

APPENDIX E: DESCRIPTION OF ECOLOGICAL SYSTEMS OF IDAHO.

Urban

Low–Intensity Urban

This ecological system occurs in scattered localities throughout the state. The system comprises small towns and residential developments characterized by human populations numbering less than 1000 residents. Vegetation is highly variable. Some sites are dominated by non–native plants, but this system generally includes a mix of native plants and decorative introduced species and hybrids. Altered water regimes are sometimes necessary for non–native plants to persist in this habitat.

High–Intensity Urban

This ecological system occurs in scattered localities throughout the state. The system is characterized by human populations numbering more than 1000 residents. Vegetation is highly variable. Native plants are typically rare and are usually restricted to remnant stands in undeveloped sites. Vegetation comprises a broad variety of introduced species and hybrids, typically consisting of turf grasses, decorative forbs and shrubs, and mixed deciduous and conifer trees. Altered water regimes, in particular, allow non–native plants to persist in this habitat.

Arableland

Herbaceous Planted and Cultivated

This ecological system comprises a variety of agricultural lands, including row crops, pasture, hay fields, and fallow fields. It is most common on flat or gently sloped terrain in areas having deep, productive soil. The system is particularly prevalent in southern and western parts of the state. In terms of acreage, wheat, barley, and alfalfa are the major species within this system. Other important species include potatoes, sugar beets, and corn.

Non–native Herbaceous

Disturbed and Invasive Grass and Forb

This ecological system is characterized by annual grasses in areas that are intensively disturbed. This system comprises lands having more than 30% coverage by nonnative plants. Dominant plants are noxious weeds and other non–native species, including cheatgrass and thistles. Grasslands are dominated by crested wheatgrass and other seeded grass species, such as bluegrasses and fescues. This system occurs primarily at low and middle elevations, often in rocky areas or sites having thin and unproductive soils.

Upland Deciduous Forest

Rocky Mountain Aspen Forest and Woodland

This widespread ecological system occurs most commonly in the southern and central Rocky Mountains, but scattered sites occur throughout much of the western U. S. and north into Canada in the montane and subalpine zones. Elevations generally range from 1525–3050 m (5000–10,000 ft), although the system occurs at lower elevations in some regions. Adequate soil moisture is required to meet high evapotranspiration demand, which is the primary limit of the distribution of this ecological system. The length of the growing season or low temperatures are a secondary limit of distribution. These are upland forests and woodlands dominated by quaking aspen without a significant conifer component (<25% relative tree cover). The understory structure may be complex with multiple shrub and herbaceous layers, or simple with just an herbaceous layer. The herbaceous layer may be dense or sparse, dominated by graminoids or forbs. Associated shrub species include snowberry, thimbleberry, Saskatoon serviceberry, and kinnikinnick. This system is maintained by stand-replacing disturbances, such as avalanches, crown fire, insect outbreak, disease, and windthrow within the matrix of conifer forests.

Rocky Mountain Bigtooth Maple Ravine Woodland

This ecological system occurs in cool ravines, toeslopes, and slump benches associated with riparian areas in the northern and central Wasatch Range extending into southern Idaho, as well as in scattered localities in southwestern Utah, central Arizona and New Mexico and the Trans-Pecos of Texas. Substrates are typically rocky colluvial or alluvial soils with favorable soil moisture. These woodlands are dominated by bigtooth maple. Some stands may include boxelder or aspen as minor components and may include scattered conifers. The system also occurs on steeper, north-facing slopes at higher elevations.

Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland

This ecological system occurs on montane slopes and plateaus in Utah, western Colorado, northern Arizona, eastern Nevada, southern Idaho and western Wyoming. Elevations range from 1700–2800 m (5500–9100 ft). Stands often occur on clay-rich soils in intermontane valleys. Soils are derived from alluvium, colluvium, and residuum from a variety of parent materials, but most typically occur on sedimentary rocks. The tree canopy is codominated by quaking aspen and conifers, including Douglas-fir, white fir, subalpine fir, Engelmann spruce, blue spruce, lodgepole pine, limber pine, and ponderosa pine. As stands age, quaking aspen is slowly reduced until the conifer species become dominant. Common shrubs include Saskatoon serviceberry, chokecherry, bigtooth maple, mountain snowberry, common juniper, Oregon boxleaf, Woods' rose, white spiraea, common snowberry, or creeping barberry. Herbaceous species include

mountain brome, pinegrass, Geyer's sedge, blue wildrye, bluegrass species, western yarrow, heartleaf arnica, aster, fleabane, northern bedstraw, sticky purple geranium, pea, silvery lupine, oblongleaf bluebells, starry false lily-of-the-valley, sweetcicely, and Fendler's meadow-rue. Most stands are in a late-seral stage of aspen changing to pure conifer systems.

Southern Woodland

Inter-Mountain Basins Mountain Mahogany Woodland and Shrubland

This ecological system occurs in hills and mountain ranges of the intermountain basins from the eastern foothills of the Sierra Nevada northeast to the foothills of the Big Horn Mountains. It typically occurs at 600–2650 m (2000–8700 ft) on rocky outcrops or escarpments and forms small- to large-patch stands in forested areas. Most stands occur as shrublands on ridges and steep rimrock slopes, but mountain mahogany may occur as a small tree in steppe areas. This system includes both woodlands and shrublands dominated by curl-leaf mountain mahogany. Mountain big sagebrush, antelope bitterbrush, manzanita, currant, and snowberry are often present. Scattered junipers or pines may also occur. Curl-leaf mountain mahogany is a slow-growing, drought-tolerant species that generally does not resprout after burning and needs the protection from fire that rocky sites provide.

Columbia Plateau Western Juniper Woodland and Savanna

This woodland system is found along the northern and western margins of the Great Basin, from southwestern Idaho, along the eastern foothills of the Cascades, and south to the Modoc Plateau of northeastern California. Elevations range from under 200 m (656 ft) along the Columbia River in central Washington to over 1500 m (5000 ft). Generally, soils are medium-textured, with abundant coarse fragments, and derived from volcanic parent materials. Where this system grades into relatively mesic forest or grassland habitats, these woodlands become restricted to rock outcrops or escarpments with excessively drained soils. Singleleaf pinyon is not present in this region, so western juniper is the only tree species, although ponderosa pine may be present in some stands. Curl-leaf mountain mahogany may occasionally codominate. Big sagebrush is the most common shrub; others are antelope bitterbrush, rubber rabbitbrush, green rabbitbrush, wax currant, and horsebrush. Graminoids include threadleaf sedge, Idaho fescue, Sandberg bluegrass, and bluebunch wheatgrass. These woodlands are generally restricted to rocky areas where fire frequency is low. Western juniper savanna may occur on the drier edges of the woodland where trees are intermingling with or invading the surrounding grasslands and where local edaphic or climatic conditions favor grasslands over shrublands.

