

**Field Key to Ecological Systems
of Map Zones 77, 78 and Portions of 75
North Pacific Maritime Region, Alaska, United States**

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Introduction

The following keys to NatureServe ecological systems cover the areas found in maritime Alaska, generally within NLCD map zones 77, 78, and portions of 75 (Figure 1). Three other documents contain field keys to the ecological systems of the Arctic, Aleutian and Boreal regions of Alaska. The field keys were written for LANDFIRE by ecology staff of the Alaska Natural Heritage Program (<http://aknhp.uaa.alaska.edu/>), which is housed with the University of Alaska Anchorage. Descriptions for each ecological system can be found on NatureServe's public website, NatureServe Explorer (<http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol>).

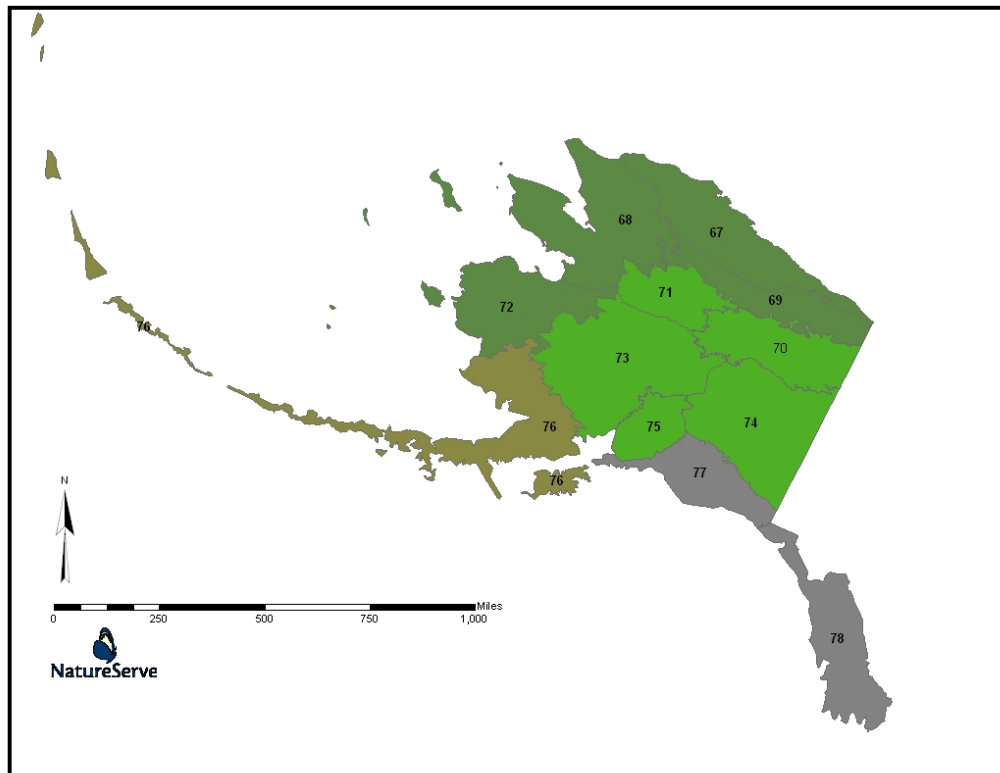


Figure 1. LANDFIRE map zones for Alaska. Keys in this document cover zones 77, 78, and portions of 75.

The ecological systems included in these keys are intended to represent the legend that LANDFIRE will be striving to map for existing vegetation. Our primary purpose was to provide keys for the natural and near-natural vegetation of these zones.

Some types are in the keys that characteristically occur at small spatial scales (generally <2 ha in size) and hence may not be mappable by the LANDFIRE project. However, we have chosen to be inclusive in the keys, so that the user will have information on these system types for comparison purposes. In some cases they may be important for modeling fire condition class and, given their relative distinctiveness on the landscape, they may indeed be mappable.

