
(POFR) Shrubby cinquefoil	_____
(PRVI) Chokecherry	_____
(MEFE) Rusty menziesia	_____
(OPHO) Devil's club	_____
(RHAL) Cascade azalea	_____
(RIBR) Stink current	_____
(RILA) Prickly currant	_____
(RIHU) Hudsonbay currant	_____
(RULA) Dwarf bramble	_____
(RUSP) Salmonberry	_____
(SACO2) Undergreen willow	_____
Willow species >5 feet tall	_____
Willow species <5 feet tall	_____
(SPDO) Douglas spiraea+	_____
(SYAL) Common snowberry	_____
(VAAL) Alaska huckleberry	_____
(VACA) Dwarf huckleberry	_____
(VADE) Cascade huckleberry	_____
(VASC) Grouse huckleberry	_____
(VAME) Big huckleberry	_____
(VAMY) Low huckleberry	_____
Other shrubs _____	_____
Other shrubs _____	_____
Other shrubs _____	_____

Grasses	**% Cover**
(CACA) Bluejoint reedgrass	_____
(DECE) Tufted hairgrass	_____
(FEOVR) Sheep fescue	_____
(GLBO) Northern mannagrass+	_____
(GLEL) Tall mannagrass+	_____
(DAIN) Timber oatgrass	_____
(POPR) Kentucky bluegrass	_____
(PHAR) Reed canarygrass	_____
Other grasses _____	_____
Other grasses _____	_____

Grasslike	**% Cover**
(CAAP3) Columbia sedge	_____
(CAAQ) Aquatic sedge+	_____
(CAAT) Awned sedge	_____
(CABU2) Buxbaum's sedge	_____
(CACU2) Cusick's sedge	_____
(CADI) Soft-leaved sedge	_____
(CAIL) Sheep sedge	_____
(CALA3) Woolly sedge	_____
(CALA4) Slender sedge	_____
(CALE5) Lenticular sedge	_____
(CALI) Mud sedge+	_____
(CANI2) Black alpine sedge	_____
(CARO2) Beaked sedge	_____
(CASA2) Russet sedge	_____
(CASCB) Holm's sedge	_____
(CASCP2) Saw-leaved sedge	_____
(CASP) Showy sedge	_____
(CAUT) Bladder sedge	_____
(CAVE) Inflated sedge	_____
(ELPA) Creeping spike-rush	_____
(ELPA2) Few-flowered spike-rush	_____
(ERPO2) Many-spiked cotton-grass+	_____
(LUHI) Smooth woodrush	
(SCMI) Small-fruited bulrush	_____
(SCVA) Softstem bulrush+	_____
Other grasslike _____	_____
Other grasslike _____	_____
Other grasslike _____	_____

Forbs, Ferns and Fern Allies	**% Cover**
(ACTR) Deerfoot vanillaleaf	_____
(ARLA) Mountain arnica	_____
(ARNU3) Wild sarsaparilla	_____
(ASCA3) Wild ginger	_____
(ATFI) Lady fern+	_____
(CABI) Twinflower marshmarigold+	_____
(CLUN) Queencup beadlily	_____
(EQUIS) Horsetail species	_____
(EQFL) Water horsetail	_____
(EQHY) Common scouring-rush	_____
(GYDR) Oak fern	_____
(LULA) Broadleaf lupine+	_____
(LYAM) Skunk-cabbage	_____
(MILE) Lewis' monkey-flower	_____
(NUPO) Indian water-lily+	_____
(POAM2) Water ladysthumb	_____
(POPU) Skunkleaf polemonium	_____
(POTAM) Pondweed species	_____
(SAPU) Dotted saxifrage+	_____
(SPARG) Bur-reed species	_____
(SETR) Arrowleaf groundsel	_____
(STAMC) Claspleaf twisted-stalk	_____
(STRO) Rosy twisted-stalk	_____
(TITRU) Coolwort foamflower	_____
(TRCA3) False bugbane	_____
(TRLA4) Globeflower	_____
(TYLA) Common cattail	_____
Other forbs _____	_____
Other forbs _____	_____
Other forbs _____	_____

Duff and Litter _____
Fresh Alluvial Deposition _____

Plant Association _____

Community Type _____

Condition Class
5 = existing vegetation similar to association guide
4 = intermediate between 5 and 3
3 = cover of native dominants codominant with increasers
2 = intermediate between 3 and 1
1 = community dominated by nonnative spp. or increasers

+ indicates similar species can also be indicators of a plant association. See series chapter information for details.