Great Basin Pinyon–Juniper Woodland

This ecological system occurs on dry mountain ranges of the Great Basin region and eastern foothills of the Sierra Nevada. It is typically found at elevations

ranging from 1600–2600 m (5200–8500 ft). These woodlands occur on warm, dry sites on mountain slopes, mesas, plateaus, and ridges. Severe climatic events occurring during the growing season, such as frosts and drought, are thought to limit the distribution of pinyon–juniper woodlands to relatively narrow altitudinal belts on mountainsides. Woodlands dominated by a mix of singleleaf pinyon and Utah juniper, pure or nearly pure occurrences of singleleaf pinyon, or woodlands dominated solely by Utah juniper comprise this system. Curl–leaf mountain mahogany is a common associate. Understory layers are variable. Associated species include shrubs, such as greenleaf manzanita, little sagebrush, black sagebrush, big sagebrush, and curl–leaf mountain mahogany, and bunch grasses, such as needle and thread, Idaho fescue, bluebunch wheatgrass, basin wildrye, and muttongrass.

Inter–Mountain Basins Juniper Savanna

This widespread ecological system occupies dry foothills and sandsheets of western Colorado, northwestern New Mexico, northern Arizona, Utah, Nevada and southern Idaho. It is typically found at elevations ranging from 1500–2300 m (5000–7500 ft). This system is generally found at lower elevations and more xeric sites than Great Basin Pinyon–Juniper Woodland. Stands occur on lower mountain slopes, hills, plateaus, basins, and flats, often where juniper is expanding into semi–desert grasslands and steppe. The stand structure is typically open savanna, although there may be inclusions of more dense juniper woodlands. This savanna is typically dominated by Utah juniper trees with high cover of perennial bunch grasses and forbs, with blue grama, and needle and thread being most common. Pinyon trees are typically not present because sites are outside the ecological or geographic range of singleleaf pinyon.

Dry Conifer Forest

Northern Rocky Mountain Dry–Mesic Montane Mixed Conifer Forest

This ecological system is composed of highly variable montane coniferous forests in the interior Pacific Northwest. This system is associated with a submesic climate regime with annual precipitation ranging from 50–100 cm (19–39 in) annually, which falls predominantly during winter or late spring. Winter snowpacks typically melt off in early spring at lower elevation sites. Elevations range from 460–1920 m (1500–6300 ft). Most stands are dominated by a mix of Douglas–fir, ponderosa pine, lodgepole pine, western white pine, and western larch. Engelmann spruce becomes increasingly common towards the eastern edge of the range. The system often occurs as a matrix of large patches dominated or codominated by one or combinations of the above species. They rarely form either upper or lower timberline forests. Understories are dominated by grasses and sedges, such as bluebunch wheatgrass, pinegrass, Geyer’s sedge, and Ross’ sedge. Understory deciduous shrubs may include Rocky Mountain maple, mallow ninebark, common snowberry, white spiraea, or thinleaf huckleberry on mesic sites.

Northern Rocky Mountain Ponderosa Pine Woodland and Savanna

This inland Pacific Northwest ecological system occurs in the foothills of the northern Rocky Mountains on the Columbia Plateau region and west along the foothills of the Modoc Plateau and eastern Cascades into southern interior British Columbia. These woodlands occur at the lower treeline ecotone between grassland or shrubland and more mesic coniferous forests typically in warm, dry, exposed sites. Elevations range from less than 500 m (1600 ft) in British Columbia to 1600 m (5300 ft) in the central Idaho mountains. Stands are found on all slopes and aspects, but moderately steep to very steep slopes or ridgetops are the most common settings. This ecological system generally occurs on glacial till, glacio-fluvial sand and gravel, dune, basaltic rubble, colluvium, to deep loess or volcanic ash-derived soils, with characteristic features of good aeration and drainage, coarse textures, neutral to slightly acid pH, and an abundance of mineral material. Ponderosa pine is the predominant conifer; Douglas-fir may be codominant to dominant in the tree canopy in the more northern expressions. The understory can be shrubby, with big sagebrush, greenleaf manzanita, kinnikinnick, curl-leaf mountain mahogany, antelope bitterbrush, mountain snowberry or common snowberry, and rose. More open stands support grasses such as bluebunch wheatgrass, needle and thread, Idaho fescue, or rough fescue.

Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland

This is a highly variable ecological system of the montane zone of the Rocky Mountains. It occurs throughout the southern Rockies, north and west into Utah, Nevada, western Wyoming, and Idaho. These are mixed-conifer forests occurring on all aspects at elevations ranging from 1200–3300 m. Rainfall averages 40–60 cm (20–40 in) per year, and summer "monsoons" occurring during the growing season contribute substantial moisture. The composition and structure of overstory is dependent upon the temperature and moisture relationships of the site and the successional stage of the stand. Douglas-fir and white fir are usually the dominant species, but ponderosa pine may be present to codominant. Douglas-fir forests occupy drier sites, and white fir-dominated forests occupy cooler sites, such as upper slopes at higher elevations, canyon sideslopes, ridgetops, and north- and east-facing slopes that burn somewhat infrequently. Blue spruce is most often found in cool, moist locations, often occurring as smaller patches within a matrix of other associations. As many as seven conifers can be found growing in the same stand. A number of cold-deciduous shrub and graminoid species are common, including kinnikinnick, creeping barberry, Oregon boxleaf, and mountain snowberry.

Northern Rocky Mountain Western Larch Woodland

This ecological system occurs in the interior montane forests of the Pacific Northwest in northern Idaho, Montana, Washington, Oregon, and southeastern British Columbia. It also occurs in the east Cascades of Washington. Elevations range from 680–2195 m (2230–7200 ft). The western larch is dominant or

codominant (over 50% of total canopy cover) with evergreen conifers, usually Douglas–fir or lodgepole pine. More shade–tolerant tree species, such as grand fir, subalpine fir, Engelmann spruce, or western hemlock, may be present. Stands develop following crownfires in areas with stand–replacing fire frequency greater than 150 years. Open larch woodlands often have undergrowth dominated by low–growing kinnikinnick, pinegrass, twinflower, white spiraea, dwarf bilberry, or common beargrass. Stands with shrubby undergrowth include dwarf bilberry, Rocky Mountain maple, snowbrush ceanothus, russet buffaloberry, mallow ninebark, thimbleberry, or thinleaf huckleberry.