Plant names are almost always in Latin and follow the nomenclature of Kartesz (1999). In limited cases, we have included synonyms for some taxa. In some cases a common name is used, particularly for choices where a large number of species within a genus would need to be listed. For example, couplets may say “sedge cover >25%”, where any combination of *Carex* or *Eriophorum* species could meet the criteria specified in the couplet. Some of the common names used (and Genera for those) include sedge (*Carex*), alder (*Alnus*), and willow (*Salix*).

The keys are “dichotomous”, which means the user follows the order of the ‘couplets’ and makes a choice between the 2 options represented in the couplet. The ordering of the couplets in each key does matter, and the user should choose the option in each couplet that best fits the data or field situation. A choice leads the user to the next couplet to be utilized in the keying process, via a number at the far right, or else leads to a final result (an ecological system type or an existing vegetation type).

If the choice the user makes leads to a “result”, then an Ecological System is named. Once an ecological system is reached in the key, it is always useful to read the description of the system to ascertain if the result fits what is described for the system.

Systems do not include Latin species names in them, and always start with a Biogeographic region (e.g. Alaska Arctic Acidic Sparse Tundra), and are in bold. Keys are generally based on dominance within vegetation strata, with tree cover generally considered first, then that of shrubs, then the herbaceous component. Codominant species within a given strata are important as well, in some cases a system type will have 2 or more codominant species, which may or may not be present in all stands. Many ecological systems will have a variable physiognomy; where appropriate these variable systems have been placed into the keys in several places (i.e. some grassland systems have a “shrub-steppe” physiognomy and hence will be in the key both as shrub-steppe and herbaceous). Environmental context parameters are also used in the keys, such as for distinguishing coastal or wetland systems from upland and non-coastal systems.

Some terminology is commonly employed throughout the keys that distinguish general spatial characteristics of the vegetation or environmental setting. For example ‘matrix’ types of vegetation are dominant across the majority of a given landscape, while ‘large

patch' types tend to occur as distinctive patches within the larger 'matrix.' Elevation-based life zones are commonly employed, with reference to 'alpine,' 'subalpine,' 'montane,' or 'foothill' zones. These zones vary in actual elevational thresholds across multiple map zones, and within individual map zones. More precise definition of these elevation breaks by map zone could be accomplished with additional research.

In the next section of the document we have provided a table showing the LANDFIRE legend units for the U.S. that represent non-natural vegetation, and a short description for each of them. They are not formally incorporated into the keys, since they are typically recognizable without the use of a key, or else their floristic composition is so variable as to be not useful in a field key. Most of these non-natural land cover types will not be mapped in the maritime region of Alaska, except perhaps in small areas adjacent to cities and towns.

Land Use, Unvegetated, Semi-natural and Altered Vegetation

LAND USE OR UNVEGETATED SURFACES	
Open Water	Open water
Developed	Generally developed lands.
Developed, Open Space	Vegetation (primarily grasses) planted in developed settings for recreation, erosion control, or aesthetic purposes. Impervious surfaces account for less than 20% of total cover. Examples include parks, lawns, golf courses, airport grasses, and industrial site grasses.
Developed, Low Intensity	Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-50% of total cover. These areas most commonly include single-family housing units.
Developed, Medium Intensity	Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50-80% of the total cover. These areas most commonly include single-family housing units
Developed, High Intensity	Includes highly developed areas where people reside in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to 100% of the total cover.
Agriculture	Generally developed for agricultural uses.
Pasture/Hay	These agriculture lands typically have perennial herbaceous cover (e.g. regularly-shaped plantings) used for livestock grazing or the production of hay. There are obvious signs of management such as irrigation and haying that distinguish it from natural grasslands. Identified CRP lands are included in this land cover type.
Cultivated Crops and Irrigated Agriculture	These areas used for the production of crops, such as corn, soybeans, small grains, sunflowers, vegetables, and cotton, typically on an annual cycle. Agricultural plant cover is variable depending on season and type of farming. Other areas include more stable land cover of orchards and vineyards.
Perennial Ice/Snow	
SEMI-NATURAL / ALTERED VEGETATION	
Ruderal Vegetation	Vegetation resulting from succession following significant anthropogenic disturbance of an area. It is generally characterized by unnatural combinations of species (primarily native species, though they often contain slight or substantial numbers and amounts of species alien to the region as well)
Ruderal Upland - Old Field	
Ruderal Upland - Abandoned Tree Plantation	
Ruderal Wetland	