GLOSSARY

abandoned (meander) channel—A former stream or river channel that has been cut off from the rest of the stream or river and often lacks year-long standing water.

abundant—When relating to plant coverage in the association key, any species having a canopy coverage of 25 percent or more in a stand.

accidental (incidental)—A species that is found rarely or occasionally as scattered individuals in an association (often as a random or chance occurrence).

aerobic—Conditions in which molecular oxygen is present in the soil environment.

alkaline—Water or soil with a pH greater than 7.4.

alluvial soil—Sediments (clay, silt, sand, gravel, cobbles, and boulders) deposited by running water, ordinarily occurring on floodplains but also on terraces during larger flood events.

alluvial terrace—Deposits of alluvial soil that mark former floodplains. Typically, a floodplain may have several sets of terraces at different elevations and of different ages (the higher the elevation, the older the age).

alluvium—An accumulation of sediments deposited by streams and rivers.

alpine—Elevation ranges found above the upper limits of (erect) tree growth.

anaerobic—A condition in which molecular oxygen is absent from the soil environment. This commonly occurs in wetlands, especially bogs, where soils experience prolonged saturation by water.

Andisols—Thick mineral soils developed in volcanic ash, cinders, other volcanic ejecta, or volcaniclastic materials.

aquatic ecosystem—The stream channel or lake bed, the water, and the vegetative communities associated with them, forming an interacting system.

association—See plant association.

available water holding capacity—The capacity of a soil to hold water in a form available to plants, expressed in inches of water per inch of soil depth. Commonly defined as the amount of water held between field capacity and wilting point. The classes are (1) Low = 0 to 0.12; (2) Moderate = 0.13 to 0.17; and (3) High >0.17

backwater areas—Seasonal or permanent water bodies found in the lowest parts of floodplains.

bank—The sloping land bordering a channel. The bank has a steeper slope than the bottom of the channel and is usually steeper than the land surrounding the channel.

bars (alluvial)—An elongated landform formed by waves and currents, usually running parallel to the shore and composed predominantly of unconsolidated sand, gravel, stones, cobbles, or stone. Examples include:

point bars—Bars that are formed on the inside of meander channels.

side bars—Bars that are formed along the edges of relatively straight sections of rivers

midchannel bars—Bars found within the channel that become more noticeable during low flow periods.

***delta bars*—**Bars formed immediately downstream of the main confluences of a tributary and the main channel.

basal area—The area of the cross section of a tree trunk 4.5 feet above the ground, usually expressed as the sum of tree basal areas in square feet per acre.

basin—A depression or hollow in the land. It is surrounded by higher ground.

beaver dams—Dams built by beavers that span the stream channel. In general, water is still flowing through the riparian wetland system.

bog—A soil and vegetation complex in which the lower parts are dead peat, gradually changing upwards to living plant tissues. This soil is usually saturated, relatively acidic, and dominated at ground level by mosses. Bogs may be either forested or open. They are distinguished from swamps and fens by the dominance of mosses and the presence of peat deposits. Bogs are usually a sphagnum moss-dominated community whose only water source is rainwater. Bogs are extremely low in nutrients, form acidic peat soil, and are a northern phenomenon generally associated with low temperatures, anaerobic conditions, and short growing seasons. Similar conditions dominated by other mosses or with water sources from cold, anaerobic, nutrient-poor seep water are common in eastern Washington.

browse—Shrubby or woody forage consumed by wildlife.

canopy cover—The ground area covered by the generalized outline of an individual plant's foliage, or collectively covered by all individuals of a species within a stand or sample area. Canopy coverage is expressed as a percentage of the total area of the plot.

