6 | Key Habitats for Wildlife in Alaska

Iliamna Bay, lower Cook Inlet. G. Frost, ABR, used with permission.

Alaska provides a diversity of terrestrial habitats for wildlife due to gradients of elevation, latitude, continentality, and glacial history. These often floristically rich and structurally complex habitats support a diversity of vertebrate wildlife "species of greatest conservation need" (SGCN). The state also hosts extensive freshwater aquatic habitats and surrounding marine waters used by wildlife, fish, and aquatic SGCN.

In the six terrestrial biogeographic regions developed for this State Wildlife Action Plan (SWAP; Figure 6.1), 33 broad-scale terrestrial, freshwater, and coastal habitats were assessed for the occurrence of vertebrate wildlife SGCN. Habitat relationships for SGCN (see Wildlife Species Richness by Habitat, below) were assessed at the Ecological Systems level in the classification of U.S. Terrestrial ecosystems (Comer et al. 2003), which describes mid-scale units of vegetation and land cover. The occurrence and extent of Ecological Systems in each biogeographic region was based on an unpublished update to the Landfire 2020 Existing Vegetation Types map for Alaska (Nawrocki et al. 2024; for the most current Alaska Vegetation Map, see: https://akveg.org/). Because of the large number of Ecological Systems types (roughly 50–70) that occur in each biogeographic region, the habitats used by SGCN were aggregated to a smaller set of broader Macrogroup classes described in the U.S. National Vegetation Classifiction (USNVC Version 3.0). This resulted in the 33 habitat types discussed in this chapter. The USNVC provides a standard methodology for classifying vegetation in North America, the use of which is mandated in federally funded projects (FGDC 2008). This alignment with the USNVC habitat classes for Alaska represents a new approach compared to the 2015 SWAP, which summarized habitat types at a much coarser level. Further aggregation

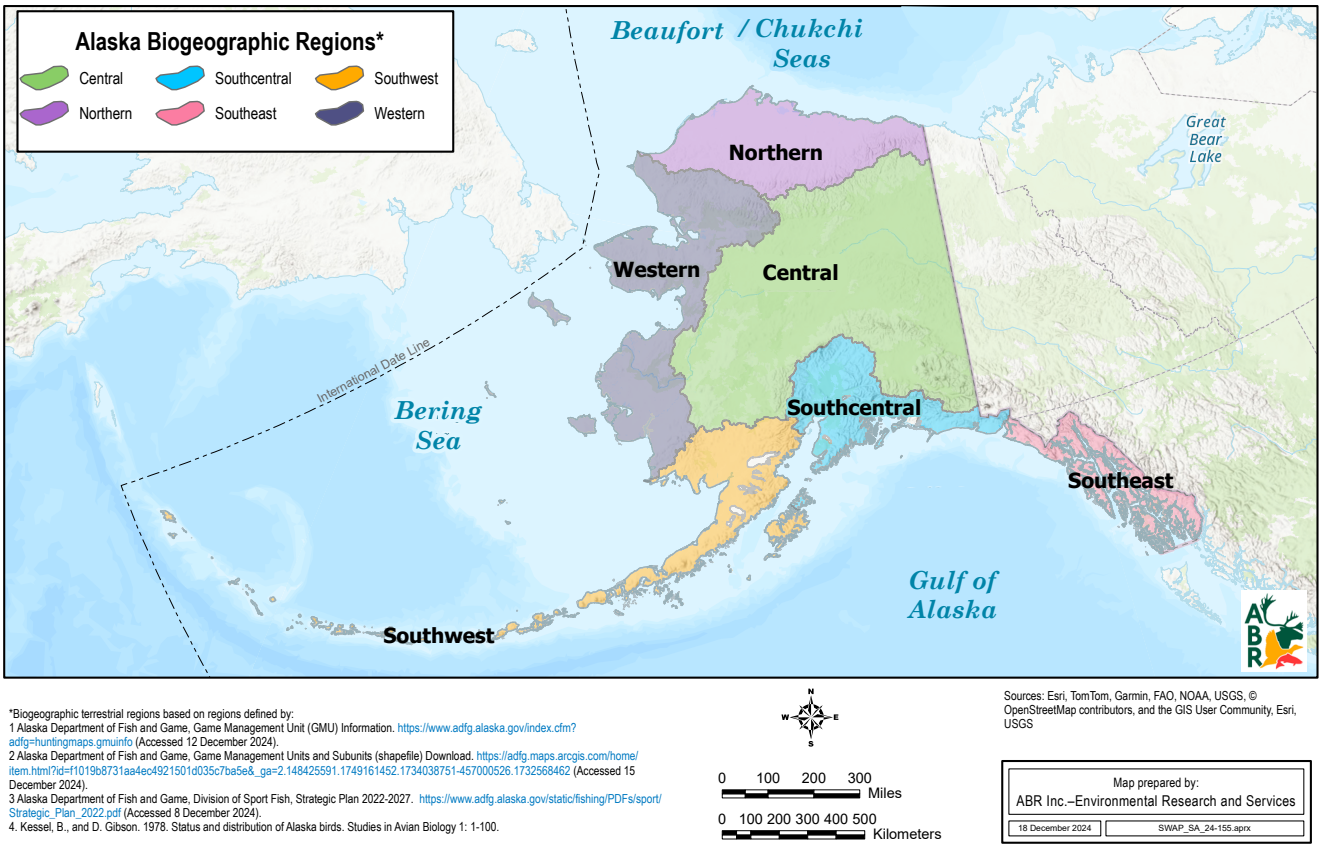


Figure 6.1. Map of the six terrestrial biogeographic regions and three oceanic regions in Alaska used in this wildlife action plan. D. Dissing, ABR.

and simplification of the 33 Macrogroup classes presented in this SWAP can be conducted to support the needs of specific habitat conservation or habitat management projects for SGCN.

Distribution maps of the Macrogroup habitats described in this chapter were prepared using an unpublished draft of the Alaska Vegetation Map (Nawrocki et al. 2025; for more the most current map, see: https://akveg.org/). Using Nawrocki et al. (2025), the areal coverage and percent of Alaska occupied by each habitat type was determined (Table 6.1). The exceptions are rivers and streams, lakes and ponds, and aquatic vegetation at waterbody margins. These freshwater aquatic habitats are not mapped separately from open water in the draft Alaska Vegetation Map. If higher resolution images of the maps and photos presented in this chapter are desired, the reader can download the separate, higher resolution copy of Chapter 6 provided as an online supplement.

Alaska is the only place in North America where Arctic Warblers breed, preferring streamside willow thickets in arctic, central, and western regions of the state. Osado, used with permission.

In the three oceanic regions used in this SWAP (Figure 6.1), we described a set of eight broad-scale marine and intertidal habitat types known to be used regularly by marine birds and mammals (Table 6.1). As with freshwater aquatic habitats noted above, marine habitats are also

Table 6.1. Terrestrial, freshwater, and marine habitats in Alaska. Areal coverage of terrestrial and freshwater habitats (USNVC Macrogroup classes) mapped across Alaska in the draft Alaska Vegetation Map (Nawrocki et al. 2025). Marine habitats described for this State Wildlife Action Plan (SWAP) were not mapped.

Habitat type	Square miles	Percent area in Alaska
Forest and woodlands		
Temperate coastal rainforest	16,731	2.88
Temperate subalpine woodland	7,733	1.33
Boreal forest	51,847	8.94
Boreal subalpine and subarctic woodland	21,607	3.73
Floodplain forests		
Temperate floodplain forest	1,533	0.26
Boreal floodplain forest	25,693	4.43
Freshwater wetlands		
Temperate forested wetland	193	0.03
Boreal forested wetland	57,850	9.98
Temperate marsh, wet meadow, and shrubland	291	0.05
Temperate fen	966	0.17
Boreal marsh, wet meadow, and shrubland	8,902	1.54
Boreal bog	27,904	4.81
Arctic marsh, wet meadow, and shrubland	17,104	2.95
Shrublands and grasslands		
Temperate shrubland and grassland	12,194	2.10
Aleutian heath and meadow	13,321	2.30
Boreal shrubland and grassland	79,342	13.69
Tundra		
Temperate alpine tundra	6,624	1.14
Boreal alpine tundra	10,211	1.76
Arctic tundra	149,496	25.79
Cliff, scree, and rock		
Temperate cliff, scree, and rock vegetation	11,158	1.92
Boreal cliff, scree, and rock vegetation	14,225	2.45
Arctic cliff, scree, and rock vegetation	12,005	2.07
Coastal habitats		
Temperate salt marsh	244	0.04
Temperate intertidal vegetation	68	0.01
Arctic salt marsh	2,856	0.49
Temperate coastal beach and dune	65	0.01
Temperate coastal cliff and bluff	20	<0.01
Arctic coastal shore	191	0.03
Freshwater aquatic habitats		
Rivers and streams	Not mapped	Not mapped
Lakes and ponds	Not mapped	Not mapped
Glacial habitats		
Perennial snow, ice, and glacial outwash	26,279	4.531.33

Table 6.1. Terrestrial, freshwater, and marine habitats in Alaska, continued.

Habitat type	Square miles	Percent area in Alaska
Human-modified habitats		
Recently disturbed or modified	7,039	1.21
Agricultural and developed lands	912	0.16
Marine		
Mudflats and island mudflats	Not mapped	Not mapped
Mainland and island rocky shores	Not mapped	Not mapped
Mainland and island cliffs and bluffs	Not mapped	Not mapped
Mainland and island cobble and sand beaches	Not mapped	Not mapped
Nearshore waters	Not mapped	Not mapped
Offshore shelf waters	Not mapped	Not mapped
Offshore marine waters	Not mapped	Not mapped
Estuarine waters	Not mapped	Not mapped

not mapped in the draft Alaska Vegetation Map, so there were no data available to determine areal coverage numbers for marine habitats. More detailed descriptions of the terrestrial and freshwater habitat types discussed in this chapter, except for the human-modified habitats, are provided in Appendix F. Appendix G provides a comprehensive list of the plant species referenced in the summary and detailed habitat descriptions. The detailed information in Appendices F and G is a resource that can be used by researchers and interested members of the public to get a better understanding the wealth of wildlife habitats that exist in Alaska and their occurrence on the landscape.

Plant taxonomy in this chapter follows the *Checklist of Vascular Plants, Bryophytes, Lichens, and Lichenicolous Fungi of Alaska* (Nawrocki et al. 2020), and common plant names follow the U.S. Department of Agriculture plants database (NRCS 2025). The common and scientific names of all SGCN discussed in this chapter are presented in Chapter 4 and Appendices A through C.