Introduced Vegetation	Vegetation dominated by introduced species. These are spontaneous, self-perpetuating, and not (immediately) the result of planting, cultivation, or human maintenance. Land occupied by introduced vegetation is generally permanently altered (converted) unless restoration efforts are undertaken.
Introduced Upland Vegetation - Treed	Land cover is significantly altered/disturbed by introduced tree species.
Introduced Upland Vegetation - Shrub	Land cover is significantly altered/disturbed by introduced woody and/or herbaceous vegetation.
Introduced Upland Vegetation - Annual and Biennial Forbland	Land cover is significantly altered/disturbed by introduced annual and biennial forbs. Natural vegetation types are no longer recognizable. Typical species that dominate these areas are <i>Acroptilon repens</i> , <i>Leucanthemum vulgare</i> , <i>Cirsium arvense</i> , <i>C. vulgare</i> , <i>Euphorbia esula</i> , <i>Lepidium latifolium</i> , <i>Carduus nutans</i> , <i>Centaurea</i> spp. (<i>diffusa</i> , <i>solstitialis</i>), <i>Salsola kali</i> , <i>Bassia scoparia</i> , <i>Halogeton glomeratus</i> , <i>Melilotus officinalis</i> , and <i>Cardaria</i> spp.
Introduced Upland Vegetation – Annual Grassland	Land cover is significantly altered/disturbed by introduced annual grasses. Natural vegetation types are no longer recognizable. Typical species include <i>Bromus japonicus</i> , <i>B. rigidus</i> , <i>B. rubens</i> , <i>B. tectorum</i> , <i>Taeniatherum caput-medusae</i> , and/or <i>Schismus barbatus</i> .
Introduced Upland Vegetation - Perennial Grassland and Forbland	Land cover is significantly altered/disturbed by introduced, non-native perennial grasses and forbs. Natural vegetation types are no longer recognizable. Grass species include <i>Agropyron cristatum</i> , <i>Poa bulbosa</i> , <i>Bromus inermis</i> , <i>Phleum pratense</i> , and <i>Poa pratensis</i> . Forbs may include: <i>Centaurea</i> spp., <i>Cirsium arvense</i> , <i>Euphorbia esula</i> , <i>Lepidium</i> spp., <i>Melilotus</i> spp.
Introduced Riparian Vegetation	Land cover is altered/disturbed and dominated by introduced woody vegetation (woodlands and shrublands). Typical riparian trees and shrubs include <i>Elaeagnus angustifolia</i> , <i>Tamarix</i> spp., <i>Triadica sebifera</i> , etc.
Introduced Wetland Vegetation	Land cover is altered/disturbed and dominated by introduced wetland vegetation. Species may include <i>Lythrum salicaria</i> , <i>Phalaris arundinacea</i> , <i>Phragmites australis</i> , etc.
Modified/Managed Vegetation	Vegetation resulting from management or modification of natural/near natural; vegetation, but producing a structural and floristic combination not clearly known to have a natural analogue. Modified vegetation may be easily restorable by either management, restoration of ecological processes, and/or succession.
Modified/Managed Upland Vegetation	Land cover is apparently managed/modified and dominated by trees and/or shrubs. Vegetation is a mixture of herbaceous, shrub, and tree species.
Recently Burned Forest and Woodland	Land cover is apparently modified by recent fires which have burned forest and woodland vegetation. Vegetation is a mixture of herbaceous, shrub, and tree species.
Recently Burned Shrubland	Land cover is apparently modified by recent fires which have shrubland vegetation. Vegetation is a mixture of herbaceous and shrub species.
Recently Burned Grassland	Land cover is apparently modified by recent fires which have burned grassland vegetation. Vegetation is a mixture of herbaceous and shrub species.
Managed Tree Plantation	Land cover is apparently modified and appears as a managed tree plantation.
Recently Logged Timberland	Land cover is apparently modified and appears as logged timberland.
Modified/Managed Wetland Vegetation	These areas include created and obviously managed wetlands of varying size resulting from water diversion. Artificial Wetlands will be mapped where obvious built structures may be distinguished from imagery.