(average) canopy cover—Refers to the "average" canopy cover of a particular species for the stands in which it was recorded. For example, the number of stands sampled for a particular plant association may be 20. However, a particular species may occur in only 7 of the 20 stands. The average canopy cover therefore represents the "average" canopy cover of that species in the seven stands.

canyon—A long, deep, narrow, very steep-sided valley with high and precipitous walls and high local relief.

capillary fringe—A zone immediately above the water table in which water is drawn upward from the water table by capillary action.

carr—Shrub-dominated wetlands on organic soil. It is also referred to as a shrub carr. Carrs in eastern Washington are typically dominated by willows and mountain alder. Other communities are dominated by species such as red-osier dogwood or Douglas spiraea. Peat or other mosses are sometimes present.

caudex—A short, more or less vertical, often woody, persistent stem at or just beneath the ground surface.

channel—An open conduit either naturally or artificially created that periodically or continuously contains moving water, or that forms a connecting link between two bodies of standing water.

classification—The orderly arrangement of objects according to their differences and similarities.

clay—Soil with rock fragments less than 0.002 mm in diameter.

climax—Climax is usually defined as the plant community that will come to occupy a site under existing climate, soils, and topography conditions. It is the "stable state" where change in the vegetation is minimal over time and competition is so great from dominant species that "invaders" are excluded and "increasers" are held to low levels.

climax species—A species that is self-regenerating in the absence of disturbance, with no evidence of replacement by other species.

cobbles—Soils with rock fragments 3 to 10 inches in diameter.

colluvial—Pertaining to material transported and deposited by gravitational action and local unconcentrated runoff at the base of steep slopes.

colluvium—Unconsolidated earth material deposited on and at the base of steep slopes by gravitational action and local unconcentrated runoff on and at the base of steep slopes.

common—When relating to plant coverage, any species having a canopy coverage of 1 percent or more in a stand.

community (plant community)—An assemblage of plants occurring together at any point in time, thus denoting no particular ecological status.

community type—An aggregation of all plant communities distinguished by floristic and structural similarities in both overstory and undergrowth layers. In this classification, it is used to name naturalized riparian communities such as reed canarygrass or seral communities such as small-fruited bulrush.

constancy—The percentage of sampled stands in which a species occurs.

crown—The leafy top of a shrub or tree.

depauperate—Describing an unusually sparse coverage of undergrowth vegetation. This condition usually develops beneath an especially dense forest canopy, often on sites having a deep layer of duff.

disturbed—Directly or indirectly altered, by humans, from a natural condition, yet retaining some natural characteristics.

diversity—The number and amount of species in a community per unit area.

dominant—The species controlling the environment.

drained—A condition in which ground or surface water has been removed by artificial means.

ecological status—The degree of departure of the current vegetation from climax. The cause of departure is not considered; therefore, ecological status may include, but is not limited to, the concept of range condition. The only consideration is the difference in species density and composition between existing and climax vegetation. Three classes are used: Climax/Late Seral, Mid Seral, and Early Seral.

ecosystem—A complete interacting system of organisms and their environment.

ecotone—The boundary between adjacent plant communities.

edaphic—The climactic status owing to soil or topography rather than climate.

emergent plant—A rooted herbaceous plant species that has parts extending above a water surface.

emergent wetland (Cowardin et al. 1979)—A class of wetland habitats characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens.

Entisol—Soils that have little or no evidence of horizon development, usually as a result of recent flood deposition. Entisols encountered during this study belong to the Cryofluvent subgroup.

ephemeral stream—A stream or stretch of stream that flows only in response to precipitation. It receives no water from springs and no long-continued supply from melting snow or other surface source. Its stream channel is at all times above the water table. These streams do not normally flow for more than 30 days.

epipedon—Diagnostic soil surfaces formed at the soil surface.

erosion—The wearing of land surfaces by running water, waves, moving ice and wind, or by such processes as mass wasting and corrosion.

facultative plants (FAC)—A plant species that is equally likely to occur in wetlands or nonwetlands (estimated probability 1 to 33 percent).

facultative upland plants (FACU)—A plant species that usually occurs in nonwetlands (estimated probability 67 to 99 percent), but is occasionally found in wetlands (estimated probability 1 to 33 percent).

facultative wetland plants (FACW)—A plant species that usually occurs in wetlands (estimated probability 67 to 99 percent), but is occasionally found in nonwetlands (estimated probability 1 to 33 percent).

fen—A peatland dominated by graminoids, sometimes with sparse scattered shrubs or trees. The water table is at the surface most of the year. There may be a flow of groundwater upward through the peat. The soils are usually circumneutral and mineral- and oxygen-rich and intergrade with bog and marsh.

flooded—A condition in which the soil surface is temporarily covered with flowing water from any source, such as streams overflowing their banks and runoff from adjacent surrounding slopes.