Northern Mesic Conifer Forest

Northern Rocky Mountain Western Hemlock–Western Red Cedar Forest

This ecological system occurs in the northern Rockies of western Montana Idaho, Washington, and southern British Columbia. Stands are dominated by western hemlock and western red cedar and are found in areas influenced by incursions of mild, wet, Pacific maritime air masses. Much of the annual precipitation occurs as rain, but where snow does occur it can generally be melted by rain during warm winter storms. Stands are best represented on sites having high soil moisture, such as toeslopes and bottomlands. At the periphery of its distribution this system is confined to moist canyons and cooler, moister aspects. Generally these are moist, non–flooded or upland sites that are not saturated yearlong. Along with western hemlock and western red cedar, Douglas–fir commonly shares the canopy, and western white pine, lodgepole pine, grand fir, Pacific yew, and western larch are major associates. Engelmann spruce, subalpine fir, and ponderosa pine) may be present but only on the coldest or warmest and driest sites. Twinflower, Oregon boxleaf, gray alder, Rocky Mountain maple, white spiraea, thimbleberry, and thinleaf huckleberry are common shrub species. The composition of the herbaceous layer reflects local climate and degree of canopy closure.

Northern Rocky Mountain Conifer Swamp

This system occurs in the northern Rocky Mountains from northwestern Wyoming north into the Canadian Rockies and west into eastern Oregon and Washington. It is dominated by conifers on poorly drained soils that are saturated year–round or may have seasonal flooding in the spring. Soils are never organic, but are mineral. Stands generally occupy sites on benches, toeslopes or valley bottoms along mountain streams. Trees present include grand fir, western red cedar, western hemlock, and Engelmann spruce. The wetland types are generally distinguishable from other upland forests and woodlands by shallow water tables and mesic or hydric undergrowth vegetation; some of the most typical species include common ladyfern, woodfern, American skunkcabbage, western oakfern, field horsetail, arrowleaf ragwort, Brewer’s miterwort, fivestamen miterwort, claspleaf twistedstalk, and bluejoint.

Subalpine Forest

Northern Rocky Mountain Subalpine Dry Parkland

This system of the northern Rockies, Cascade Mountains, and northeastern Olympic Mountains is typically a high-elevation mosaic of stunted tree clumps, open woodlands, and herb- or dwarf-shrub-dominated openings occurring above closed forest ecosystems and below alpine communities. It includes open areas with clumps of whitebark pine, as well as woodlands dominated by whitebark pine. Landforms include ridgetops, mountain slopes, glacial trough walls, moraines, talus slopes, and cirque headwalls and basins. Some sites have little snow accumulation because of high winds and sublimation. In harsh, wind-swept environments trees are often stunted and flagged. The stands often originate when Engelmann spruce or whitebark pine colonize a sheltered site such as the lee side of a rock. Subalpine fir then can colonize in the shelter of Engelmann spruce and may form a dense canopy by branch layering. The climate is typically very cold in winter and dry in summer.. Other woody species include shrubs and dwarf-shrubs, such as yellow mountainheath, laurel, gooseberry currant, shortfruit willow, grayleaf willow, diamondleaf willow, thinleaf huckleberry and grouse whortleberry, that may be present to codominant. The herbaceous layer is sparse under dense shrub canopies or may be dense where the shrub canopy is open or absent.

Rocky Mountain Lodgepole Pine Forest

This system is widespread in upper montane to subalpine elevations of the Rocky Mountains, Intermountain region, and north into the Canadian Rockies. These are subalpine forests where the dominance of lodgepole pine is related to fire history and topo-edaphic conditions. Following stand-replacing fires, lodgepole pine will rapidly colonize and develop into dense, even-aged stands. Most forests in this ecological system are early- to mid-successional forests which developed following fires. Some lodgepole pine forests will persist on sites that are too extreme for other conifers to establish. These include excessively well-drained pumice deposits, glacial till and alluvium on valley floors where there is cold air accumulation, warm and droughty shallow soils over fractured quartzite bedrock, and shallow moisture-deficient soils with a significant component of volcanic ash. Soils supporting these forests are typically well-drained, gravelly, coarse-textured, acidic, and rarely formed from calcareous parent materials. These forests are dominated by lodgepole pine with shrub, grass, or barren understories. Sometimes there are intermingled mixed conifer and aspen stands with the latter occurring with inclusions of deeper, typically fine-textured soils. The shrub stratum may be conspicuous to absent; common species include kinnikinnick, snowbrush ceanothus, twinflower, creeping barberry, antelope bitterbrush, white spiraea, rose spiraea, russet buffaloberry, dwarf bilberry, grouse whortleberry, thinleaf huckleberry, common snowberry, and currant.

Rocky Mountain Subalpine Dry–Mesic Spruce–Fir Forest and Woodland

Engelmann spruce and subalpine fir forests comprise a substantial part of the subalpine forests of the Cascades and Rocky Mountains from southern British Columbia east into Alberta, south into New Mexico and the Intermountain region. They are the matrix forests of the subalpine zone, with elevations ranging from 1275 m in its northern distribution to 3355 m in the south (4100–11,000 ft). Sites within this system are cold year–round, and precipitation is predominantly in the form of snow, which may persist until late summer. Snowpacks are deep and late–lying, and summers are cool. Frost is possible almost all summer and may be common in restricted topographic basins and benches. Tree canopies are usually dominated by Engelmann spruce and subalpine fir. Lodgepole pine is common in many stands and patches of pure lodgepole pine are common. Some stands comprise mixed conifer and quaking aspen. In some areas Engelmann spruce–dominated forests are on limestone or dolomite, while nearby codominated spruce–fir forests are on granitic or volcanic rocks. Xeric species may include common juniper, twinflower, creeping barberry, or grouse whortleberry. More northern occurrences often have taller, more mesic shrub and herbaceous species, such as Cascade azalea, and thinleaf huckleberry. Disturbance includes occasional blow–down, insect outbreaks, and stand–replacing fire.

Rocky Mountain Subalpine Mesic Spruce–Fir Forest and Woodland

This is a high–elevation system of the Rocky Mountains, dry eastern Cascades and eastern Olympic Mountains dominated by Engelmann spruce and subalpine fir. It extends westward into the northeastern Olympic Mountains and the northeastern side of Mount Rainier in Washington. Engelmann spruce is generally more important in southern forests than those in the Pacific Northwest. Occurrences are typically found in locations with cold–air drainage or ponding or where snowpacks linger late into the summer, such as north–facing slopes and high–elevation ravines. Stands can extend below the subalpine zone in places where cold–air ponding occurs. Northerly and easterly aspects predominate. Forests occur on gentle to very steep mountain slopes, high–elevation ridgetops and upper slopes, plateaus, basins, alluvial terraces, well–drained benches, and inactive stream terraces. Mesic understory shrubs include Cascade azalea, Saskatoon serviceberry, thimbleberry, western Labrador tea, pink mountainheath, and willow. Herbaceous species include red baneberry, starry false lily–of–the–valley, yellowdot saxifrage, Hitchcock’s smooth woodrush, or bluejoint. Disturbances include occasional blow–down, insect outbreaks (30–50 years), mixed–severity fire, and stand–replacing fire (150–500 years).