Key To Pacific Maritime Alaska Ecological Systems And Existing Vegetation Types

This key is intended for identifying Ecological Systems and selected existing vegetation types that are found in the Pacific maritime region of Alaska. The region occurs along the Gulf of Alaska Coast and roughly follows the crest of the Kenai, Chugach, St. Elias, and Coast Mountain Ranges. This region is part of the North American temperate rainforest, which extends south into British Columbia and Washington. The Alaska coastal forests span two of the temperate rainforest zones: the subpolar rainforest and the perhumid rainforest.

More specifically, the Alaska maritime region includes the coastal and Sitka spruce zones of Kodiak Island, a narrow band along the Katmai Coast on the west side of Cook Inlet, the Gulf Coast side of the Kenai Peninsula (Kenai Fjords and Blying Sound), the eastern tip of Turnagain Arm (Portage, Placer, 20 Mile drainages), Prince William Sound, east along the gulf coast to southeast Alaska. The Maritime region includes most of southeast Alaska, exceptions are upper valleys or large watersheds near the Canadian border that are more like the boreal transition zone (Chilkat River, Skagway, Upper Taku). These boundaries also coincide roughly with ecoregional boundaries (Nowacki et al. 2001) and species turnover, and are useful descriptors of geographic distribution. In general, the maritime region coincides with the following Alaska ecoregions: 28 (northern and coastal portion), 29, 30 (south of Chugach-St. Elias Crest), 31 (west of Coast Mountains crest), 32 (Figure 2).