floodplain—The nearly level alluvial plain that borders a stream. It is usually a constructional landform built of recent sediment deposited during overflow and lateral migration of the stream. In this classification it refers to the alluvial plain immediately adjacent to the stream influenced by 1- to 3-year flooding.

flood storage—The process by which peak flows (from precipitation, runoff, groundwater discharge, etc.) enter a wetland and are delayed in their downslope journey.

fluvial—Pertaining to or produced by the action of a stream or river.

fluvial surfaces—The various land surfaces associated with the riparian zone such as point bars, floodplains, streambanks, terraces, and overflow channels.

foothills—Steeply sloping uplands (with hill relief up to 1,000 feet) that fringe a mountain range or high plateau escarpment.

forage condition—An ecological concept used to interpret livestock grazing impacts on vegetation. It describes the departure from potential under existing environmental conditions and assumes a causal relationship between the vegetation and domestic ungulate grazing.

forage (herbage) production—The aboveground biomass (air-dried pounds per acre) of all grasses, sedges, and forbs; no allowance is made for proper use factors.

foraging/feeding—The gathering or consumption of food for nutrition.

forb—Any herbaceous plant, usually broad-leaved, that is not a grass or grass-like plant.

forested wetland (Cowardin et al. 1979)—A class of wetland habitat characterized by woody vegetation that is 6 m (20 ft) tall or taller.

frequently flooded—A class of flood frequency in which flooding is common in most years (more than a 50 percent chance of flooding in any year, or more than 50 times in 100 years).

freshwater impounded wetland—A palustrine or lacustrine wetland formed in a topographic depression or by the natural or artificial damming of a river, stream, or other channel.

gallery forest—A strip of forest confined to a stream margin or floodplain in an otherwise unforested landscape.

geomorphic surface—A mappable part of the land surface that is defined in terms of morphology origin, age, and stability of component landforms.

geomorphology—The science that treats the general configuration of the earth's surface; specifically the study of the classification, description, nature, origin, and development of landforms and their relationships to underlying structures, and of the history of geologic changes as recorded by these surface features.

glacial outwash—Stratified sand and gravel carried, sorted, and deposited by water that originated mainly from the melting of glacial ice.

glacial till—Unsorted, unstratified glacial drift, generally unconsolidated, deposited directly by a glacier without subsequent reworking by water from the glacier.

gleyed soils—Soils having an intense reduction of iron during soil development, or reducing conditions owing to stagnant water, as indicated by base colors that approach neutral (bluish, grayish, or greenish), with or without mottles. In the more extreme condition, ferrous iron is present.

graminoid—Refers to grass or grasslike plants such as grasses, sedges, and rushes.

gravel—A soil mixture composed primarily of rock fragments 0.08 inch to 3 inches in diameter. Usually contains much sand.

groundwater—Water occupying the interconnected pore spaces in the soil or geologic material below the water table; this water has a positive pressure.

growing season—The portion of the year when soil temperatures are above biological zero (41 degrees Fahrenheit) as defined by standard soil taxonomy.

habitat type—All the land capable of producing similar plant communities at climax. USDA FS Region 6 loosely uses plant association to name climax plant communities, making it synonymous to a habitat type.

herbaceous—Nonwoody vegetation such as grasses and forbs.

herbage production—See forage production.

high-lining—The process by which crowns of trees and tall shrubs are shaped by browsing animals; it results in the removal of lower branches to a line as high as the browsing animals can reach.

Histosols—A soil order composed of organic soils (peats and mucks) with generally greater than 50 percent organic matter in the upper 80 cm (32 inches) or that are of any thickness if overlaying rock. This classification violates the 80-cm rule, as some organic soils in eastern Washington have not developed sufficient thickness to meet the rule in the postglacial period, yet all the soil within the plant rooting zone is organic. Suborders are distinguished by the degree of decomposition of organic material and the presence of moss fibers:

fibric—Plant remains are so little decomposed that at least three-fourths (by volume) are not destroyed by rubbing and their botanical origin can be determined.

hemic—Organic materials are intermediate in decomposition between fibric and sapric. About half of the organic fibers are destroyed by rubbing the soil between the fingers.

sapric—Consists of highly decomposed plant remains. At least five-sixths of the fibers rub smooth. The botanic origin cannot be determined. Soils are usually black and consist of the residue that remains after aerobic decomposition on sites with widely fluctuating water tables.