As defined in this chapter, terrestrial habitats include upland, wetland, and freshwater aquatic habitats on the mainland and islands of Alaska. These habitats are described in decreasing order of vegetation structural complexity (i.e., forests, shrublands, herbaceous, sparsely vegetated, aquatic). Marine habitats include coastal and intertidal areas along the mainland and islands, as well as nearshore and offshore waters.

Wildlife Species Richness by Habitat

In a novel approach for Alaska, species richness for vertebrate wildlife SGCN was assessed for 33 coarse-scale terrestrial, freshwater aquatic, and coastal habitats, many of which were mapped across the state, and in eight coarse-scale marine and intertidal habitats (Table 6.1). Species richness (the number of species occurring within a region or habitat area) was assessed by first conducting a matrix habitat evaluation procedure (Johnson and O'Neil 2001, Morrison et al. 2006) to identify the important Ecological Systems (Nawrocki et al. 2024) and USNVC Macrogroup (Nawrocki et al. 2025) habitat classes for each wildlife SGCN. Categorical habitat-value rankings for wildlife SGCN were used to define those habitats consistently used by SGCN and these were identified as the important habitats for each species. In this approach, based on habitat-use information in the scientific literature and extensive field experience in Alaska, habitats were ranked for each SGCN and habitat type as high, moderate, low, or negligible value (Table 6.2). In practice, the combination of high- and

Table 6.2. Categorical habitat-value classes used to calculate species richness for birds, mammals, and amphibians in each terrestrial, freshwater, and marine habitat.

Value class	Description
High	High-value habitats are frequently used during the migration and breeding season for nesting and/or foraging/hunting by nonresident species or for shelter, breeding, denning, overwintering, foraging, and/or hunting by resident species.
Moderate	Moderate-value habitats may be used regularly during the breeding, migration, or wintering seasons for foraging/hunting or as travel corridors but less so than high-value habitats.
Low	Low-value habitats would see little use by the species under consideration and in very low numbers.
Negligible	The species is not expected to occur or would occur very rarely in negligible-value habitats.

Table 6.3. Statewide species richness values for wildlife "species of greatest conservation need" (SGCN) by habitat type (the total number of species that were considered to regularly use each habitat), richness rankings, and percent areal coverage of the 41 coarse-scale terrestrial, freshwater, and marine habitats assessed in Alaska. Richness ranks reflect only the total number of species that can consistently use each habitat; the rankings do not address species richness per unit area because not all habitat sizes are known (some are not mapped in the draft Alaska Vegetation Map [Nawrocki et al. 2025]).

Habitat group	Habitat type	Statewide species richness	Richness rank	Percent area in Alaska
Freshwater wetlands	Boreal marsh, wet meadow, and shrubland	114	1	1.54
Freshwater wetlands	Boreal bog	112	2	4.81
Tundra	Arctic tundra	110	3	25.79
Freshwater wetlands	Arctic marsh, wet meadow, and shrubland	109	4	2.95
Forest and woodlands	Boreal forest	91	5	8.94
Freshwater wetlands	Temperate marsh, wet meadow, and shrubland	90	6	0.05
Freshwater aquatic habitats	Lakes and ponds	86	7	Not mapped
Freshwater wetlands	Boreal forested wetland	81	8	9.98
Floodplain forests	Temperate floodplain forest	75	9	0.26
Coastal habitats	Arctic salt marsh	74	10	0.49
Shrublands and grasslands	Boreal shrubland and grassland	70	11	13.69
Coastal habitats	Temperate coastal beach and dune	69	12	0.01
Human-modified habitats	Recently disturbed or modified	67	13	1.21
Floodplain forests	Boreal floodplain forest	66	14	4.43
Coastal habitats	Temperate salt marsh	66	14	0.04
Forest and woodlands	Temperate coastal rainforest	63	15	2.88
Forest and woodlands	Boreal subalpine and subarctic woodland	62	16	3.73
Marine	Offshore shelf waters	62	16	Not mapped
Shrublands and grasslands	Aleutian heath and meadow	61	17	2.30
Marine	Nearshore waters	58	18	Not mapped
Marine	Estuarine waters	55	19	Not mapped

Table 6.3. Categorical habitat-value classes, continued.

Habitat group	Habitat type	Statewide species richness	Richness rank	Percent area in Alaska
Freshwater aquatic habitats	Rivers and streams	53	20	Not mapped
Human-modified habitats	Agricultural and developed lands	53	20	0.16
Coastal habitats	Arctic coastal shore	52	21	0.03
Freshwater wetlands	Temperate fen	52	21	0.17
Forest and woodlands	Temperate subalpine woodland	49	22	1.33
Freshwater wetlands	Temperate forested wetland	49	22	0.03
Tundra	Boreal alpine tundra	51	23	1.76
Shrublands and grasslands	Temperate shrubland and grassland	50	24	2.10
Coastal habitats	Temperate intertidal vegetation	46	25	0.01
Tundra	Temperate alpine tundra	45	26	1.14
Coastal habitats	Temperate coastal cliff and bluff	42	27	<0.01
Marine	Offshore marine waters	42	27	Not mapped
Marine	Mainland and island cobble and sand beaches	39	28	Not mapped
Cliff, scree, and rock	Arctic cliff, scree, and rock vegetation	34	29	2.07
Marine	Mainland and island rocky shores	33	30	Not mapped
Marine	Mudflats and island mudflats	33	30	Not mapped
Marine	Mainland and island cliffs and bluffs	23	31	Not mapped
Cliff, scree, and rock	Boreal cliff, scree, and rock vegetation	19	32	2.45
Cliff, scree, and rock	Temperate cliff, scree, and rock vegetation	16	33	1.92
Glacial habitats	Perennial snow, ice, and glacial outwash	7	34	4.53

moderate-value rankings for both resident and migratory SGCN represents those habitats that can be consistently used by wildlife SGCN (see also Marcot et al. 2015). These habitat-ranking data for high- and moderate-value habitats were then used to develop species richness numbers by habitat type for wildlife SGCN in the six terrestrial biogeographic and three oceanic regions used in this SWAP (Figure 6.1).

The statewide species richness values and rankings for each habitat (Table 6.3) were developed only for vertebrate wildlife SGCN, for which distribution and habitat-use information is relatively well known. Because of a lack of comprehensive data on the distribution of aquatic species in Alaska, a similar assessment of species richness for fish and aquatic invertebrate SGCN in freshwater and marine habitats was not conducted; however, notes on the occurrence of those aquatic SGCN are provided in the following habitat descriptions.

Our assessment of wildlife species richness occurred before public comment on the 2025 SWAP, and any subsequent changes involving the inclusion or exclusion of SGCN in the SWAP are not reflected here. However, given the large number of SGCN occurring within the habitat types in each biogeographic region, it is unlikely that the addition or subtraction of small numbers of SGCN would substantially alter the species richness calculations. This possibility was assessed by comparing

species richness values calculated from an early version versus a later version of the SGCN list (a process in which seven SGCN were added and 12 SGCN were removed). The results indicated minimal change to species richness numbers in each habitat type (an average change of 2.4 species or 3.7%).

These species richness data are most useful when comparing richness among different habitats, either at the local or regional scale. They are less appropriate for comparing species richness among entire regions encompassing multiple habitat types, such as the nine biogeographic regions used in this SWAP. This is because, across all available habitats, there would generally be at least one or more habitats that are classified as high or moderate value for each SGCN. This is the result of habitat partitioning among species and when the data are summarized across multiple habitats and multiple species, each habitat on the landscape becomes classified as important for one or more SGCN. In this entire-region assessment scenario, there would be little to no difference between species richness derived from high and moderate habitat-value data and a simple list of the species that occur in each region. In contrast, the "heatmaps" presented in Chapter 5, showing hotspots of occurrence of SGCN across the state (based on range map data), are better at illustrating broad, regional patterns of occurrence of SGCN in Alaska.

At the statewide scale, the most wildlife species-rich habitats are freshwater wetlands (Table 6.3). These marsh, wet meadow, bog, and wet shrublands represent the 1st, 2nd, and 4th most species-rich types. Other forested freshwater wetlands rank 6th and 8th in species richness. These habitats provide a diversity of wetland areas suitable for waterbird, shorebird, seabird, passerine, raptor, and small mammal SGCN. They also provide shrub and forested wetlands that are transitional to more well-drained forests. These edge habitats are attractive to additional species of passerines, shorebirds, seabirds, and raptors.[1]

Other species-rich habitats at the statewide scale include Arctic tundra, which ranks as the 3rd most species-rich habitat, boreal forest (ranked 5th), and lakes and ponds (ranked 7th). Arctic tundra is a widespread, diverse habitat, which at the Macrogroup scale used in this chapter encompasses nine different moderate-scale habitats, ranging from mesic meadows, mesic dwarf shrub tundra, tussock tundra, and alder shrubland, to well-drained upland dwarf shrub and lichen tundra and sparsely vegetated montane tundra. Statewide, as with freshwater wetlands, the wide diversity of habitat types including Arctic tundra provides suitable habitat for a large number of bird and mammal SGCN. Similarly, boreal forest at the Macrogroup scale includes six moderate-scale forest types with notable differences in landscape position, vegetation structure, and species composition. As a group, these different forest types are attractive to a large number of bird and mammal SGCN. Lakes and ponds and the transitional littoral zones from lacustrine to adjacent terrestrial habitats are known to attract a large number of waterbirds, shorebirds, seabirds, and their predators (raptors), as well as small mammals and furbearers. Other relatively species-rich terrestrial and primarily freshwater habitats include temperate floodplain forest (ranked 9th), Arctic salt marsh (ranked 10th), and boreal shrubland and grassland (ranked 11th).

[1] At more localized scales (e.g., for possible State Wildlife Grant-funded habitat projects), the high species richness numbers in freshwater wetlands would decrease. This is because at local scales there would not be multiple subspecies of small mammals present, for example, and a reduced set of bird and mammal species would occur, when compared to the large number of species expected to use these habitats statewide. For the same reasons, to varying degrees, similar reductions in species richness at local scales would occur for all the other broad-scale habitats assessed in this chapter.

Old beaver pond near Koktuli River in southwestern Alaska. ABR, used with permission.

In the most species-rich terrestrial habitat (boreal marsh, wet meadow, and shrubland), the highest species richness values were tied or differed by a single species in three biogeographic regions (Southeast, Central, and Southcentral). In the second-most species-rich habitat (boreal bog), the highest species richness values were very similar in the Central and Western regions, differing by just two species. In the third-most species-rich habitat (Arctic tundra), species richness was greatest, by far, in the Western region.