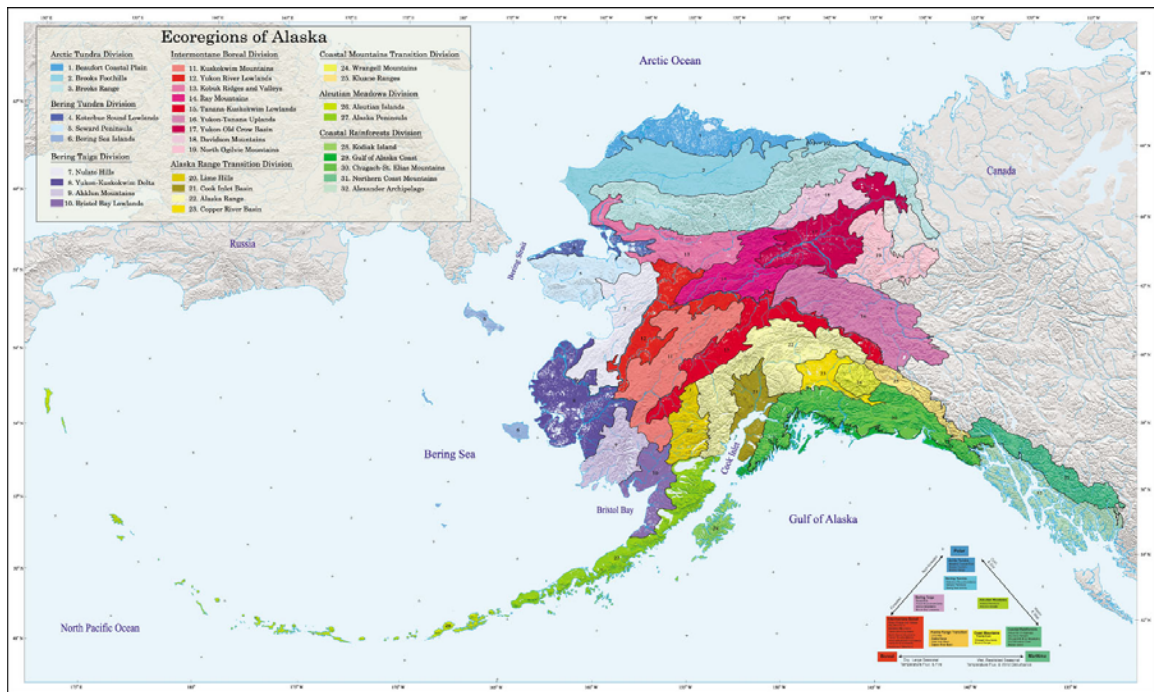


Figure 2. Ecoregions of Alaska. Figure from the final report of Nowacki et al. (2001). <http://agdc.usgs.gov/ecoreg/ecoreg.html> [Nowacki, G.; P. Spencer, M. Fleming, T. Brock, and T. Jorgenson. Ecoregions of Alaska: 2001. U.S. Geological Survey Open-File Report 02-297 (map).]

General Key

1. Riverine or coastal systems.....	5
1. Not as above (other uplands or lowlands)	2
2. Total vegetation cover is less than 10%	<u>Unvegetated Systems</u>
2. Total vegetation cover is greater than 10% (forest, shrub, or herbaceous).....	3
3. Total canopy cover of trees is greater than 10%	<u>Forested Systems</u>
3. Total canopy cover of trees is less than 10% (shrub, herbaceous).....	4
4. Total canopy cover of shrubs is at least 25%	<u>Shrubland Systems</u>
4. Total canopy cover of shrubs is less than 25%	<u>Herbaceous Systems</u> and <u>Sparse Shrub Systems</u>
5. Coastal systems influenced by ocean tides, currents, and wave action including beaches, beach meadows, dunes, and tidal marshes	<u>Coastal Systems</u>
5. Riverine systems	<u>Floodplains</u>

Forested Ecological Systems

1. Peatlands and poorly drained forest	2
1. Well-drained or productive forest	5
2. Peatlands; tree canopy usually less than 25%; dwarf or small-statured trees.....	3
2. Poorly drained or low-productivity forest; open canopy (25-60%)	4
3. <i>Pinus contorta</i> var. <i>contorta</i> dominates tree cover	Alaskan Pacific Maritime Shore Pine Bog and Poor Fen
3. <i>Tsuga mertensiana</i> dominates tree cover	Alaskan Pacific Maritime Mountain Hemlock Peatland
4. <i>Tsuga mertensiana</i> is the dominant tree; north and west of Yakutat (subpolar rainforest)	Alaskan Pacific Maritime Poorly Drained Conifer Woodland
4. No single conifer dominates; common trees include <i>Tsuga heterophylla</i> , <i>Tsuga mertensiana</i> , <i>Thuja plicata</i> , <i>Cupressus nootkatensis</i> , <i>Pinus contorta</i>	Alaskan Pacific Maritime Poorly Drained Conifer Woodland
5. <i>Populus balsamifera</i> cover is at least 25 % of the total tree cover; uplands	Alaskan Pacific Maritime Periglacial Woodland and Shrubland
5. <i>Populus balsamifera</i> cover is less than 25 % of the total tree cover	6
6. <i>Tsuga mertensiana</i> cover is at least 25% of the total tree cover	12
6. <i>Tsuga mertensiana</i> cover is less than 25% of the total tree cover.....	7
7. <i>Thuja plicata</i> cover is 25% or more of the total tree cover	North Pacific Hypermaritime Western Red-cedar-Western Hemlock Forest
7. <i>Thuja plicata</i> cover is less than 25% of the total tree cover	8
8. <i>Cupressus nootkatensis</i> cover is 25% or more of the total tree cover	