Mesic Deciduous Shrubland

Northern Rocky Mountain Lower Montane Mesic Deciduous Shrubland

This shrubland system occurs in the lower montane and foothill regions around the Columbia Basin, and north and east into the northern Rockies. These

shrublands are usually found on steep slopes of canyons and in areas with some soil development, including either loess deposits or volcanic clays. Fire, flooding, and erosion all impact these shrublands, but they typically will persist on sites for long periods. These communities develop near talus slopes as garlands, at the heads of dry drainages, and toeslopes in the moist shrub–steppe and steppe zones. Rocky Mountain maple, Mallow ninebark, bitter cherry, chokecherry, and oceanspray are the most common dominant shrubs. In moist areas, common snowberry, black hawthorn, or rose are generally dominant. Idaho fescue, prairie Junegrass, bluebunch wheatgrass, and Sandberg bluegrass are the most important grasses. Thurber’s needlegrass and basin wildrye can be locally important. Kentucky bluegrass is a common introduced grass. Old man’s whiskers, slender cinquefoil, nineleaf biscuitroot, arrowleaf balsamroot, and species of buckwheat, phlox, and fleabane are important forbs.

Southern Xeric Shrubland and Steppe

Inter–Mountain Basins Big Sagebrush Shrubland

This ecological system occurs throughout much of the western U. S., typically in broad basins between mountain ranges, plains and foothills between 1500 and 2300 m (4921 and 7546 ft) elevation. Soils are typically deep, well–drained, and non–saline. These shrublands are dominated by basin big sagebrush or Wyoming big sagebrush. Scattered juniper, greasewood, and saltbush may be present in some stands. Rubber rabbitbrush, green rabbitbrush, antelope bitterbrush, or mountain snowberry may codominate disturbed stands. Perennial herbaceous plants typically comprise less than 25% vegetative cover. Common grasses include Indian ricegrass, blue grama, streambank wheatgrass, Idaho fescue, needle and thread, basin wildrye, western wheatgrass, Sandberg bluegrass, and bluebunch wheatgrass.

Inter–Mountain Basins Mixed Salt Desert Scrub

This extensive ecological system includes open–canopied shrublands of basins, alluvial slopes, and plains across the Intermountain western U. S. The distribution also extends into a limited portion of the southern Great Plains. Substrates are often alkaline, saline, and calcareous soils that are medium– to fine–textured. The vegetation is characterized by a open to moderately dense stands of one or more saltbush species, such as shadscale saltbush or fourwing saltbush. Other shrubs present to codominate may include Wyoming big sagebrush, green rabbitbrush, rubber rabbitbrush, spiny hopsage, winterfat, desert–thorn, bud sagebrush, or horsebrush. Greasewood is generally absent but if present does not codominate. The herbaceous layer is sparse to moderately dense and is dominated by perennial grasses, such as Indian ricegrass, blue grama, streambank wheatgrass, western wheatgrass, Sandberg bluegrass, or alkali sacaton. Various forbs are also present.

Columbia Plateau Low Sagebrush Steppe

This matrix ecological system is composed of sagebrush dwarf–shrub–steppe that occurs in a variety of shallow–soil habitats throughout eastern Oregon, northern Nevada, and southern Idaho. Little sagebrush and occasionally black sagebrush form stands that typically occur on mountain ridges and flanks and broad terraces, ranging from 1000 to 3000 m (3281 to 9843 ft) in elevation. Substrates are shallow, fine–textured soils or poorly drained clays and almost always very stony and associated with recent rhyolite or basalt. Other shrubs and dwarf–shrubs may include antelope bitterbrush, buckwheat, and other species of sagebrush. Common grasses include Idaho fescue, prairie Junegrass, bluebunch wheatgrass, and Sandberg bluegrass. Many forbs compose the herbaceous vegetation, especially at the higher elevations. Isolated individuals of western juniper and curl–leaf mountain mahogany can often be found in this system.

Columbia Plateau Steppe and Grassland

These grasslands are similar floristically to Inter–Mountain Basins Big Sagebrush Steppe but are defined by a more frequent fire regime and the absence or low cover of shrubs over large areas, occasionally entire landforms. These are extensive grasslands, not grass–dominated patches within the sagebrush shrub–steppe ecological system. This system occurs throughout much of the Columbia Plateau and is found at slightly higher elevations farther south. Soils are variable, including relatively deep, fine–textured soils with coarse rock fragments, non–saline soils having a microphytic crust, stony volcanic–derived clays, and alluvial sands. This grassland is dominated by perennial bunch grasses and forbs (>25% cover) sometimes with a sparse (<10% cover) shrub layer; green rabbitbrush, rubber rabbitbrush, horsebrush, or sagebrush may be present in disturbed stands. Associated graminoids include Indian ricegrass, bottlebrush squirreltail, streambank wheatgrass, needle and thread, Idaho fescue, rough fescue, prairie Junegrass, Sandberg bluegrass, and bluebunch wheatgrass. Common forbs are Hood’s phlox, sandwort, and milkvetch. Areas with deeper soils are rare because of conversion to agricultural uses. The rapid fire–return regime of this ecological system maintains a grassland by retarding shrub invasion, and landscape isolation and fragmentation limit seed dispersal of native shrub species. Fire frequency is presumed to be less than 20 years. Through isolation from a seed source, combined with repeated burning, these are "permanently" converted to grassland.

Inter–Mountain Basins Big Sagebrush Steppe

This widespread matrix–forming ecological system occurs throughout much of the Columbia Plateau and northern Great Basin and Wyoming and is found at slightly higher elevations farther south. Soils are typically deep and non–saline, often with a microphytic crust. This shrub–steppe is dominated by perennial grasses and forbs (>25% cover) with basin big sagebrush, xeric big sagebrush, Wyoming big sagebrush, threetip sagebrush, or antelope bitterbrush dominating or codominating the open to moderately dense (10–40% cover) shrub layer. Shadscale saltbush, green rabbitbrush, rubber rabbitbrush, horsebrush, or prairie sagewort may be common especially in disturbed stands. Associated grasses

include Indian ricegrass, plains reedgrass, streambank wheatgrass, Idaho fescue, rough fescue, prairie Junegrass, Sandberg bluegrass, and bluebunch wheatgrass. Common forbs are Hood's phlox, sandwort, and milkvetch. Areas with deeper soils more commonly support basin big sagebrush but have largely been converted to agricultural systems. The natural fire regime of this ecological system likely maintains a patchy distribution of shrubs. Shrubs may increase following heavy grazing or with fire suppression, particularly in moist portions of the northern Columbia Plateau where it forms a landscape mosaic pattern with shallow-soil scabland shrublands. Where fire frequency has allowed for shifts to a native grassland condition, maintained without significant shrub invasion over a 50- to 70-year interval, the area would be considered Columbia Basin Foothill and Canyon Dry Grassland.