limnic—Consists of thick layers of sedimentary organic material on the bottoms of lakes or ponds. The fibers rub smooth. Usually olive to olive brown color. Formed under totally anaerobic decomposition.

hydric soil (USDA SCS 1990)—A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile. Hydric soil indicators are Histisol, histic epipedon, sulfuric odor, aquic moisture regime, reducing conditions, gleyed or low-chroma colors, concretions, high organic content, and listing on local Hydric Soils List (Environmental Laboratory 1987).

hydrophyte—Any macrophytic plant that grows in water or on a substrate that is at least potentially deficient in oxygen as a result of excessive water content; plants typically found in wetland or aquatic habitat.

impounded—Bodies of water formed in a topographic depression or by the natural or artificial damming of a river, stream, or other channel.

Inceptisol—Soils that lack the mollic epipedon and have high available water throughout the growing season. Textures are finer than loamy sand, and the altered horizons have lost bases but retain some weatherable minerals. Surface horizons are gray to black and are high in carbon.

indicator plant—A plant whose presence or abundance indicates certain environmental conditions and the presence of a habitat type, association, or community type.

intermittent stream—A stream, or reach of a stream, that flows for protracted periods only when it receives groundwater discharge or continued contributions from melting snow or other surface and shallow subsurface sources.

inundation—A condition in which water temporarily or permanently covers a land surface.

krummholz—Trees that are dwarfed and twisted because of severe climate (wind, low temperature, etc.) at the high-elevation limits of forest development.

lacustrine—Permanently flooded lakes and reservoirs, whose total area exceeds 20 acres or whose maximum depth exceeds 6.6 feet at low water.

landform—Any element of the landscape characterized by a distinctive surface expression, internal structure, or both, and sufficiently conspicuous to be included in a physiographic description.

long-duration flooding—A duration class in which inundation for a single event ranges from 7 days to 1 month.

low elevation—Elevation ranges generally occurring between sea level and the midmontane zone. NOTE: The upper limit of this region varies with microclimatic conditions and may extend above the base of adjacent foothills.

major type—Refers to a plant association or community type that occupies an extensive area within a wetland zone. Also, any plant association that has at least five plots in the classification database.

marsh—Wetlands where the vegetation is dominated by graminoids, with the water table at or above the surface most of the year and with little or no accumulation of peat.

meander—A meander is one of a series of sinuous loops, with sine-wave form, in the course of a stream channel. Highly meandering stream channels commonly have cross sections with low width-to-depth ratios, fine-grained bank materials, and low gradient.

mineral soil—Soils composed of predominantly mineral materials (sands, silts, clays) instead of organic materials. The soil contains less than 20 percent organic matter.

minor type—Refers to a plant association or community type that occupies little area within a wetland zone. Also, any plant association that has fewer than five plots in the classification database.

moderate elevation (midmontane)—Elevation zones identified by vegetation that does not extend below the upper elevation of adjacent foothills or into the subalpine. The boundary between the midmontane and subalpine zones varies considerably from one geographical region to another and with microclimatic conditions.

mollic epipedon—Abstraction of soil properties common to the soils of the steppes of North America, Europe, and Asia based on the horizons at or near the surface rather than the deeper ones.

Mollisol—A soil having a dark brown to black surface horizon (mollic epipedon) that is relatively thick, has a high base saturation, and usually well-developed structure. The mollic epipedon is the result of underground decomposition of organic residues in the presence of a bivalent cation such as calcium.

monotypic stands—Stands composed primarily of a single species.

moraine—A rounded ridge, hill, or mound of rubble left behind by a retreating glacier.

mottling—Variation of coloration in soils as represented by localized spots, patches, or blotches of contrasting color. Commonly develops under alternating wet and dry periods with associated reduction and oxidation environments. Mottling generally indicates poor aeration and impeded drainage.

natural—Dominated by native biota and occurring within a physical system that has developed through natural processes without human intervention.

obligate wetland plants—Refers to a plant species that occurs almost always (estimated probability greater than 99 percent) under natural conditions in wetlands.

organic loam—A generalized name for soils having more than 12 percent organic particles in addition to clay, silt, and sand.

organic soil—Soils composed of primarily organic rather than mineral material. Equivalent to Histisol.

overbank flooding—Any situation in which inundation occurs as a result of the water level of a river or stream rising above bank level.