Across all 33 terrestrial habitats assessed, some regional patterns in species richness are evident. The Southeast region had the highest species richness for nine of the 33 habitats (27%), and the Western region had the highest species richness for six habitats (18%). Outside of those two regions, the Southwest and Southcentral regions had the highest species richness for three and two habitats (nine and six percent), respectively. The Central region had the highest species richness in a single habitat (three percent). For 12 additional habitats, the highest species richness values were tied or very similar for groups of two to four regions, which included the Southeast, Southwest, Southcentral, Western, and Central regions in various combinations. The Northern region did not have the highest species richness for any habitat and was not included in any combination of two to four regions with similarly high levels of species richness.

Of the marine habitats, offshore shelf waters is considered to be the most species-rich habitat (ranked 16th, tied with boreal subalpine and subarctic woodland), followed by nearshore waters (ranked 18th) and estuarine waters (ranked 19th). As with freshwater lakes and ponds, these marine areas are well known to provide habitat for a wide diversity of marine birds and mammals. In both offshore shelf waters and nearshore waters, the highest species richness values occur in the Bering Sea region. In estuarine waters, the highest species richness values were tied between the Bering Sea and Gulf of Alaska regions.

Across all eight marine habitats assessed, the highest species richness values for five habitats (63 percent) were found in the Bering Sea region. The Gulf of Alaska had the highest species richness for one habitat and the region was tied with the Bering Sea for the highest species richness in two habitats. The Beaufort-Chukchi Seas region did not have the highest species richness for any marine habitat.

For each of the habitats described in this chapter, its occurrence and development on the landscape or in the marine environment is discussed, along with the composition and structure of characteristic plant or algal communities. Notes on the areal coverage of each habitat in Alaska (when mapped), the wildlife species richness number and ranking among all 41 habitats assessed, and the characteristic SGCN that contribute to the species richness numbers in each habitat are also presented. The characteristic SGCN noted as regularly occurring in each habitat described in the following sections are the wildlife species and subspecies that were assigned high- or moderate-value habitat rankings for each habitat in the habitat evaluation procedure.

Terrestrial, Freshwater, and Coastal Habitats

Forest and Woodlands

Temperate Coastal Rainforest

USNVC Synonym: Vancouverian Coastal Rainforest

ACCS.

Biogeographic region	Species richness
Central	20
Northern	0
Southcentral	35
Southeast	52
Southwest	21
Western	0

The temperate coastal rainforest forms a near-continuous band through the Southeast and Southcentral biogeographic regions, bordering the Gulf of Alaska and extending to the upper islands of the Kodiak Archipelago (Figure 6.2). This habitat has also been mapped sparingly in the Southwest and Central regions. These are productive forests dominated by full-stature, needleleaf trees with stands present over a broad elevational gradient from sea level to the subalpine. Canopy cover ranges from open with a well-developed deciduous shrub understory to closed with a species-poor understory that includes pocket wetlands and bryophyte (mosses, liverworts, and hornworts) carpets. Forest canopies consist of Sitka spruce and western hemlock with understory shrubs such as blueberry, huckleberry, rusty menziesia, and devil's club. The main large-scale disturbance to this habitat is timber harvest. At the local scale, windthrow (trees uprooted by wind) affects plant succession, avalanches and landslides influence the habitat extent, and pests and pathogens affect overall forest health.

Temperate coastal rainforests cover 16,731 square miles (2.9%) of Alaska (Table 6.1). The large elevational range and vegetation structure complexity of coastal rainforests can provide high- or moderate-habitat value for 63 wildlife SGCN statewide. Across all terrestrial and marine habitats evaluated, this species richness number is moderate to moderately high and ranks 15th among the 41 habitats assessed (Table 6.3). By far, the highest wildlife species richness in temperate coastal rainforests occurs in the Southeast Alaska biogeographic region, with a richness value of 52 (see table above). The next most species-rich region for coastal rainforests is Southcentral, with a much lower richness value of 35. Species richness then drops in the Southwest and Central regions to 21 and 20, respectively. These rainforests have not been mapped in the Northern and Western regions.

In temperate coastal rainforests statewide, five amphibian SGCN can occur regularly: Columbia spotted frog, long-toed salamander, northwestern salamander, western toad, and wood frog. Nineteen mammal SGCN can consistently occur in this habitat, including five species of bat (little brown myotis, California myotis, long-eared myotis, long-legged myotis, and silver-haired bat) and other characteristic mammal species including northwestern deermouse, root vole, southern red-

backed vole, northern flying squirrel, and five subspecies of dusky shrew. A total of 39 avian SGCN can also regularly use this habitat type; commonly occurring species include Sooty Grouse, Marbled Murrelet, dozens of passerines (e.g., Brown Creeper, Chestnut-backed Chickadee, Hermit Thrush, Golden-crowned Kinglet, Pacific Wren, Ruby-crowned Kinglet, Townsend's Warbler, Varied Thrush), Rufous Hummingbird, Vaux's Swift, American Three-toed Woodpecker, Hairy Woodpecker, and Red-breasted Sapsucker. Several raptors (e.g., Bald Eagle, Boreal Owl, Northern Saw-whet Owl, Queen Charlotte Goshawk) can also occur.

Figure 6.2. Distribution of temperate coastal rainforest in Alaska. M. Geist, ACCS.

Temperate Subalpine Woodland

USNVC Synonym: Vancouverian Subalpine-High Montane Forest

ACCS.

Biogeographic region	Species richness
Central	20
Northern	0
Southcentral	30
Southeast	39
Southwest	0
Western	0

Temperate subalpine woodlands occur in montane settings throughout the Southeast biogeographic region and westward through Southcentral to Cook Inlet and the Kenai Peninsula (Figure 6.3). The habitat has also been mapped sparingly in the Central region. These are treeline forests and woodlands dominated by needleleaf trees interspersed with thickets of tall deciduous shrubs, dwarf shrub heaths, and herb meadows. This habitat is commonly found at higher elevations exposed to cold temperatures and desiccating winds but may also develop at lower elevations in colder

microclimates. As exposure increases, trees become dwarfed, and the canopy thins to form isolated stands of mountain hemlock skirted by thickets of low shrubs such as copperbush, blueberry, and rusty menziesia. Dwarf ericaceous and crowberry shrub heaths and herb meadows grow among the tree-shrub islands. Avalanches and landslides tend to control the extent of this habitat at upper elevations, with small-scale windthrow affecting lower elevation forests with more continuous canopies.

Temperate subalpine woodlands cover 7,733 square miles (1.3%) of Alaska (Table 6.1). These treeline forests in the temperate zone can provide high- and moderate-value habitat for 49 wildlife SGCN statewide. Across all terrestrial and marine habitats evaluated, this species richness number is moderate to moderately low and ranks 22nd (tied with temperate forested wetland) among the 41 habitats assessed (Table 6.3). The highest wildlife species richness in temperate subalpine woodlands occurs in Southeast Alaska, with a richness value of 39 (see table above). Much lower species richness values occur in the Southcentral and Central regions, 30 and 20, respectively, and the habitat has not been mapped in the other three terrestrial biogeographic regions.

The vegetation structure complexity in temperate subalpine woodlands can support a diversity of species, including several habitat generalists. Statewide, three amphibian SGCN (Columbia spotted frog, long-toed salamander, and northwestern salamander) can occur, along with 11 mammal SGCN including American marten, snowshoe hare, two species of voles, five subspecies of dusky shrew, and cinereus shrew. Thirty-five avian SGCN can also occur regularly in this habitat, including these characteristic species: American Three-toed Woodpecker, Black Merlin, Brown Creeper, Canada Jay, Cedar Waxwing, Chestnut-backed Chickadee, Hermit Thrush, Olive-sided Flycatcher, Rufous Hummingbird, Spruce Grouse, Vaux's Swift, and White-crowned Sparrow.

Figure 6.3. Distribution of temperate subalpine woodland in Alaska. M. Geist, ACCS.

Boreal Forest

USNVC Synonym: Alaskan-Yukon North American Boreal Forest

Mike Flemming, ACCS.

Biogeographic region	Species richness
Central	46
Northern	10
Southcentral	46
Southeast	52
Southwest	39
Western	34

The boreal forest type occurs primarily in the Central and Southcentral biogeographic regions, and in the Western and Southwest regions to the longitudinal limit of trees (Figure 6.4). This habitat has also been mapped sparingly in the Southeast and Northern regions. These are mixed needleleaf-broadleaf forests and woodlands where canopy and understory species composition follow a moisture and productivity gradient. The warmest and driest sites tend to be dominated by quaking aspen with an open understory of dry-site shrubs, including kinnikinnick, prickly rose, and buffaloberry. More mesic sites of moderate productivity tend to be dominated by a mix of white spruce, black spruce, and Alaska birch. Characteristic shrubs of mesic sites include deciduous species such as Siberian alder, resin birch, dwarf birch, prickly rose, and shorter stature ericaceous shrubs. Lichens and feathermosses provide important ground cover on dry and mesic sites, respectively. Colder, low-productivity sites are often dominated by black spruce with a dwarf and low shrub understory of crowberry, bog blueberry, and dwarf birch. Wildland fire is a major, landscape-scale disturbance, while insect infestation and blowdown impact forests at smaller scales.

Boreal forests are quite common and cover 51,847 square miles (8.9%) of Alaska (Table 1.1). Boreal forests statewide can provide high- and moderate-value habitat for a large number (91) of wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is high and ranks fifth among the 41 habitats assessed (Table 6.3), making it the most biologically diverse forest habitat in Alaska in terms of wildlife species richness. Boreal forests in Southeast Alaska have the greatest wildlife species richness value (52), while the Southcentral and Central regions have moderately lower richness values of 46 each (see table above). Notably lower richness values for boreal forests, ranging from 39 to 10, were determined for the other three biogeographic regions.

Three amphibian SGCN (Columbia spotted frog, long-toed salamander, and northwestern salamander) use boreal forests in the Southeast region, while one amphibian SGCN (wood frog) can routinely use this habitat across the state. Twenty-seven mammal SGCN can occur regularly in boreal forests statewide including these characteristic small mammals: seven subspecies of Arctic ground squirrels, five species of voles, and nine species and subspecies of shrews (e.g., Holarctic least shrew, pygmy shrew, tundra shrew). A total of 60 avian SGCN can be found in boreal forest habitats, with regular use by these characteristic species: Spruce Grouse, Sooty Grouse, American Three-toed Woodpecker, Boreal Chickadee, Brambling, Canada Jay, Gray-headed Chickadee, Gray-

cheeked Thrush, Hermit Thrush, Olive-sided Flycatcher, Northern Shrike, Western Wood-Pewee, Yellow-rumped Warbler, Boreal Owl, American Goshawk, Great Gray Owl, Red-tailed Hawk, Northern Hawk-Owl, and Western Screech-Owl.