..... North Pacific Mesic Western Hemlock-Yellow-cedar Forest	
8. <i>Cupressus nootkatensis</i> cover is less than 25% of the total tree cover.....	9
9. <i>Abies amabilis</i> cover is 25% or more of the total tree cover	
..... North Pacific Mesic Western Hemlock-Silver Fir Forest	
9. <i>Abies amabilis</i> cover is less than 25% of the total tree cover.....	10
10. <i>Tsuga heterophylla</i> is the dominant tree.....	
..... Alaskan Pacific Maritime Western Hemlock Forest	
10. <i>Picea sitchensis</i> is the dominant tree	11
11. Beach ridges dominated by <i>Picea sitchensis</i>	
..... Alaskan Pacific HyperMaritime Sitka Spruce Beach Ridge	
11. Upland <i>Picea sitchensis</i> forests adjacent to the coast.....	
..... Alaskan Pacific Maritime Sitka Spruce Forest	
12. <i>Abies lasiocarpa</i> is at least 25% of the total tree cover	
..... North Pacific Maritime Mesic Subalpine Parkland	
12. <i>Abies lasiocarpa</i> is less than 25% of the total tree cover	13
13. Forests near treeline; <i>Tsuga mertensiana</i> is the dominant tree; may have krummholz growth form	
..... Alaskan Pacific Maritime Subalpine Mountain Hemlock Woodland	
13. Lower elevation forests with at least 25% cover of <i>Tsuga mertensiana</i> , which can be mixed with <i>Picea sitchensis</i>	
..... Alaskan Pacific Maritime Mountain Hemlock Forest	

Shrubland Ecological Systems

1. Tall-shrub species (<i>Rubus spectabilis</i> included in "tall") have at least 25% cover	2
1. Tall-shrub species have less than 25% cover	5
2. Early-seral deglaciated uplands dominated by <i>Alnus viridis ssp. sinuata</i> and <i>Salix</i> spp.	
..... Alaskan Pacific Maritime Periglacial Woodland and Shrubland	
2. Not recently deglaciated	3
3. Open canopied tall-shrub wetlands.....	
..... North Pacific Shrub Swamp	
3. Not wetlands	4
4. Avalanche slopes (sea level to treeline) dominated by <i>Alnus viridis ssp. sinuata</i> and <i>Rubus spectabilis</i>	
..... Alaskan Pacific Maritime Avalanche Slope Shrubland	
4. <i>Alnus viridis ssp. sinuata</i> and <i>Rubus spectabilis</i> shrublands (usually above treeline) ...	
..... Alaskan Pacific Maritime Subalpine Alder-Salmonberry Shrubland	
5. Low-shrub species have at least 25% cover	6
5. Low-shrub species less than 25% cover.....	7
6. <i>Elliottia pyroliflorus</i> cover is at least 25% (usually above treeline) ...	
..... Alaskan Pacific Maritime Subalpine Copperbush Shrubland	
6. <i>Myrica gale</i> and/or <i>Vaccinium uliginosum</i> cover is at least 25%; wetlands	
..... Alaskan Pacific Maritime Wet Low Shrubland	
7. Dwarf-shrub species have at least 25% cover; alpine heath.....	

- **Alaskan Pacific Maritime Alpine Dwarf-Shrubland**
- 7. Dwarf-shrub species have at least 25% cover; peatlands
- **Alaskan Pacific Maritime Dwarf-shrub-Sphagnum Peatland**
- (also in herbaceous key--not always 25% shrub)