oxbow lake—A meander channel of a stream or river that is formed by breaching a meander loop during flood stage. The ends of the cut-off meander are blocked by bank sediments.

palustrine—Tidal and nontidal wetlands dominated by trees, shrubs, persistent emergent herbs, and emergent mosses or lichens where salinity from ocean-derived salts is below 0.5 parts per thousand (ppt). Also included are wetlands without such vegetation, but with all of the following characteristics: area less than 20 acres; lacking active wave-formed or bedrock shoreline features; maximum water depth less than 6.6 feet at low water; ocean-derived salinity less than 0.5 ppt.

parent material—The unconsolidated and undeveloped mineral or organic matter from which the soil is developed.

peat—Unconsolidated soil material consisting largely of underdecomposed or only slightly decomposed organic matter accumulated under conditions of excessive soil moisture.

moss peat—Peat soil composed of partially decomposed sphagnum or other mosses.

sedge peat—Peat soil composed of partially decomposed graminoids, especially sedges.

woody peat—Peat soil composed of partially decomposed wood.

perched water table—Zone of saturated soil that lies above a zone of saturated soil within 80 inches of the soil surface. Also called episaturation.

perennial stream—A stream that runs above ground throughout its length and throughout the year.

permanently flooded—Water covers the land surface throughout the year in all years (may be absent during extreme drought periods).

pioneer plants—Herbaceous annual and seedling perennial plants that colonize bare areas such as gravel bars as a first stage in secondary succession.

plant association—Normal usage is a climax community type (Pfister et al. 1977). In this classification, however, it refers to an assemblage of native riparian and wetland vegetation occurring together in equilibrium with the environment for a given fluvial surface (i.e., the potential natural vegetation on a fluvial surface).

plant community—See community.

pond—Small bodies of water encircled by wetland vegetation. Wave action is minimal, allowing emergent vegetation to establish. Usually less than 3 acres in area.

ponded—A condition in which free water covers the soil surface. For example, a closed depression. The water is removed only by percolation, evaporation, or transpiration.

poorly drained—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods (longer than 7 days).

poor fen—A peatland that is intermediate in nutrient status and vegetation composition between a fen and a bog. An example is the *Carex lasiocarpa* (CALA4) plant association.

poorly represented—When relating to plant coverage in the association descriptions, any species that has a canopy coverage less than 5 percent.

pothole—A depressional wetland caused by glaciation. The body of water is less than 20 acres in size.

redox concentrations—A redoximorphic feature characterized by zones in the soil of accumulation of iron and manganese oxides. These may form nodules, concretions, soft bodies, or pore linings and vary in shape, size, and color.

redox depletions—A redoximorphic feature characterized by zones in the soil of low chroma (less than 3) where iron and manganese oxides alone have been removed, or where both iron/manganese oxides and clay have been removed.

reservoir—An artificial (dammed) water body with at least 20 acres covered by surface water.

restored—Artificially returned from a disturbed or totally altered condition, to a state that mimics the original, natural condition.

riparian—Of, on, or relating to the banks of a natural course of water. That land, next to running water, where plants dependent on a perpetual source of water occur.

riparian species—Plant species occurring within the riparian zone.

riparian wetland—An out-of-channel, palustrine wetland associated with the flowing water of a riparian system.

riparian or wetland ecosystem—The ecosystem located between aquatic and terrestrial environments. This classification treats this concept rather broadly or loosely by including transitional (also known as xeroriparian) ecosystems lying between riparian and terrestrial ecosystems. Thus, in the broad sense, these ecosystems are identified by the presence of vegetation that requires or tolerates free or unbound water or conditions that are more moist than normal (Franklin and Dyrness 1973).

riparian zone (ecosystem)—The interface between aquatic and terrestrial ecosystems that is defined by the presence of vegetation that requires or tolerates free or unbound water or conditions that are more moist than normal (Franklin and Dyrness 1973). The term is treated rather broadly in this classification and includes transitional (xeroriparian) ecosystems.

riverine system (Cowardin et al. 1979)—Any wetland and deepwater habitat contained within a channel, with the exception of wetlands dominated by trees, shrubs, persistent emergents, and emergent mosses or lichens.

root crown—The persistent base of a plant.

saline—Soil or water containing sufficient soluble salts to interfere with the growth of plants.