Figure 6.4. Distribution of boreal forest in Alaska. M. Geist, ACCS.

Boreal Subalpine and Subarctic Woodland

USNVC Synonym: North American Northern Boreal Woodland

ADF&G.

Biogeographic region	Species richness
Central	36
Northern	12
Southcentral	36
Southeast	29
Southwest	37
Western	31

Boreal subalpine and subarctic woodlands form at treeline throughout all six biogeographic regions but primarily in the Central, Western, and Southwest regions (Figure 6.5). These woodlands are dominated by short-stature needleleaf and broadleaf trees and a low to dwarf shrub understory with herbs, lichens, and bryophytes. In areas of treeline expansion, trees are evenly distributed and display normal growth forms. In contrast, trees and shrubs may be stunted or contorted at the limit of a species' climatic tolerance or treeline regression. Where more developed tree canopies or terrain provide protection from desiccating winds and insulation from low temperatures, broadleaf deciduous trees (e.g., Alaska birch) and shrubs (e.g., grayleaf willow, Richardson's willow, Bebb willow, resin birch) are more common. Understories tend to be more forb- and bryophyte-rich in these relatively productive stands. In less-protected sites, shorter stature dwarf birch and ericaceous species (e.g., marsh labrador tea, crowberry, bog blueberry, lingonberry) are common. In

these comparatively less-productive sites, understories tend to be more graminoid (sedges, rushes, and grasses) dominated and lichen-rich. The expression of boreal woodlands on the landscape is largely dependent on climate and the presence of permafrost. Because of this, regional changes in temperature and precipitation can cause the expansion or contraction of this habitat type. As with other forested habitats, wildland fire can be a major, landscape-scale disturbance.

Boreal subalpine and subarctic woodlands cover 21,607 square miles (3.7%) of Alaska (Table 6.1). These treeline forests in the boreal zone statewide can provide high- and moderate-value habitat for 62 wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderate and ranks 16th (tied with offshore shelf waters) among the 41 habitats assessed (Table 6.3. The highest wildlife species richness values for boreal subalpine and subarctic woodlands occur in the Southwest, Southcentral, and Central regions, with richness values of 37, 36, and 36, respectively (see table above). Notably lower richness values ranging from 31 to 12 were determined for the other three biogeographic regions.

Statewide, the mix of trees and shrubs in boreal subalpine and subarctic woodlands can provide food, cover, and breeding resources for a range of animal species, including one amphibian SGCN (long-toed salamander) and 20 mammal SGCN of different groups, such as little brown myotis, snowshoe hare, and long-tailed vole. Boreal subalpine woodlands can provide habitat for 41 avian SGCN, including these characteristic species: American Tree Sparrow, Black-backed Woodpecker, Blackpoll Warbler, Boreal Chickadee, Redpoll, Fox Sparrow, Gray-headed Chickadee, Golden-crowned Sparrow, Varied Thrush, and White-crowned Sparrow.

Figure 6.5. Distribution of boreal subalpine and subarctic woodland in Alaska. M. Geist, ACCS.

Floodplain Forests

Temperate Floodplain Forest

USNVC Synonym: Vancouverian Flooded & Swamp Forest

ACCS.

Biogeographic region	Species richness
Central	0
Northern	0
Southcentral	50
Southeast	62
Southwest	0
Western	0

Temperate floodplain forests occur in settings prone to riverine flooding in the Southeast biogeographic region and westward through Southcentral to Cook Inlet and the Kenai Peninsula (Figure 6.6). Forest structure and species composition are largely dependent on flooding regime. Glacially fed rivers are characterized by frequent, large-scale flood events with high sediment input driven by glacial runoff and snowmelt. Forests associated with these glacial rivers form broad mosaics of needleleaf and broadleaf trees dominated by black cottonwood, red alder, and Sitka spruce. Forests associated with nonglacial rivers and streams experience smaller-scale and less frequent overbank flooding driven by precipitation events. Here, riparian forests form narrow corridors dominated by red alder and Sitka spruce. In both floodplain settings, deciduous broadleaf shrub understories dominated by Sitka alder, devil's club, and salmonberry are associated with frequently disturbed substrates. On more stable substrates, various forbs, including threeleaf foamflower, enchanter's nightshade, twisted stalk, and false lily of the valley are common. Flooding and the associated erosion and redeposition of sediment are the primary disturbances.

Temperate floodplain forests cover a relatively small area (1,533 square miles, 0.3%) of Alaska (Table 6.1). These forests provide high- and moderate-value habitat for a relatively large number (75) of wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is relatively high and ranks 9th among the 41 habitats assessed (Table 6.3). By far, the highest wildlife species richness in temperate floodplain forests occurs in the Southeast biogeographic region, with a richness value of 62 (see table above). The only other region in which these floodplain forests were mapped (Southcentral Alaska) has a substantially lower richness value of 50.

Temperate floodplain forests statewide can be consistently used by five amphibian, 26 mammal, and 44 avian SGCN. The five amphibians that can occur in this habitat are Columbia spotted frog, long-toed salamander, northwestern salamander, western toad, and wood frog. Among the mammals that use this habitat are five species of bats (little brown myotis, California myotis, long-eared myotis, long-legged myotis, and silver-haired bat), American marten, North American river otter, muskrat, northern flying squirrel, and several species of mice, voles, and shrews. Characteristic avian SGCN that can regularly use floodplain forests include American Three-toed Woodpecker,

Blackpoll Warbler, Golden-crowned Kinglet, MacGillivray's Warbler, Pine Siskin, Varied Thrush, Queen Charlotte Goshawk, Western Screech-owl, Short-billed Gull, and Harlequin Duck.

Figure 6.6. Distribution of temperate floodplain forests in Alaska. M. Geist, ACCS.

Boreal Floodplain Forest

USNVC Synonym: North American Boreal Flooded & Rich Swamp Forest

ACCS.

Biogeographic region	Species richness
Central	49
Northern	0
Southcentral	56
Southeast	0
Southwest	46
Western	39

Boreal floodplain forests occur in settings prone to riverine flooding, primarily in the Central, Western, and Southwest biogeographic zones; this habitat has also been mapped sparingly in the Southcentral region (Figure 6.7). Forest structure and species composition are largely dependent on flooding regime, which ranges from narrow extents driven by precipitation events along low-volume streams to broad-scale seasonal floods driven by glacial runoff, snowmelt, and the breakup of river ice. Forests associated with glacial rivers form broad mosaics of balsam poplar and white spruce with deciduous broadleaf shrub understories of feltleaf willow, thin-leaf alder, and Siberian alder. On more stable substrates, the understory transitions to mesic shrubs and forbs such as prickly rose, highbush cranberry, and twinflower. Bluejoint reedgrass is an abundant and common component of the herbaceous stratum. Flooding and the associated erosion and redeposition of sediment are the

primary disturbances; however, ice dams and ice scour can cause catastrophic damage, particularly along larger rivers. Due to the presence of water, fire frequency and severity in floodplain systems are typically lower than that of the surrounding boreal forest.

Boreal floodplain forests cover 25,693 square miles (4.4%) of Alaska (Table 6.1). Floodplain forests in the boreal zone statewide can provide high- and moderate-value habitat for 66 wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderate to moderately high and ranks 14th (tied with temperate salt marsh) among the 41 habitats assessed (Table 6.3). Wildlife species richness in boreal floodplain forests is greatest in the Southcentral region, with a richness value of 56 (see table above). Notably lower species richness in these floodplain forests occurs in the Central and Southwest regions, with richness values of 49 and 46, respectively. Species richness drops to 39 in the Western region and the habitat has not been mapped in the other two regions.

These boreal floodplain forests statewide can be consistently used by two amphibians (western toad and wood frog) and 19 mammal SGCN such as these characteristic species: little brown myotis, American marten, North American river otter, snowshoe hare, Alaska hare, three species of voles, and seven species and subspecies of shrews. This habitat can also support 45 avian SGCN, including Spruce Grouse, Willow Ptarmigan, Short-billed Gull, Harlequin Duck, and a diversity of passerines (e.g., Alder Flycatcher, Fox Sparrow, Orange-crowned Warbler, Ruby-crowned Kinglet, Yellow-rumped Warbler). The following raptor species occur in this habitat type: American Goshawk, Boreal Owl, Great Gray Owl, Red-tailed Hawk.

Figure 6.7. Distribution of boreal floodplain forests in Alaska. M. Geist, ACCS.

Freshwater Wetlands

Temperate Forested Wetland

USNVC Synonyms: North Pacific Bog

ACCS.

Biogeographic region	Species richness
Central	0
Northern	0
Southcentral	35
Southeast	43
Southwest	0
Western	0

Temperate forested wetlands occur in peatland settings in the Southeastern biogeographic region and westward through Southcentral to Cook Inlet and the Kenai Peninsula (Figure 6.8). Forested wetlands develop as dwarf needleleaf woodlands in bog and fen settings and as full-stature, closed canopy stands of needleleaf trees. For all variants of this habitat type, conifers capable of growing in saturated conditions, such as shore pine, western hemlock, mountain hemlock, Alaska cedar, and Sitka spruce, dominate the canopy. Woodland bogs and fens, known colloquially as muskeg, are characterized by a mosaic of trees, low shrubs, herbs, mosses, and standing water across hummocky topography. As woodland bogs are precipitation-fed and typically nutrient-poor, they are characterized by slow-growing dwarf ericaceous shrubs such as bog labrador tea, bog blueberry, and crowberry; *Sphagnum* moss blankets much of the ground cover. By contrast, woodland fens are groundwater-fed and typically more nutrient-rich, supporting low deciduous shrubs (e.g., crab apple, redosier dogwood, sweetgale, alpine laurel) underlain by a diversity of forbs and graminoids. Mature wetland forests are characterized by tall needleleaf trees and a discontinuous broadleaf shrub understory that includes species of tall blueberries, rusty menziesia, devil's club, and salal punctuated by pockets of obligate wetland species and bryophytes. The saturated and inundated soils in this habitat type slow soil decomposition such that organic matter accumulates as woody, *Sphagnum*, or sedge peat.

Temperate forested wetlands cover only 193 square miles (<0.1%) of Alaska (Table 6.1) but provide high- and moderate-value habitat for 49 species of SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderate to moderately low and ranks 22nd (tied with temperate subalpine woodland) among the 41 habitats assessed (Table 6.3). By far, the highest wildlife species richness in temperate forested wetlands occurs in the Southeast region, with a richness value of 43 (see table above). Notably lower species richness occurs in the Southcentral region, with a value of 35, and the habitat has not been mapped in the other four regions.