Herbaceous and Sparse Shrub Ecological Systems

- 1. Shallow water (usually >1 m) with aquatic emergent and submerged vegetation
- **Temperate Pacific Freshwater Aquatic Bed**
- 1. Not aquatic 2
- 2. Less than 25% vascular plant cover 3
- 2. More than 25% vascular plant cover 4
- 3. Shrub cover is 10-24%; alpine (or subalpine ridges)
- **Alaskan Pacific Maritime Alpine Sparse Shrub and Fell-field**
- 3. Shrub cover is less than 10%; alpine forbs dominate
- **North Pacific Alpine and Subalpine Bedrock and Scree**
- 4. Wetland herbaceous vegetation 5
- 4. Mesic herbaceous vegetation 8
- 5. Alpine herbaceous wetland **Alaskan Pacific Maritime Alpine Wet Meadow**
- 5. Not alpine 6
- 6. Well-developed peatlands (bogs and poor fens) dominated by *Sphagnum* spp. and dwarf-shrubs; common shrubs include *Andromeda polifolia*, *Kalmia polifolia*, *Vaccinium oxycoccos* (= *Oxycoccus microcarpos*), *Empetrum nigrum*, and *Vaccinium uliginosum*
- **Alaskan Pacific Maritime Dwarf-shrub-Sphagnum Peatland**
- also included in shrubland key, dwarf-shrub cover is sometimes greater than 25%
- 6. Not bogs and poor fens 7.
- 7. Sites with persistent water; usually at least 10 cm above ground surface; common species include *Menyanthes trifoliata*, *Comarum palustre*, *Equisetum fluviatile*
- **Temperate Pacific Freshwater Emergent Marsh**
- 7. Sites without persistent standing water; or sites with an organic mat >40 cm deep that may be floating; common species include *Carex aquatilis* var. *dives*, *Carex saxatilis*, *Menyanthes trifoliata*
- **Alaskan Pacific Maritime Fen and Wet Meadow**
- 8. Mesic meadows occurring from sea level to the subalpine; dominant species are *Calamagrostis canadensis* and *Chamerion angustifolium*
- **Alaskan Pacific Maritime Mesic Herbaceous Meadow**
- 8. Mesic meadows occurring in the alpine and subalpine; common species include *Carex macrochaeta*, *Geranium erianthum*, *Artemisia arctica*, *Lupinus nootkatensis*, and *Valeriana sitchensis*
- **Alaska Sub-boreal and Maritime Alpine Mesic Herbaceous Meadow**

Coastal Ecological Systems

- 1. Subtidal or lower intertidal zones dominated by *Zostera marina* and macrophytic algae
- **North Pacific Maritime Eelgrass Bed**
- 1. Above the subtidal zone 2

- 2. Regularly inundated low-lying tidal marshes and tidal flats3
- 2. Vegetation is above the tidal zone, but may be exposed to periodic inundation4
- 3. Sparsely vegetated or barren tidal flats, inundated very frequently
..... **Temperate Pacific Intertidal Flat**
- 3. Dominant species is *Carex lyngbyei* **Temperate Pacific Tidal Salt and Brackish Marsh**
- 4. Linear coastlines with rocky substrates, including cobble beaches, rocky headlands and
seacliffs affected by salt spray **Alaskan Pacific Maritime Rocky Coastline**
- 4. Coastal areas with sand or silt substrates5
- 5. Coastal meadows and sloughs associated with delta deposits and uplifted marsh deposits
..... **Alaskan Pacific Maritime Coastal Meadow and Slough-Levee**
- 5. Linear coastal areas shaped by the wind and water transport of sand
..... **Alaskan Pacific Maritime Coastal Dune, Beach, and Beach Meadow**

Floodplain Ecological Systems

- 1. Aquatic and wetland vegetation; substrate is water or poorly drained silt
..... **Alaskan Pacific Maritime Shrub and Herbaceous Floodplain Wetland**
- 1. Floodplain vegetation on well-drained deposits (shrub, forest, and herbaceous).....
..... **Alaskan Pacific Maritime Floodplain Forest and Shrubland**

Sparsely and Unvegetated Ecological Systems

- 1. Coastal environment: tidal flat; rocky beaches, sandy beaches, dunes **Use Coastal Systems Key**
- 1. Sparsely vegetated, non-coastal environments.....2
- 2. Alpine and high subalpine talus, cliffs, or bedrock with less than 10% cover of vascular plants
..... **North Pacific Alpine and Subalpine Bedrock and Scree**
- 2. Sparsely vegetated montane environments, or ice and permanent snow.....3
- 3. Permanent or semipermanent snow and ice
..... **North American Glacier and Ice Field**
- 3. Montane and low elevation, non-coastal talus, cliffs, or bedrock with less than 10% cover of
vascular plants **North Pacific Montane Massive Bedrock, Cliff and Talus**