sand—Composed predominantly of coarse-grained mineral sediments with diameters larger than 0.003 inches and smaller than 0.08 inches in diameter.

saturated—A soil condition in which all voids (pore spaces) between soil particles are filled with water.

scarce—When relating to plant coverage in the association descriptions, any species that is very scattered, represented by a few individuals, or has canopy coverage of less than 1 percent.

seasonally flooded—Surface water is present for extended periods especially early in the growing season, but is absent by the end of the season in most years. When surface water is absent, the water table is often near the land surface (see also: semipermanently flooded.)

sediment—Solid material, both mineral and organic, that is in suspension, is being transported or has been moved from its site of origin by water, and has come to rest on the earth's surface.

sediment trapping—The process by which particulate matter is deposited and retained (by any mechanism or process) within a wetland.

seep—Groundwater discharge areas where the water table comes close to the soil surface. In general, seeps have less flow than a spring and may not result in water forming an unconfined flow.

semipermanently flooded—Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.

seral—Refers to species or communities that have not theoretically attained a steady state with the environment, where current populations of some species are being replaced by other species.

series—Refers to a group of plant associations having the same climax species characterizing the dominant plant cover. Thus the willow series is characterized by all plant associations dominated by species of willows, and the Pacific silver fir series is composed of all plant associations potentially dominated by Pacific silver fir at climax.

shore (streambank)—Land on or near an ocean, lake, river, or stream between the ordinary high-water mark and low-water mark.

shoreline (streambank) anchoring—The stabilization of soil at the water's edge, or in shallow water, by fibrous plant roots—may include long-term buildup of riparian soil.

shrub—A woody plant that at maturity is usually less than 20 feet (6 meters) tall and generally exhibits several erect, spreading, or prostrate stems and has a bushy appearance; e.g., mountain alder (*Alnus incana*) or Geyer willow (*Salix geyeriana*). This term is used somewhat loosely in this classification as some shrubs, such as mountain alder, variably meet the definition of shrub or tree depending on site. Therefore, some users may interpret some plants indicated as "shrubs" in this classification as trees.

silt—Rock fragments between 0.0008 inches and 0.00008 inches in diameter; as a textural class, a mixture of 20 to 50 percent sand, 30 to 80 percent silt, and 10 to 30 percent clay-sized particles.

site index—An index of timberland productivity based on the height of specific trees at 50 or 100 years (formulas for specific tree species are given in references).

sphagnum bog—A palustrine-impounded wetland with a mineral-poor substrate composed primarily of *Sphagnum* spp., and which is acidic (pH 5.5 or lower).

spring—A groundwater discharge area that has more flow than seeps and often produces a channel or pool below the source.

stable—The condition of little or no perceived change in plant communities that are in relative equilibrium with existing environmental conditions; describes persistent but not necessarily culminating stages (climax) in plant succession.

stand—An existing plant community that is relatively uniform in composition, structural, and site conditions; thus it may serve as a local example of a community type or association.

stockpond—An artificial (dammed) body of water of less than 20 acres covered by surface water.

stone—Rock fragments larger than 10 inches but less than 24 inches.

stream—A natural waterway that is defined as first to third order.

streambank—That portion of the channel cross section that controls the lateral movement of water.

stream order—A classification of streams according to the number of the tributaries. Order 1 streams have no tributaries; a stream of any higher order has two or more tributaries of the next lower order.

subalpine—The elevation region, identifiable by characteristic vegetation, between the midmontane and alpine zones. The boundaries between these zones differ considerably from one geographical region to another and with microclimatic conditions.

succession—The progressive changes in plant communities toward a steady state. Primary succession begins on a bare surface not previously occupied by plants, such as a recently deposited gravel bar. Secondary succession occurs following disturbances on sites that previously supported vegetation.

swale—A depression or topographic low area.

sward (turf)—An expanse of grass or grasslike plants (fens, bogs, meadows).

swamp—Vegetation dominated by trees, with the water table at or above the surface most of the year and with little or no accumulation of peat. Often intergrades with bog, fen, or carr.

taproot—The primary root continuing the axis of the plant downward. Such roots can be thick or thin.

terrace—A steplike surface, bordering a valley floor or shoreline that represents the former position of an alluvial plain or lake. In this classification it refers to the often multiple terraces beyond the 1- to 3-year floodplain (see alluvial terrace).