Many wetland-obligate and some generalist wildlife species can use temperate forested wetlands for breeding. Statewide, Columbia spotted frog, northwestern salamander, western toad, and wood frog are the four amphibian SGCN that can regularly use this habitat. The 10 mammal SGCN that occur

consistently in this habitat type are American marten, snowshoe hare, long-tailed vole, root vole, southern red-backed vole, cinereus shrew, and four subspecies of dusky shrew. There are 35 avian SGCN that can be found regularly in these forested wetlands, including these characteristic species: Sooty Grouse, Rufous Hummingbird, Vaux's Swift, Hairy Woodpecker, Chestnut-backed Chickadee, Dark-eyed Junco, Lincoln's Sparrow, Rusty Blackbird, Song Sparrow, White-crowned Sparrow, Bald Eagle, and Merlin.

Figure 6.8. Distribution of temperate forested wetland in Alaska. M. Geist, ACCS.

Boreal Forested Wetland

USNVC Synonym: North American Boreal Conifer Poor Swamp

ACCS.

Biogeographic region	Species richness
Central	54
Northern	15
Southcentral	48
Southeast	40
Southwest	38
Western	36

Boreal forested wetlands occur in peatland settings across the Central and Southcentral biogeographic regions, extending into the Western and Southwest regions to the limits of continuous forest (Figure 6.9). This habitat has also been mapped sparingly in the Northern and Southeast regions. These wetlands have woodland to open forest canopies dominated by needleleaf trees. Where saturation results from the presence of shallow permafrost, the growth of trees is stunted, and slow-growing dwarf shrubs and bryophytes are common in the understory. Black spruce bogs are a good example of this common and widespread type of boreal forested wetland. Where saturation results from

high groundwater levels unrelated to permafrost, soils and water are warmer, and needleleaf trees are more likely to reach full stature. In these more productive settings, broadleaf shrubs and herbs characterize the understory. Tamarack fens are a good example of this less common type of boreal forested wetland. The expression of boreal forested wetlands on the landscape is largely dependent on climate and the presence of permafrost. Where a regional increase in temperature results in permafrost degradation and improved drainage, sites may transition out of the wetland condition. Wildland fire is a common disturbance in boreal ecosystems, including forested wetlands.

Boreal forested wetlands are quite common and cover 57,850 square miles (10.0%) of Alaska (Table 6.1). Forested wetlands in the boreal zone statewide can provide high- and moderate-value habitat for 81 wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is high and ranks 8th among the 41 habitats assessed (Table 6.3). The highest wildlife species richness for boreal forested wetlands occurs in the Central region, with a richness value of 54 (see table above). Species richness drops to 48 in the Southcentral region and declines further from 40 to 36 in the other three boreal forest regions.

Boreal forested wetlands can provide cover for many species of small mammals and breeding habitat for many tree-nesting birds, shorebirds, and wetland-obligate amphibians. All five amphibian SGCN (Columbia spotted frog, long-toed salamander, northwestern salamander, western toad, and wood frog) can be found in this habitat type, although the majority of species occur in Southeast Alaska. Nineteen mammal SGCN can regularly use boreal forested wetlands, including these characteristic species: snowshoe hare, Nearctic brown lemming, northern bog lemming, five species of voles (e.g., meadow vole, root vole, taiga vole), and eight species and subspecies of shrews (e.g., barren ground shrew, tundra shrew). There are 57 avian SGCN that can consistently use boreal forest wetlands, including these characteristic species: Spruce Grouse, American Three-toed Woodpecker, Black-backed Woodpecker, and dozens of passerines (e.g., Blackpoll Warbler, Bohemian Waxwing, Boreal Chickadee, Canada Jay, Fox Sparrow, Gray-cheeked Thrush, Golden-crowned Kinglet, Lincoln's Sparrow, Olive-sided Flycatcher, Rusty Blackbird, White-crowned Sparrow). Raptors (e.g., American Goshawk, Boreal Owl, Great Gray Owl, Northern Hawk-Owl), Short-billed Gulls, and shorebirds (e.g., Greater Yellowlegs, Hudsonian Godwit, Lesser Yellowlegs, Solitary Sandpiper, Wilson's Snipe) also use this habitat type.

Figure 6.9. Distribution of boreal forested wetland in Alaska. M. Geist, ACCS.

Temperate Marsh, Wet Meadow, and Shrubland

USNVC Synonym: Vancouverian Lowland Marsh, Wet Meadow & Shrubland

ACCS.

Biogeographic region	Species richness
Central	30
Northern	0
Southcentral	60
Southeast	64
Southwest	42
Western	0

Temperate marshes, wet meadows, and shrublands occur in wetland settings primarily in the Southeast, Southcentral, and Southwest biogeographic regions (Figure 6.10). These habitats have also been mapped sparingly in the Central region. These are freshwater systems that form in areas of regular inundation (mudflats), saturation (wet meadows), slow-moving water (emergent marshes), or standing water (wet shrublands). Plant communities are dominated by annual herbs, emergent, rhizomatous graminoids and forbs, and low deciduous broadleaf shrubs. Vegetation may occur as a near monoculture in permanently flooded basin sites or as a combination of herbaceous and woody types in sites with more varied topography. Riparian or otherwise wet shrublands are typically dominated by thin-leaf and Sitka alder in disturbed or nutrient-poor settings. Barclay's, grayleaf, and tealeaf willow occur in sites with better-developed soils and available nutrients. Rhizomatous graminoids such as common spikerush, softstem bulrush, water sedge, beaked sedge, and Northwest Territory sedge are common emergents. Characteristic forbs include horsetails, common marestail, water arum, buckbean, and purple marshlocks. Disturbances that alter natural hydrologic conditions may impact these wetland systems.

Temperate marsh, wet meadow, and shrubland habitats cover only 291 square miles (<0.1%) of Alaska (Table 6.1). These wetlands statewide, however, can provide high- and moderate-value habitat for a relatively large number (90) of wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is high and ranks 6th among the 41 habitats assessed (Table 6.3). The highest wildlife species richness, by far, in temperate marsh, wet meadow, and shrubland habitats occurs the Southeast and Southcentral regions, with richness values of 64 and 60, respectively (see table above). Substantially lower richness values of 42 and 30, respectively, were determined for the Southwest and Central regions and these wetland habitats have not been mapped in the other two regions.

These temperate wetlands can provide breeding habitat for many seabirds, shorebirds, waterfowl, amphibians, and shrub-nesting passerines, and foraging habitat for mammals such as bats, voles, and shrews. Statewide, all five amphibian SGCN can occur in this habitat along with 27 mammal SGCN, including five species of bat (little brown myotis, California myotis, long-eared myotis, long-legged myotis, and silver-haired bat) and these other characteristic species: muskrat, Alaska hare, snowshoe hare, meadow jumping mouse, collared lemming, root vole, five subspecies of dusky shrew, western water shrew, and Glacier Bay water shrew. A total of 58 avian SGCN can use these

wetland habitats for nesting and foraging, including numerous passerines (e.g., Alder Flycatcher, Blackpoll Warbler, Redpoll, Fox Sparrow, Gray-cheeked Thrush, Lincoln's Sparrow, Orange-crowned Warbler, Red-winged Blackbird, Rusty Blackbird, Song Sparrow, Varied Thrush, White-crowned Sparrow, Wilson's Warbler), seabirds (e.g., Aleutian Tern, Herring Gull, Short-billed Gull), shorebirds (e.g., Greater Yellowlegs, Lesser Yellowlegs, Red-necked Phalarope, Solitary Sandpiper, Wilson's Snipe), and waterbirds (e.g., Blue-winged Teal, Dusky Canada Goose, Horned Grebe, Lesser Scaup, Northern Pintail, Red-necked Grebe, Trumpeter Swan). Of the aquatic SGCN, Alaska blackfish are common in the marsh habitats in these freshwater wetlands.

Figure 6.10. Distribution of temperate marsh, wet meadow, and shrubland in Alaska. M. Geist, ACCS.

Temperate Fen

USNVC Synonym: North Pacific Fen

ACCS.

Biogeographic region	Species richness
Central	23
Northern	0
Southcentral	31
Southeast	34
Southwest	33
Western	0

Temperate fens are small in extent and uncommon on the landscape, occurring in peatland settings primarily in the Southeast, Southcentral, and Southwest biogeographic regions (Figure 6.11). This habitat has also been mapped sparingly in the Central region. Vegetation cover is continuous in this habitat type and characterized by a species-rich assemblage of graminoids, forbs, and bryophytes where, typically, no single species is dominant. Species composition is driven by the chemical

qualities of the water and soil, with fens categorized as poor (low pH) or rich (circumneutral to high pH). Poor fens resemble bogs and are more likely to support low and dwarf shrubs, but they lack ericaceous shrubs and have little to no *Sphagnum* moss. Rich fens support a diversity of herbs, many well-adapted to lime-rich soil. Species characteristic of both poor and rich fens include forbs (e.g., buckbean, purple marshlocks, deercabbage, and burnet) and graminoids (e.g., water, rock, and mud sedges). As shallow and flowing groundwater is requisite for the formation and maintenance of fens, they typically develop across gentle slopes or in areas of groundwater discharge. In some locations, high precipitation can overcome the drainage afforded by terrain, allowing fens to develop on relatively steep slopes. Fens are slow-developing systems that are difficult to restore following disturbance.

Temperate fens cover only 966 square miles (0.2%) of Alaska (Table 6.1). Fens in the temperate zone statewide can provide high- and moderate-value habitat for 52 wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderate and ranks 21st (tied with Arctic coastal shore) among the 41 habitats assessed (Table 6.3). The highest wildlife species richness in temperate fens occurs in the Southeast, Southwest, and Southcentral regions, with richness values of 34, 33, and 31, respectively. Species richness is substantially lower in the Central region, with a value of 23, and these fens have not been mapped in the other two regions.

Temperate fens can support amphibians, several small mammals, ground-nesting birds, and species that use the species-rich understory for foraging. All five amphibian SGCN (Columbia spotted frog, long-toed salamander, northwestern salamander, western toad, and wood frog) can be found in this habitat type, although the majority of species occur in Southeast Alaska. Fens can also support 11 mammal SGCN, including these characteristic species: Alaska hare, muskrat, meadow jumping mouse, Nelson's collared lemming, Nearctic brown lemming, and root vole. Thirty-six avian SGCN can occur regularly in these wetlands, including these characteristic species: Savannah Sparrow, Short-billed Gull, Greater Yellowlegs, Hudsonian Godwit, Least Sandpiper, Lesser Yellowlegs, Marbled Godwit, Red-necked Phalarope, Semipalmated Sandpiper, Spotted Sandpiper, Solitary Sandpiper, Wilson's Snipe, Aleutian Tern, and Sandhill Crane.