Inter-Mountain Basins Montane Sagebrush Steppe

This ecological system includes sagebrush communities occurring at montane and subalpine elevations across the western U.S. from 1000 m (3281 ft) in eastern Oregon and Washington to over 3000 m (9843 ft) in the southern Rockies. Climate is cool, semi-arid to subhumid. This system primarily occurs on deep-soiled to stony flats, ridges, nearly flat ridgetops, and mountain slopes. In general this system is associated with mild topography, fine soils, and some source of subsurface moisture. Vegetation is composed primarily of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and related taxa such as spiked big sagebrush. Antelope bitterbrush may codominate or even dominate some stands. Other common shrubs include snowberry, serviceberry, rubber rabbitbrush, squaw apple, wax currant, and green rabbitbrush. Most stands have an abundant perennial herbaceous layer (over 25% cover). Common grasses include Idaho fescue, needle and thread, muttongrass, slender wheatgrass, mountain brome, Sandberg bluegrass, spike fescue, tufted hairgrass, and bluebunch wheatgrass. In many areas, frequent wildfires maintain an open herbaceous-rich steppe condition, although at most sites, shrub cover can be unusually high for a steppe system (>40%), with the moisture providing equally high grass and forb cover.

Inter-Mountain Basins Semi-Desert Shrub-Steppe

This ecological system occurs throughout the intermountain western U.S., typically at lower elevations on alluvial fans and flats with moderate to deep soils. This semi-arid shrub-steppe is typically dominated by graminoids (>25% cover) with an open shrub layer. Characteristic grasses include Indian ricegrass, blue grama, inland saltgrass, needle and thread, Sandberg bluegrass, and alkali sacaton. The woody layer is often a mixture of shrubs and dwarf-shrubs. Characteristic species include fourwing saltbush, big sagebrush, green rabbitbrush, rubber rabbitbrush, and winterfat. Big sagebrush may be present but does not dominate. The general structure of stands may be either open shrubland with patchy grasses or patchy open herbaceous layer. Disturbance may be important in maintaining woody plants. Microphytic crust is present in some stands.

Dry Grassland

Columbia Basin Foothill and Canyon Dry Grassland

These grasslands are similar floristically to Columbia Basin Palouse Prairie but are distinguished by landform, and soil characteristics. They occur in the canyons and valleys of the Columbia Basin, particularly along the Snake River canyon, the lower foothill slopes of the Blue Mountains, and along the main stem of the Columbia River in eastern Washington. Stands are found on steep open slopes, from 90 to 1525 m (300–5000 ft) elevation. Annual precipitation is low, ranging from 4 to 10 cm (1.6-4 in). Settings are primarily long, steep slopes of 100 m to well over 400 m (328-1312 ft), with soils derived from residuum and having patchy, thin, windblown surface deposits. Fire frequency is presumed to be less than 20 years. The vegetation is dominated by patchy graminoid cover, cacti, and some forbs. Bluebunch wheatgrass, Idaho fescue, and plains pricklypear are common species. Snowberry, mallow ninebark, oceanspray, and currant are infrequently occurring deciduous shrubs that may increase with fire exclusion.

Northern Rocky Mountain Plateau and Valley Grassland

These grasslands are defined by short summers, cold winters, and soils derived from recent glacial and alluvial material. It occurs in British Columbia, low valleys near the Washington border, and northern Idaho. It is found at elevations ranging from 300–1650 m. These are extensive grasslands not grass-dominated patches within the sagebrush shrub steppe ecological system. This grassland is dominated by perennial bunch grasses and forbs (>25% cover), sometimes with a sparse (<10% cover) shrub layer. Bluebunch wheatgrass or needle and thread commonly dominate sites on level to moderate slopes and on certain steep slopes with a variety of other grasses, such as Indian ricegrass, Richardson's needlegrass, prairie Junegrass, and Kentucky bluegrass. Shrub species may be scattered, including Saskatoon serviceberry and big sagebrush. Soils are relatively deep, non-saline, and fine-textured with coarse fragments. A soil crust of lichen covers almost all open soil between clumps of grasses. Landscape isolation and fragmentation limits seed dispersal of native shrub species. The fire regime comprises a rapid fire-return that retards shrub invasion; fire frequency is presumed to be less than 20 years.

Palouse Prairie

Columbia Basin Palouse Prairie

This once-extensive grassland system occurs in southern British Columbia, eastern Washington, and Oregon. In much of the range rolling topography is composed of loess hills and plains over basalt plains. The climate of this region has warm-hot, dry summers and cool, wet winters. Precipitation is high, usually 38–76 cm annually (15–30 in). The soils are typically deep and well-developed. The cool-season bunch grasses that dominate the vegetation are adapted to this

winter precipitation. Characteristic species are bluebunch wheatgrass and Idaho fescue with needle and thread, basin wildrye, prairie Junegrass, western wheatgrass, or Sandberg bluegrass. Shrubs commonly include Saskatoon serviceberry, rose, buckwheat, common snowberry, and black hawthorn. Remnant grasslands are now typically restricted to steep and rocky sites.

Subalpine Grassland

Northern Rocky Mountain Montane Grassland

This ecological system of the northern Rocky Mountains is found at mid- to low-elevations in the mountains of northeastern Wyoming and Montana, west through Idaho into the Blue Mountains of Oregon, and north into the Okanagan and the Canadian Rockies. These dry grasslands are small meadows to large open parks surrounded by conifer trees but lack tree cover within them. Generally, the soil textures are much finer and soils are often deeper under grasslands than in the neighboring forests. These northern montane grasslands occur where summers are predominantly dry and winter precipitation falls as rain. Montane grasslands are similar to subalpine counterparts but represent species that do not occur at higher altitudes. The fire regime in montane grasslands is more frequent than subalpine grasslands, particularly in parkland and valleys near ponderosa pine systems. Stands have a moderately dense cool-season, medium-tall bunch grasses dominated by rough fescue, bluebunch wheatgrass, Idaho fescue, basin wildrye, slender wheatgrass, Pumpelly's brome, Richardson's needlegrass, western needlegrass, prairie Junegrass, as well as threadleaf sedge and timber oatgrass. Common forbs include old man's whiskers, northern bedstraw, bluebell bellflower, littleleaf pussytoes, sticky purple geranium, and slender cinquefoil. Shrub cover is generally nonexistent in southern examples but can occur in adjacent wetlands or riparian areas.