timber production—The indexing of a forest stand to produce wood fiber in cubic feet per acre per year.

toeslope—The geomorphic component that forms the outermost gently inclined surface at the base of a hill slope.

topography—The relative positions and elevations of the natural or humanmade features of an area that describe the configuration of its surface.

transition zone (ecosystem)—The interface between the riparian or wetland and adjacent terrestrial ecosystems that is identified by conditions that are more moist than normal. Soils are briefly saturated only in the spring, if at all, although soil moisture relationships are excellent due to the proximity to riparian or wetland sites. Also referred to as xeroriparian.

tree—A woody plant that at maturity is usually 20 feet or more in height and generally has a single trunk unbranched to about 3 feet above the ground, and a more or less definite crown.

upland—Land at a higher elevation, in general, than the alluvial plain or low stream terrace.

valley—An elongate, relatively large, externally drained depression of the earth's surface that is primarily developed by stream erosion.

very long duration flooding—A duration class in which inundation for a single event is greater than 1 month.

very poorly drained—Water is removed so slowly that free water remains at or near the soil surface during most of the growing season.

volcanic—Pertaining to the structures, rocks, and landforms produced by volcanic action.

water path—Used in the description of bogs such as the few-flowered spike-rush (ELPA2) association to describe shallow, wide depressions in which water collects and flows during periods of high water, but which are not streambeds.

water regime (nontidal)—Includes the following types (Cowardin et al. 1979):

permanently flooded—Water covers the land surface throughout the year in all years. Vegetation is composed of hydrophytes.

intermittently exposed—Surface water is present throughout the year except in years of extreme drought.

semipermanently flooded—Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the soil surface.

seasonally flooded—Surface water is present for extended periods especially early in the growing season, but is absent by the end of the growing season in most years. When surface water is absent, the water table is usually at or very near the soil surface.

saturated—The substrate is saturated to the surface for extended periods during the growing season, but surface water is seldom present.

temporarily flooded—Surface water is present for brief periods during the growing season, but the water table usually lies well below the soil surface for most of the season.

intermittently flooded—The substrate is usually exposed, but the surface water is present for variable periods without the detectable seasonal periodicity. Weeks, months, even years may intervene between periods of inundation. Plant communities may change as soil moisture changes.

water table—The depth below which the ground is saturated with water. The depth to standing water.

weathering—All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents with essentially no transport of the altered material. These changes result in disintegration and decomposition of the material.

well represented—When relating to plant coverage, any species having a canopy coverage of greater than 5 percent.

wetland—An area having one or more of the following three attributes: (1) at least periodically the substrate is dominated by facultative or obligate hydrophytes, (2) the substrate is predominantly hydric soil, (3) the substrate is nonsoil and is either saturated with or covered by shallow water at some time during the growing season.

wet meadow—A herbaceous wetland on mineral soil. Generally, wet meadows occur in seasonally flooded basins and flats, and are especially prominent on the margins (transition zone) of wetlands with organic soil. Soils are dry for part of the growing season.

wetland/riparian species—Plant species occurring within the wetland/riparian zone. Obligate species require the environmental conditions within the wetland zone. Facultive species tolerate the environmental conditions but may also occur away from the wetland zone.

wetland status—Refers to plant species that have exhibited an ability to develop to maturity and reproduce in an environment where all or portions of the soil within the root zone become, periodically or continually, saturated or inundated during the growing season. The ability to grow and reproduce in wetlands is due to morphological or physiological adaptations or reproductive strategies of the plant. These adaptations lead to the development of wetland communities that can be categorized as follows:

OBL (obligate wetland)—Plant species that occur almost always (estimated probability greater than 99 percent) under natural conditions in wetlands.

FACW (facultative wetland)—See p. 348.

FAC (facultative)—See p. 348.

valley gradient—The lengthwise slope of the valley floor expressed as a percentage. The following classes are used in this classification:

Very low	<1 percent
Low	1 to 3 percent
Moderate	4 to 5 percent
Steep	6 to 8 percent
Very steep	>8 percent

valley width—The width of the valley floor in feet (meters). The following classes are used in this classification:

Very broad	>984 feet (300 m)
Broad	328 to 984 feet (100.1 to 300 m)
Moderate	99 to 327 feet (30.1 to 100 m)
Narrow	33 to 98 feet (10 to 30 m)
Very narrow	33 feet (<10 m)

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