Figure 6.11. Distribution of temperate fen in Alaska. M. Geist, ACCS.

Boreal Marsh, Wet Meadow, and Shrubland

USNVC Synonym: North American Boreal Marsh, Wet Meadow & Shrubland

M. Flemming, ACCS.

Biogeographic region	Species richness
Central	65
Northern	19
Southcentral	65
Southeast	66
Southwest	59
Western	61

Boreal marshes, wet meadows, and shrublands occur in wetland settings primarily in the Central and Western biogeographic regions (Figure 6.12). These habitats have also been mapped sparingly in the other four terrestrial regions. These are freshwater systems that form in areas of regular inundation (floodplains), saturation (wet meadows), or slow-moving or standing water (emergent marshes and wet shrublands). The plant communities are dominated by emergent, rhizomatous graminoids, forbs, and low deciduous broadleaf shrubs. Vegetation can form a near monoculture in permanently flooded basin sites or as a mosaic of herbaceous and woody plants in sites with more heterogenous topography. Riparian or otherwise wet shrublands are typically dominated by thin-leaf and Sitka alder in disturbed or nutrient-poor settings and tealeaf and Richardson's willow in sites with more mature soils and available nutrients. Rhizomatous graminoids such as water sedge, Northwest Territory sedge, softstem bulrush, and pendant grass are common emergent plants in this habitat. Characteristic forbs include horsetails, common marestail, buckbean, and purple marshlocks. These wetland systems will likely be impacted by any alterations to their natural hydrology.

Boreal marsh, wet meadow, and shrubland habitats cover a relatively small area (8,902 square miles, 1.5%) of Alaska (Table 6.1). These wetlands statewide, however, have the highest species richness of all 41 terrestrial and marine habitats assessed in this SWAP and can provide high- and moderate-value habitat for 114 wildlife SGCN (Table 6.3). Wildlife species richness in boreal marsh, wet meadow, and shrubland habitats is strikingly similar in the Southeast, Central, and Southcentral biogeographic regions, with richness values of 66, 65, and 65, respectively (see table above). In the Western and Southwest regions, species richness drops slightly to 61 and 59 SGCN, respectively. Richness then drops further to 19 in the Northern region where this boreal habitat is not common.

The vegetation structure complexity in these boreal wetland habitats can provide cover, foraging habitat, and breeding habitat for a diverse set of wildlife species. Statewide, this includes all five amphibian SGCN (Columbia spotted frog, long-toed salamander, northwestern salamander, western toad, and wood frog) and 30 mammal SGCN such as these characteristic species: muskrat, snowshoe hare, meadow jumping mouse, Nearctic brown lemming, northern bog lemming, meadow vole, root vole, western water shrew, and Glacier Bay water shrew. A total of 79 avian SGCN can also occur regularly in this habitat, including numerous passerines (e.g., Alder Flycatcher, American Tree

Sparrow, Arctic Warbler, Bluethroat, Blackpoll Warbler, Fox Sparrow, Gray-cheeked Thrush, Lincoln's Sparrow, Olive-sided Flycatcher, Orange-crowned Warbler, Red-winged Blackbird, Rusty Blackbird, Savannah Sparrow, Song Sparrow, Tree Swallow, Varied Thrush, White-crowned Sparrow, Wilson's Warbler). These wetland habitats are also routinely used by raptors (e.g., Boreal Owl, Great Gray Owl, Northern Hawk Owl), seabirds (e.g., Aleutian Tern, Herring Gull, Short-billed Gull), shorebirds (e.g., Greater Yellowlegs, Least Sandpiper, Lesser Yellowlegs, Red-necked Phalarope, Semipalmated Sandpiper, Solitary Sandpiper, Upland Sandpiper, Wilson's Snipe), and waterbirds (e.g., Dusky Canada Goose, Horned Grebe, Lesser Scaup, Northern Pintail, Red-necked Grebe, Red-throated Loon, Sandhill Crane, Surf Scoter, Trumpeter Swan, White-winged Scoter, Yellow-billed Loon). Of the aquatic SGCN, Alaska blackfish are common in the marsh habitats in these freshwater wetlands.

Figure 6.12. Distribution of boreal marsh, wet meadow, and shrubland in Alaska. M. Geist, ACCS.

Boreal Bog

USNVC Synonym: North American Boreal & Subboreal Bog & Acidic Fen

ACCS.

Biogeographic region	Species richness
Central	53
Northern	36
Southcentral	43
Southeast	35
Southwest	45
Western	55

Boreal bogs occur in peatland settings primarily across the Central, Western, Southwest, and Southcentral biogeographic regions; however, the habitat has also been mapped sparingly in the other two terrestrial regions (Figure 6.13). These bogs form as mosaics of low to dwarf shrubs, graminoids, and bryophytes. Ericaceous shrubs (e.g., bog blueberry, lingonberry, bog and marsh

labrador tea, crowberry, bog rosemary, small cranberry) and *Sphagnum* mosses are consistently present. Dwarf trees encroach on the drier margins and ridges but do not gain dominance. Precipitation is the primary water source for bogs, and soils are acidic and nutrient-poor, with a thick accumulations of peat. The expression of boreal wetlands on the landscape largely depends on climate and the associated presence of permafrost. Where regional increases in temperature results in permafrost degradation and improved drainage, sites may no longer function as wetlands. Wildland fire is a common disturbance in boreal ecosystems. Through their dam-building activities, beavers can cause substantial hydrologic change to peatland systems.

Boreal bogs cover 27,904 square miles (4.8%) of Alaska (Table 6.1). Bogs in the boreal zone statewide can provide high- and moderate-value habitat for a large number (112) of wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is high and ranks 2nd among the 41 habitats assessed (Table 6.3). The highest wildlife species richness in boreal bogs occurs in the Western and Central regions, with richness values of 55 and 53, respectively (see table above). Richness drops to 45 and 43 in the Southwest and Southcentral regions, respectively, and drops again to 36 and 35 in the Northern and Southeast regions, respectively.

While plant species diversity is low, the patchwork of shrubs, graminoids, and bryophytes in boreal bogs can support breeding and foraging habitat for numerous wildlife species. Three species of amphibian SGCN occur in this habitat type, although two of them (Columbia spotted frog and western toad) are limited to Southeast Alaska. Twenty-eight mammal SGCN also occur in this habitat including these characteristic species: meadow jumping mouse, Nearctic brown lemming, northern bog lemming, meadow vole, root vole, southern red-backed vole, barren ground shrew, western water shrew, and Glacier Bay water shrew. A total of 81 avian SGCN can consistently occur in boreal bog habitats including a diversity of shorebirds (e.g., Bar-tailed Godwit, Black-bellied Plover, Black Turnstone, Greater Yellowlegs, Hudsonian Godwit, Least Sandpiper, Lesser Yellowlegs, Pacific Golden-plover, Red Phalarope, Red-necked Phalarope, Rock Sandpiper, Semipalmated Sandpiper, Solitary Sandpiper, Spotted Sandpiper, Stilt Sandpiper, Western Sandpiper, Whimbrel, Wilson's Snipe). Several species of seabirds (e.g., Parasitic Jaeger, Sabine's Gull, Short-billed Gull, Glaucous Gull, Aleutian Tern), waterbirds (e.g., Black Brant, Emperor Goose, Taverner's Cackling Goose, Tule Greater White-fronted Goose, Northern Pintail, Sandhill Crane), passerines (e.g., Bohemian Waxwing, Fox Sparrow, Lapland Longspur, Lincoln's Sparrow, Rusty Blackbird, Savannah Sparrow, White-crowned Sparrow), and raptors (e.g., Boreal Owl, Great Gray Owl, Northern Hawk Owl, Rough-legged Hawk) can also breed and forage in this habitat type.

Figure 6.13. Distribution of boreal bog in Alaska. M. Geist, ACCS.

Arctic Marsh, Wet Meadow, and Shrubland

USNVC Synonym: Arctic Freshwater Marsh & Wet Meadow

A. Underwood, ADF&G.

Biogeographic region	Species richness
Central	57
Northern	54
Southcentral	0
Southeast	0
Southwest	51
Western	80

Arctic marshes, wet meadows, and shrublands occur in wetland settings primarily in the Northern and Western biogeographic regions; the habitat has also been mapped sparingly in the Central and Southwest regions (Figure 6.14). These habitats are well-vegetated areas dominated by emergent graminoids, broadleaf shrubs, and aquatic mosses. The plant community composition follows a gradient of water depth and persistence mainly driven by permafrost. Deep and permanently flooded permafrost basins often support monocultures of pendant grass, with shallower waters supporting creeping sedge, water sedge, and tall cottongrass. Shrubs tend to be shorter in poorly drained areas underlain by shallow, ice-rich permafrost and taller on substrates where seasonal thaw is deep and drainage is better. Arctic wetland shrublands are dominated by tealeaf willow, bog willow, and dwarf birch, with diverse sedges occurring in the wettest areas. Floodplain shrublands support taller willows such as littletree, grayleaf, barrenground, and Richardson's willow on regularly flooded terrain, and by mats of the prostrate shrub entireleaf mountain-avens in regularly inundated terrains. The dynamics of these habitats are influenced by seasonal cycles of freezing, thawing, and flooding. In areas of fine-grained, ice-rich sediment, periglacial (freeze-thaw) processes

such as permafrost degradation and aggregation, cryoturbation (frost churning), and solifluction (movement of wet soil) influence the habitat. The cyclical development of patterned ground, such as polygon tundra, thaw lakes, and string and flark fens is ongoing at the landscape scale.

Arctic marsh, wet meadow, and shrubland covers 17,104 square miles (3.0%) of Alaska (Table 6.1). These wetlands in the Arctic regions of the state can provide high- and moderate-value habitat for a large number (109) of wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is high and ranks 4th among the 41 habitats assessed (Table 6.3). By a substantial margin, the highest wildlife species richness in Arctic marsh, wet meadow, and shrubland habitats occurs in the Western biogeographic region, with a richness value of 80 (see table above). Richness drops in the Central, Northern, and Southwest regions, with values of 57, 54, and 51, respectively and the habitat has not been mapped in the other two regions.