Northern Rocky Mountain Subalpine Dry Grassland

This is a high-elevation grassland system dominated by perennial grasses and forbs occurring on dry sites, particularly south-facing slopes. It is most extensive in the Canadian Rockies portion of the Rocky Mountain cordillera, extending south into western Montana, eastern Washington, and Idaho. Subalpine dry grasslands are small meadows to large open parks surrounded by conifer trees. In general soil textures are much finer and soils are often deeper under grasslands than in the neighboring forests. Grasslands are composed primarily of tussock-forming species that form a dense sod that makes root penetration difficult for tree species. Disturbance from fire also plays a role in maintaining these open grassy areas. Typical dominant species include prairie Junegrass, rough fescue, Idaho fescue, greenleaf fescue, western needlegrass, Richardson's needlegrass, Pumpelly's brome, slender wheatgrass, spike trisetum, Virginia strawberry, and fireweed.

Rocky Mountain Subalpine Mesic Meadow

This Rocky Mountain ecological system is restricted to sites in the subalpine zone where finely textured soils, snow deposition, or wind-swept dry conditions limit tree establishment. It is found typically above 3000 m (9843 ft) in elevation in the southern part of its range and above 1500 m (4921 ft) in the northern part. These upland communities occur on gentle to moderate-gradient slopes. The soils are typically seasonally moist to saturated in the spring but dry out later in the growing season. These sites are not as wet as those found in Rocky Mountain Alpine-Montane Wet Meadow. Vegetation is typically forb-rich, with forbs contributing more to overall herbaceous cover than graminoids. Important taxa include fleabane, aster, bluebells, penstemon, bellflower, lupine, goldenrod, licorice-root, western meadow-rue, Sitka valerian, arrowleaf balsamroot, mule-ears, tufted hairgrass, prairie Junegrass, and shrubby cinquefoil.

Alpine

Rocky Mountain Alpine Dwarf-Shrubland

This widespread ecological system occurs above upper timberline throughout the Rocky Mountain cordillera, including alpine areas of ranges in Utah and Nevada, north into Canada. Elevations are above 3360 m (11,111 ft) in the Colorado Rockies but drop to less than 2250 m (7381 ft) in southeastern British Columbia. This system occurs in areas of level or concave glacial topography, with late-lying snow and subirrigation from surrounding slopes. Soils are moist but well-drained, strongly acid, and often have substantial peat layers. Vegetation in these areas is controlled by snow retention, wind desiccation, permafrost, and a short growing season. This ecological system is characterized by a semi-continuous layer of dwarf-shrubs or dwarf willows, which form a heath-type ground cover less than 0.5 m (1.6 ft) in height, and dense tufts of grasses and scattered forbs occur. Eightpetal mountain-avens communities occur on more wind-swept and drier sites than the heath communities. Within these communities, western moss heather, eightpetal mountain-avens, arctic willow, netleaf willow, or pink mountainheath can be dominant shrubs. Blueberry, western Labrador tea, yellow mountainheath, and laurel may also be shrub associates. The herbaceous layer is a mixture of sedges and forbs, including fleabane, partridgefoot, woolly pussytoes, tundra aster, lousewort, Indian paintbrush, tufted hairgrass, white marsh marigold, fawnlily, Parry's rush, Piper's woodrush, showy sedge, black alpine sedge, and American bistort. Fell-fields often intermingle with the alpine dwarf-shrubland.

Rocky Mountain Dry Tundra

This widespread ecological system occurs above upper treeline throughout the Rocky Mountain cordillera, including alpine areas of ranges in Utah, Idaho, and Nevada, and isolated alpine sites in the northeastern Cascades. It is found on gentle to moderate slopes, flat ridges, valleys, and basins, where the soil has become relatively stabilized and the water supply is more or less constant. Vegetation is limited by long snow retention, wind desiccation, permafrost, and a

short growing season. This system is characterized by a dense cover of low-growing, perennial graminoids and forbs. Rhizomatous, sod-forming sedges are dominant, and prostrate and mat-forming plants with thick rootstocks or taproots characterize the forbs. Dominant species include blackroot sedge, dryspike sedge, northern singlespike sedge, spike sedge, tufted hairgrass, alpine fescue, Idaho fescue, Ross' avens, Bellardi bog sedge, and cushion phlox. Although alpine tundra dry meadow is the matrix of the alpine zone, it typically intermingles with alpine bedrock and scree, ice field, fell-field, alpine dwarf-shrubland, and alpine wet meadow systems.

Rocky Mountain Alpine–Montane Wet Meadow

These are high-elevation communities found throughout the Rocky Mountains and Intermountain regions, dominated by herbaceous species found on wetter sites with very low-velocity surface and subsurface flows. They range in elevation from montane to alpine (1000–3600 m). These types occur as large meadows in montane or subalpine valleys, as narrow strips bordering ponds, lakes, and streams, and along toeslope seeps. They are typically found on flat areas or gentle slopes, but may also occur on sub-irrigated sites with slopes up to 10%. In alpine regions, sites typically are small depressions located below late-melting snow patches or on snowbeds. Soils of this system may be mineral or organic. In either case, soils show typical hydric soil characteristics, including high organic content. This system often occurs as a mosaic of several plant associations, often dominated by grasses, sedges, and forbs, including slimstem reedgrass, white marsh marigold, heartleaf bittercress, sheep sedge, smallwing sedge, black alpine sedge, mountain sedge, native sedge, tufted hairgrass, fewflower spikerush, Drummond's rush, alpine yellowcress, arrowleaf ragwort, Parry's clover, and American globeflower. Often alpine dwarf-shrublands, especially those dominated by willow, are immediately adjacent to the wet meadows. Wet meadows are tightly associated with snowmelt and typically not subjected to disturbance events, such as flooding.

North American Alpine Ice Field

This widespread ecological system is composed of unvegetated landscapes of ice and snow at the highest elevations where snowfall accumulates faster than it melts. Environmental conditions include snow and ice retention, wind desiccation, and permafrost. Snowpacks and ice fields never melt or, if so, then for only a few weeks. This system is part of the alpine mosaic consisting of alpine bedrock and scree, tundra dry meadow, wet meadow, fell-fields, and dwarf-shrubland.