These Arctic wetland habitats can provide shrublands for nesting birds as well as marshes and wet meadows for foraging waterbirds, shorebirds, and mammals. Statewide, one amphibian SGCN (wood frog) can regularly use this habitat type along with 22 mammal SGCN, including these characteristic species: Arctic fox, Alaska hare, muskrat, meadow jumping mouse, Nearctic brown lemming, northern bog lemming, meadow vole, root vole, and barren ground shrew. A total of 86 avian SGCN can occur consistently in this habitat, including seabirds (e.g., Glaucous Gull, Long-tailed Jaeger, Parasitic Jaeger, Pomarine Jaeger, Sabine's Gull, Steller's Eider), shorebirds (e.g., American Golden-plover, Black-bellied Plover, Dunlin, Long-billed Dowitcher, Pacific Golden-plover Pectoral Sandpiper, Red Phalarope, Red-necked Phalarope, Semipalmated Sandpiper, Stilt Sandpiper, Western Sandpiper), and waterbirds (e.g., Arctic Loon, Black Brant, Black Scoter, Canvasback, Emperor Goose, King Eider, Long-tailed Duck, Red-necked Grebe, Red-throated Loon, Sandhill Crane, Spectacled Eider, Surf Scoter, Taverner's Cackling Goose, White-winged Scoter, Trumpeter Swan, Yellow-billed Loon). Willow Ptarmigan, Lapland Longspur, and Snowy Owl can also occur in this habitat. Of the aquatic SGCN, Alaska blackfish are common in the aquatic marsh habitats in these Arctic wetlands.

Figure 6.14. Distribution of Arctic marsh, wet meadow, and shrubland in Alaska. M. Geist, ACCS.

Shrublands and Grasslands

Temperate Shrubland and Grassland

USNVC Synonym: Northern Vancouverian Lowland-Montane Grassland & Shrubland

ACCS.

Biogeographic region	Species richness
Central	28
Northern	0
Southcentral	32
Southeast	42
Southwest	19
Western	0

Temperate shrublands and grasslands occur in upland settings primarily in the Southeast, Southcentral, and Southwest biogeographic regions, and the habitat has been mapped sparingly in the Central region as well (Figure 6.15). These habitats form as open to closed thickets of low to tall deciduous shrubs and herbaceous meadow openings or combinations of the types. Herbaceous species either establish as an understory to the shrub layer or as species-rich meadows. Characteristic shrubs include Sitka alder, salmonberry, devil's club, copperbush, and blueberry, with willows also occurring in wetter sites. In meadows, a mixture of ferns, forbs, and graminoids is characteristic, including species such as ladyfern, bluejoint reedgrass, fireweed, cowparsnip, false hellebore, and Sitka valerian. Shrublands and grasslands tend to develop where tree growth is precluded by either disturbance or climate, such as on mountain sideslopes steep enough to produce frequent avalanches, along coastal headlands, and above the elevational treeline.

Temperate shrubland and grassland covers 12,194 square miles (2.1%) of Alaska (Table 6.1). These mixtures of shrub and meadow habitat in temperate zones statewide can provide high- and moderate-value habitat for 50 wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderate to moderately low and ranks 24th among the 41 habitats assessed (Table 6.3). By far, the highest wildlife species richness in temperate shrubland and grassland occurs the Southeast region, with a richness value of 42 (see table above). Richness values drop in the Southcentral, Central, and Southwest regions to 32, 28, and 19, respectively, and the habitat has not been mapped in the other two regions.

Temperate shrublands and grasslands can provide cover and foraging habitat suitable for a diverse set of amphibian, mammal, and bird species. Statewide, four amphibian SGCN (Columbia spotted frog, long-toed salamander, western toad, and wood frog) can occur regularly along with 17 mammal SGCN, including these characteristic species: little brown myotis, silver-haired bat, northern bog lemming, meadow vole, and root vole. Twenty-nine avian SGCN can also regularly use this habitat type including these characteristic species: Willow Ptarmigan, Alder Flycatcher, American Tree Sparrow, Fox Sparrow, Gray-cheeked Thrush, Golden-crowned Sparrow, Northern Shrike, Orange-crowned Warbler, Redpoll, Savannah Sparrow, Song Sparrow, Varied Thrush, White-crowned Sparrow, Wilson's Warbler, Short-eared Owl, Semipalmated Sandpiper, and Spotted Sandpiper.

Figure 6.15. Distribution of temperate shrubland and grassland in Alaska. M. Geist, ACCS.

Aleutian Heath and Meadow

USNVC Synonym: North Pacific-Bering Maritime Heath & Meadow

ACCS.

Biogeographic region	Species richness
Central	15
Northern	0
Southcentral	25
Southeast	0
Southwest	41
Western	33

Aleutian heaths and meadows occur primarily in the Southwest biogeographic region from the lower Alaska Peninsula and lower Kodiak Archipelago, extending through the Aleutian Islands to the Kamchatka Peninsula (Figure 6.16). These habitats with Aleutian Island floristic affinities have also been mapped sparingly in the Western, Southcentral, and Central regions. These habitats develop as open canopies of short-stature deciduous shrubs, herbaceous meadows, or mosaics of vegetation types. When dominated by ericaceous dwarf shrubs, this habitat is referred to as heath. Shrub stature generally decreases as maritime influence increases. Graminoids, ferns, and forbs may dominate the shrub understory or be interspersed as patches of meadow. As this habitat typically spans an area of plant species exchange between the Russian Far East and western Alaska, its floristics are somewhat unique. Common low shrubs include Sitka alder, a variety of willow species, salmonberry, and bog blueberry. Common dwarf shrubs include crowberry, Aleutian mountainheath, Alaska bellheather, and partridgefoot. Common graminoids, ferns, and forbs include Pacific reedgrass, dunegrass, bluejoint reedgrass, ladyfern, seacoast angelica, cowparsnip, and Kamchatka aconite. Volcanism

and deglaciation are primary agents of landscape-scale disturbance. Otherwise, exposure to strong coastal winds affects plant distributions and community composition.

Aleutian heath and meadow covers 13,321 square miles (2.3%) of Alaska (Table 6.1). Heaths and meadows with Aleutian Islands floristic affinities statewide can provide high- and moderate-value habitat for 61 wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderate and ranks 17th among the 41 habitats assessed (Table 6.3). The highest wildlife species richness value in Aleutian heath and meadow (41) occurs in the Southwest region where the habitat is most common. Species richness drops in the Western, Southcentral, and Central regions to 33, 25, and 15, respectively, and the habitat has not been mapped in the other two regions.

Aleutian heath and meadow habitats can support many ground-nesting birds and small mammal species, while low and dwarf shrubs can provide cover for other species. Statewide, two amphibian SGCN (western toad and wood frog) can regularly use these habitats along with 19 mammal SGCN, including these characteristic species: six subspecies of Arctic ground squirrels, snowshoe hare, meadow jumping mouse, collared lemming, Nearctic brown lemming, northern collared lemming, root vole, and Pribilof Island shrew. Forty avian SGCN can also consistently use this habitat type, including Aleutian Cackling Goose, Rock Ptarmigan, Willow Ptarmigan, passerines (e.g., American Pipit, Horned Lark, Gray-crowned Rosy Finch, Lapland Longspur, Northern Wheatear, Savannah Sparrow, Snow Bunting, White-crowned Sparrow), seabirds (e.g., Fork-tailed Storm-petrel, Kittlitz's Murrelet, Leach's storm-petrel, Long-tailed Jaeger, several auklet species), and shorebirds (e.g., Black-bellied Plover, Pacific Golden-plover, Surfbird, Wilson's Snipe).

Figure 6.16. Distribution of Aleutian heath and meadow in Alaska. M. Geist, ACCS.

Boreal Shrubland and Grassland

USNVC Synonym: North American Boreal Shrubland & Grassland

ACCS.

Biogeographic region	Species richness
Central	39
Northern	17
Southcentral	36
Southeast	32
Southwest	37
Western	42

Boreal shrublands and grasslands occur in upland settings throughout the Central biogeographic region, extending into the Western, Southwest, and Southcentral regions (Figure 6.17). The habitat has also been mapped sparingly in the Northern and Southeast regions. The habitat type develops as shrublands, grasslands, herbaceous meadows, or mosaics of the three. Shrubland cover ranges from open to closed. Shrub stands may be dominated by deciduous or evergreen shrubs and can include or be co-dominated by dwarf shrubs. Herbaceous communities tend to be dominated by graminoids on dry, wind-exposed sites, with the proportion of forbs increasing in more protected sites that are better able to retain moisture. Shrub stands are characterized by one or more deciduous shrub species: Siberian alder, tealeaf willow, grayleaf willow, Richardson's willow, resin birch, and dwarf birch. Young or disturbed sites tend to be alder-dominated and typically support an herb-rich understory. In contrast, older, more stable sites tend to be dominated by willow and birch and are characterized by an understory of ericaceous dwarf shrubs. In an uncommon setting, boreal shrublands and grasslands develop on inland dunes and steppe bluffs. Here, vegetation is characterized by dry, open low shrub and herb associations. Boreal shrublands and grasslands develop where extreme site conditions, such as recent deglaciation, wildland fire, cold air drainage, avalanche, or unstable substrates, preclude the establishment of trees.

Boreal shrublands and grasslands are quite common and cover 79,342 square miles (13.7%) of Alaska (Table 6.1). Shrublands and grasslands in the boreal zone statewide can provide high- and moderate-value habitat for 70 wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderately high and ranks 11th among the 41 habitats assessed (Table 6.3). The highest wildlife species richness in boreal shrublands and grasslands occurs in the Western biogeographic region, with a richness value of 42 (see table above). Richness values drop in the Central, Southwest, Southcentral, and Southeast regions, to 39, 37, 36, and 32, respectively, and then drop further to 17 in the Northern region.

Four species of amphibian SGCN occur in this habitat type (long-toed salamander, northwestern salamander, western toad, and wood frog) although the majority are limited to Southeast Alaska. Twenty-eight mammal SGCN also occur in this habitat, including these characteristic species: Alaska hare, snowshoe hare, meadow jumping mouse, Nearctic brown lemming, northern bog lemming, five species of voles, seven species subspecies of Arctic ground squirrel, and 10 species and subspecies of shrews (e.g., tundra shrew, dusky shrew). Thirty-eight species of birds including Willow Ptarmigan, a

large number of passerines (e.g., Alder Flycatcher, American Tree Sparrow, Arctic Warbler, Blackpoll Warbler, Bluethroat, Fox Sparrow, Golden-crowned Sparrow, Gray-cheeked Thrush, Lincoln's Sparrow, Northern Shrike, Orange-crowned Warbler, Redpoll, Savannah Sparrow, Varied Thrush, White-crowned Sparrow, Wilson's Warbler), raptors (e.g., American Kestrel, Northern Hawk Owl, Short-eared Owl), shorebirds (e.g., Upland Sandpiper, Wilson's Snipe), and waterbirds (e.g., Sandhill Crane, Black Scoter) can regularly use this habitat for nesting and foraging.