Rocky Mountain Alpine Bedrock and Scree

This ecological system is restricted to the highest elevations of the Rocky Mountains, from Alberta and British Columbia south into New Mexico, west into the highest mountain ranges of the Great Basin. It is composed of barren and sparsely vegetated alpine substrates, typically including both bedrock outcrop and scree slopes, having lichen-dominated communities. Exposure to

desiccating winds, rocky and sometimes unstable substrates, and a short growing season limit plant growth. There can be sparse cover of forbs, grasses, lichens and low shrubs.

Open Water

Open Water

This system comprises large waterbodies. Typical examples include major rivers, reservoirs, and lakes. Shallow water may include growths of aquatic plants, but vegetation is typically sparse or lacking in this system.

Southern Wetland

Columbia Plateau Silver Sagebrush Seasonally Flooded Shrub–Steppe

This ecological system includes sagebrush communities occurring at lowland and montane elevations in the Columbia Plateau–northern Great Basin region, east almost to the Great Plains. These are generally depressional wetlands or non–alkaline playas, occurring as small– or occasionally large–patch communities, in a sagebrush or montane forest matrix. Climate is generally semi–arid, although it can be cool in montane areas. This system occurs in poorly drained depressional wetlands, the largest characterized as playas, the smaller as vernal pools, or along seasonal stream channels in valley bottoms or mountain meadows. Silver sagebrush is dominant, with basin big sagebrush, Wyoming big sagebrush, or mountain big sagebrush occasionally codominant. Understory grasses and forbs include Sandberg bluegrass, Cusick’s bluegrass, pullup muhly, mat muhly, and basin wildrye dominant at the drier sites; common spikerush, tufted hairgrass, and sedge species dominate at wetter or higher–elevation sites.

Inter–Mountain Basins Greasewood Flat

This ecological system occurs throughout much of the western U. S. in the Intermountain basins and extends onto the western Great Plains. It typically occurs near drainages on stream terraces and flats or may form rings around more sparsely vegetated playas. Sites typically have saline soils and a shallow water table. Sites flood intermittently but remain dry for most growing seasons. The water table remains high enough to maintain vegetation despite salt accumulations. This system usually occurs as a mosaic of multiple communities with open to moderately dense shrublands dominated or codominated by greasewood. Fourwing saltbush, shadscale saltbush, or winterfat may be present to codominant. Stands are often surrounded by mixed salt desert scrub. The herbaceous layer, if present, is usually dominated by grasses, including alkali sacaton, inland saltgrass, or common spikerush.

North American Arid West Emergent Marsh

This widespread ecological system occurs throughout much of the arid and semi-arid regions of western North America, typically surrounded by savanna, shrub steppe, or desert vegetation. Natural marshes may occur in depressions in the landscape (ponds, kettle ponds), as fringes around lakes, and along slow-flowing streams and rivers (such riparian marshes are also referred to as sloughs). Marshes are frequently or continually inundated, with water depths up to 2 m. Water levels may be stable, or may fluctuate 1 m (3.3 ft) or more over the course of the growing season. Water may be alkaline or semi-alkaline, but alkalinity is highly variable even within the same complex of wetlands. Marshes have distinctive soils that are typically mineral but can also accumulate organic material. Soils have characteristics that result from long periods of anaerobic conditions. The vegetation is characterized by herbaceous plants that are adapted to saturated soil. Common emergent and floating vegetation includes species of bulrush, cattail, rush, pondweed, knotweed, pond-lily, and canarygrass. This system may also include areas of relatively deep water with floating-leaved plants (duckweed, pondweed, and brasenias) and submergent and floating plants, such as watermilfoil, hornwort, and waterweed.

Inter-Mountain Basins Playa

This ecological system is composed of barren and sparsely vegetated playas (generally <10% plant cover) found in the intermountain western U. S. Salt crusts are common throughout, with small saltgrass beds in depressions and sparse shrubs around the margins. These systems are intermittently flooded. Water is prevented from percolating through the soil by an impermeable soil subhorizon and is left to evaporate. Soil salinity varies greatly with soil moisture and greatly affects species composition. Characteristic species include iodinebush, greasewood, spiny hopsage, Lemmon's alkaligrass, basin wildrye, inland saltgrass, and saltbush.

Riparian Woodland

Columbia Basin Foothill Riparian Woodland and Shrubland

This is a low-elevation riparian system found on the periphery of the mountains surrounding the Columbia River Basin along major tributaries and the main stem of the Columbia at relatively low elevations. This riparian system is associated with streams at and below lower treeline, including permanent, intermittent, and ephemeral streams having woody riparian vegetation. These forests and woodlands require flooding and some gravels for reestablishment. They are found in low-elevation canyons and draws, floodplains, steep-sided canyons, or narrow V-shaped valleys with rocky substrates. Sites are subject to temporary flooding during spring runoff. Underlying gravels that keep the water table just below the ground surface are favored substrates for cottonwood. Rafted ice and logs in freshets may cause considerable damage to tree boles. Beavers crop younger cottonwood and willows and frequently dam side channels occurring in these stands. Important and diagnostic trees include black cottonwood, white

alder, quaking aspen, netleaf hackberry, water birch, and ponderosa pine. Important shrubs include black hawthorn, Lewis' mock orange, red-osier dogwood, Pacific willow, Nootka rose, Woods' rose, Saskatoon serviceberry, chokecherry, and common snowberry.

Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland

This system occurs in mountain ranges of the Great Basin and along the eastern slope of the Sierra Nevada within a broad elevation range from about 1220 m (4000 ft) to over 2135 m (7000 ft). This system often occurs as a mosaic of multiple communities that are tree-dominated and have a diverse shrub component. The variety of plant associations connected to this system reflects elevation, stream gradient, floodplain width, and flooding events. Dominant trees may include white fir, gray alder, water birch, narrowleaf cottonwood, black cottonwood, and Douglas-fir. Dominant shrubs include silver sagebrush, red-osier dogwood, narrowleaf willow, arroyo willow, Lemmon's willow, or yellow willow. Herbaceous layers are often dominated by species of sedge and rush and perennial grasses and mesic forbs, such as tufted hairgrass, slender wheatgrass, fowl mannagrass, Rocky Mountain iris, starry false lily-of-the-valley, or Fendler's meadow-rue. Introduced forage species such as creeping bentgrass, Kentucky bluegrass, timothy, and cheatgrass are often present in disturbed stands. These are disturbance-driven systems that require flooding, scour, and deposition for seed germination and maintenance of vegetation.

Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland

This system of the northern Rocky Mountains and the east slopes of the Cascades consists of deciduous and mixed conifer-deciduous forests that occur on streambanks and river floodplains of the lower montane into foothill zones. Riparian forest stands are maintained by annual flooding and hydric soils throughout the growing season. Riparian forests are often accompanied by riparian shrublands or open areas dominated by wet meadows. Balsalm poplar is the key species. Several other tree species can be mixed in the canopy, including quaking aspen, paper birch, water birch, and white spruce. Understory shrubs include red-osier dogwood, gray alder, paper birch, and common snowberry.

Rocky Mountain Lower Montane Riparian Woodland and Shrubland

This system is found throughout the Rocky Mountain and Colorado Plateau regions within a broad elevation range from approximately 900 to 2800 m. This system often occurs as a mosaic of multiple communities that are tree-dominated with diverse shrubs. This system is dependent on episodic flooding. Stands occur within the flood zone of rivers, on islands, sand or cobble bars, and immediate streambanks. They can form large, wide occurrences on mid-channel islands in larger rivers or narrow bands on small, rocky canyon tributaries, and well-drained benches. The system also typically occurs in backwater channels and other perennially wet but less scoured sites, such as floodplain swales and irrigation ditches. Dominant trees may include boxelder, narrowleaf cottonwood,

balsalm poplar, Douglas–fir, blue spruce, peachleaf willow, or Rocky Mountain juniper. Dominant shrubs include Rocky Mountain maple, gray alder, water birch, red–osier dogwood, river hawthorn, chokecherry, skunkbush sumac, Drummond’s willow, narrowleaf willow, shining willow, silver buffaloberry, or snowberry. Introduced Russian olive and tamarisk are common in some stands.

Rocky Mountain Subalpine–Montane Riparian Shrubland

This system occurs throughout the Rocky Mountain cordillera from New Mexico north into Montana and also occurs in mountainous areas of the Intermountain region and Colorado Plateau. These are montane to subalpine riparian shrublands occurring as narrow bands of shrubs lining streambanks and alluvial terraces in low–gradient valley bottoms and floodplains with sinuous stream channels. Generally the system is found at higher elevations but can be found anywhere from 1700–3475 m. Stands also occur around seeps, fens, and isolated springs on hillslopes away from valley bottoms. This system often occurs as a mosaic of multiple communities that are shrub– and herb–dominated and includes above–treeline, willow–dominated, snowmelt–fed basins that feed into streams. The dominant shrubs reflect the large elevational gradient and include gray alder, dwarf birch, water birch, red–osier dogwood, Bebb willow, Booth’s willow, shortfruit willow, Drummond’s willow, Geyer’s willow, diamondleaf willow, and Wolf’s willow. Generally the upland vegetation surrounding these riparian systems are of either conifer or aspen forests.

Rocky Mountain Subalpine–Montane Riparian Woodland

This riparian woodland system comprises seasonally flooded forests and woodlands found at montane to subalpine elevations of the Rocky Mountain cordillera, from southern New Mexico north into Montana and west into the Intermountain region, as well as the interior of British Columbia and the eastern slopes of the Cascade Mountains. This system contains conifer and aspen woodlands that line montane streams. These are communities tolerant of periodic flooding and high water tables. Snowmelt moisture in this system may create shallow water tables or seeps for a portion of the growing season. Stands typically occur at elevations between 1500–3300 m (4920–10,830 ft); farther north, elevation ranges between 900 and 2000 m. The system occurs on floodplains or terraces of rivers and streams, in V–shaped, and in narrow valleys and canyons where there is cold–air drainage. Less frequently, stands occur in moderate–wide valley bottoms on large floodplains along broad, meandering rivers, and on pond or lake margins. Dominant trees include subalpine fir, Engelmann spruce, Douglas–fir, blue spruce, quaking aspen, and Rocky Mountain juniper. Other trees that may be present include gray alder, white fir, lodgepole pine, narrowleaf cottonwood, box elder, and Utah juniper.

Dune, Canyon, and Rockland

Inter–Mountain Basins Active and Stabilized Dune

This ecological system occurs in intermountain basins and is composed of unvegetated to moderately vegetated (<10–30% plant cover) active and stabilized dunes and sandsheets. Species occupying these environments are often adapted to shifting, coarse-textured substrates (usually quartz sand) and form patchy or open grasslands, shrublands, or steppe composed of Indian ricegrass, basin big sagebrush, fourwing saltbush, rubber rabbitbrush, yellow wildrye, chokecherry, lemon scurfpea, antelope bitterbrush, alkali sacaton, or crinklemat.

Inter–Mountain Basins Cliff and Canyon

This ecological system occurs from foothill to subalpine elevations and includes barren and sparsely vegetated landscapes (generally <10% plant cover) of steep cliff faces, narrow canyons, and smaller rock outcrops of various igneous, sedimentary, and metamorphic bedrock types. Also included are sites with unstable scree and talus slopes that typically occur below cliff faces. Widely scattered trees and shrubs may include white fir, limber pine, singleleaf pinyon, juniper, big sagebrush, antelope bitterbrush, curl-leaf mountain mahogany, oceanspray, and other species often common in adjacent plant communities.

Inter–Mountain Basins Volcanic Rock and Cinder Land

This ecological system occurs in the intermountain western U. S. and is limited to barren and sparsely vegetated (generally <10% plant cover) volcanic substrates such as basalt lava, basalt dikes with associated colluvium, basalt cliff faces and uplifted "backbones," tuff, cinder cones, or cinder fields. It may occur as large-patch, small-patch and linear (dikes) spatial patterns. Vegetation is variable and includes a variety of species depending on local environmental conditions, such as elevation or the age and type of substrate. At montane and foothill elevations, scattered ponderosa pine, limber pine, or juniper trees may be present. Shrubs, such as fourwing saltbush and cushion buckwheat, are often present on lava flows and cinder fields.

Rocky Mountain Cliff, Canyon and Massive Bedrock

This ecological system of barren and sparsely vegetated landscapes (generally <10% plant cover) is associated with steep cliff faces, narrow canyons, and smaller rock outcrops of various igneous, sedimentary, and metamorphic bedrock. The system occurs throughout the Rocky Mountains and northeastern Cascade Ranges in North America. Also included are sites with unstable scree and talus slopes that typically occur below cliff faces. Soil development is limited. Small patches of vegetation may be dense, but trees and shrubs are typically widely scattered. Characteristic trees includes Douglas-fir, ponderosa pine, limber pine, quaking aspen, white fir, and subalpine fir, or juniper at lower elevations. Shrubs may include oceanspray, currant, ninebark, rose, juniper, creeping barberry, skunkbush sumac, or Saskatoon serviceberry. Herbaceous plants are not well-represented.