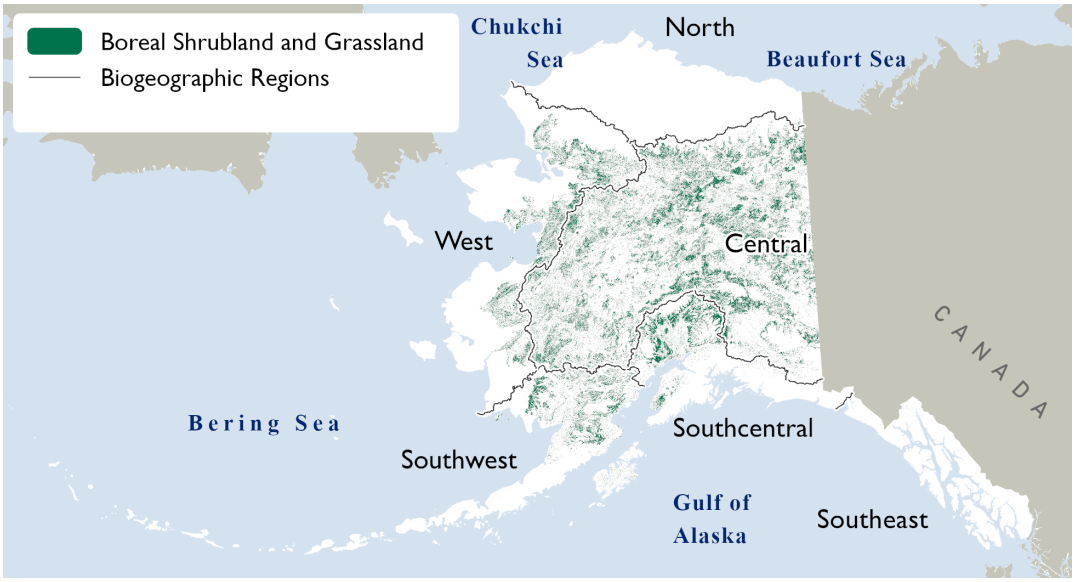


Figure 6.17. Distribution of boreal shrubland and grassland in Alaska. M. Geist, ACCS.

Tundra

Temperate Alpine Tundra

USNVC Synonym: Vancouverian Alpine Tundra

ACCS.

Biogeographic region	Species richness
Central	18
Northern	0
Southcentral	24
Southeast	21
Southwest	27
Western	0

Temperate alpine tundra occurs in montane settings throughout the Southeast and Southcentral biogeographic regions, extending into the Central and Southwest regions where these regions overlap with the Alaska Range (Figure 6.18). This habitat type is found at high elevations or on exposed sites where it develops as treeless, sparsely to well-vegetated patches of dwarf shrubs, graminoids, and forbs. In the most wind-exposed and rocky sites, tundra vegetation develops in protected microsites as a sparse cover of prostrate shrubs, graminoids, forbs, and lichens. Prostrate

shrubs in the mountain-avens genus and graminoids (e.g., longawn sedge, alpine fescue) are common species. In more protected areas, tundra forms a semicontinuous cover of dwarf ericaceous or willow shrub. Common ericaceous shrubs include western moss heather, yellow mountainheath, Alaska bellheather, bog blueberry, dwarf bilberry, and crowberry. Common willow species include arctic, sprouting leaf, and netleaf willows. In the most wind-protected sites, tundra may develop as lush herbaceous meadows with forbs (e.g., larkspurleaf monkshood, burnet, Sitka valerian, Kamchatka fritillary, Alaska Indian paintbrush, wooly geranium, Nootka lupine). Disturbances include wind, soil and snow creep, and freeze-thaw action; steeper sites may be prone to avalanches. On mountain summits where treeline is advancing due to a warming climate, the extent of alpine tundra will be reduced.

Temperate alpine tundra covers 6,624 square miles (1.1%) of Alaska (Table 6.1). Alpine tundra in the temperate zone statewide can provide high- and moderate-value habitat for 45 wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderately low and ranks 26th among the 41 habitats assessed (Table 6.3). The highest wildlife species richness in temperate alpine tundra occurs in the Southwest and Southcentral regions, with richness values of 27 and 24, respectively (see table above). Richness values drop to 21 and 18 in the Southeast and Central regions, respectively, and these alpine habitats have not been mapped in the other two regions.

The low-stature vegetation in temperate alpine tundra provides ideal habitat for obligate high-elevation mammals and ground-nesting birds. Statewide, three amphibian SGCN (Columbia spotted frog, long-toed salamander, and western toad) can occur regularly in this habitat, as well as 18 mammal SGCN. Characteristic mammal SGCN include hoary marmot, collared pika, root vole, and five subspecies of Arctic ground squirrel. A total of 24 avian SGCN can occur consistently in this habitat type, including these characteristic species: Rock Ptarmigan, American Pipit, Horned Lark, Northern Wheatear, Savannah Sparrow, Snow Bunting, American Golden-plover, Black-bellied Plover, Surfbird, and Aleutian Cackling Goose.

Figure 6.18. Distribution of temperate alpine tundra in Alaska. M. Geist, ACCS.

Boreal Alpine Tundra

USNVC Synonym: Western Boreal Alpine Tundra

ACCS.

Biogeographic region	Species richness
Central	20
Northern	20
Southcentral	25
Southeast	20
Southwest	22
Western	18

Boreal alpine tundra occurs in montane settings primarily in the Central, Southcentral, and Western biogeographic regions, although the habitat has been mapped in all six terrestrial regions (Figure 6.19). This habitat type is found at high elevations or on exposed sites where it develops as treeless, sparsely to well-vegetated patches of dwarf shrubs, graminoids, and forbs. In the most wind-exposed and rocky sites, tundra develops in protected microsites as a sparse cover of prostrate shrubs, graminoids, forbs, and lichens. Prostrate shrubs include dry-site species such as mountain-avens, pincushion plant, and alpine bearberry. Graminoids include Altai fescue, alpine sweetgrass, Bigelow's sedge, spike trisetum, and smallawned sedge. A variety of forbs with cushion or creeping growth forms may also occur. In more protected areas, tundra forms a semicontinuous cover of dwarf ericaceous or willow shrub. Common ericaceous species include crowberry, alpine azalea, bog blueberry, and white Arctic mountain heather. Common willow species are Arctic, polar, skeletonleaf, and netleaf willow. In the most wind-protected sites, lush herbaceous meadows with herbs (e.g., larkspurleaf monkshood, longawn sedge, Altai fescue, wooly geranium, forget-me-not, fringed grass of Parnassus, Canadian burnet, arrowleaf ragwort, Sitka valerian) establish. Disturbances include wind, soil and snow creep, and freeze-thaw action; steeper sites may be prone to avalanches. The extent of alpine tundra is likely to be reduced on mountain summits where treeline is advancing due to a warming climate.

Boreal alpine tundra covers 10,211 square miles (1.8%) of Alaska (Table 6.1). Alpine tundra in the boreal zone statewide can provide high- and moderate-value habitat for 51 wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderate to moderately low and ranks 23rd among the 41 habitats assessed (Table 6.3). Wildlife species richness values in boreal alpine tundra are strikingly similar in each of the six terrestrial biogeographic regions in Alaska, with values spanning a narrow range from 25 to 18 (see table above).

Three amphibian SGCN (northwestern salamander, western toad, and wood frog) can occur regularly in boreal alpine tundra, although the majority of species are restricted to Southeast Alaska. The habitat can also support 20 mammal SGCN including these characteristic species: collared pika, tundra shrew, St. Lawrence Island shrew, five subspecies of dusky shrew, and seven subspecies of Arctic ground squirrels. A total of 28 avian SGCN can occur regularly in this habitat, including the

following characteristic species: Rock Ptarmigan, American Pipit, Horned Lark, Northern Wheatear, Savannah Sparrow, Smith's Longspur, Snow Bunting, White-crowned Sparrow, American Golden-plover, Surfbird, and Upland Sandpiper.

Figure 6.19. Distribution of boreal alpine tundra in Alaska. M. Geist, ACCS.

Arctic Tundra

USNVC Synonym: Arctic Dry-Moist Tundra

ACCS.

Biogeographic region	Species richness
Central	52
Northern	53
Southcentral	32
Southeast	0
Southwest	57
Western	78

Arctic tundra occurs in treeless settings primarily in the Northern, Western, and Southwest biogeographic regions; the habitat has also been mapped in the Central and Southcentral regions (Figure 6.20). This habitat type develops as sparsely to well-vegetated areas of shrubs, graminoids, and forbs. Mosses and lichens are important components of the understory. Generally, the stature and cover of vegetation and the abundance of woody species increases as sites gain protection from wind, insulation from freezing temperatures, or have a sustained water source through the growing season. Because of this, tundra communities range in structure and composition from sparse assemblages of prostrate shrubs, low-stature herbs, mosses, and lichens in the most exposed, often high-elevation sites, to a continuous cover of low and dwarf shrubs interspersed with tussock forming-sedges, forbs, and a diversity of nonvascular species across the more protected, low elevation coastal plains. Tussock tundra is widespread and characterized by a high abundance of

tussock-forming sedges in combination with low and dwarf shrubs. Shrub-dominated tundra without tussocks tends to be dominated by either mountain-avens, willow, or ericaceous species. Mountain-avens prostrate shrub tundra occurs in dry, windswept areas with little retention of snow; dwarf willow shrub tundra occurs in small patches on moderately exposed sites; and ericaceous shrub tundra commonly occurs on moderately protected mesic to moist sites. Mesic herbaceous tundra is an uncommon habitat type occupying small patches in areas of late-lying snow, seeps, and stream margins. Much of the Arctic is underlain by continuous permafrost, and where soils are ice-rich, periglacial processes are common. These range in scale from cryoturbation and solifluction to thaw slumping (down-slope debris slides) and the development of patterned ground. Where sediment is well-drained with low interstitial ice volumes, the effects of permafrost are negligible.

Arctic tundra is the most abundant terrestrial habitat statewide covering 149,496 square miles (25.8%) of Alaska (Table 6.1). These tundra habitats can provide high- and moderate-value habitat for a large number (110) of wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is high and ranks 3rd among the 41 habitats assessed (Table 6.3). By far, the Western region has the greatest wildlife species richness, with 78 SCGN (see table above). Species richness values drop in the Southwest, Northern, and Central regions to 57, 53, and 52, respectively, and drop again in the Southcentral region to 32. Arctic tundra does not occur in the Southeast region.

Statewide, the single amphibian SGCN that can regularly occupy Arctic tundra is the wood frog. Thirty-four mammal SGCN can routinely occur in these habitats, including these characteristic species: Alaska hare, Alaska marmot, hoary marmot, seven subspecies of Arctic ground squirrels, and a suite of lemming, mice, vole, and shrew species. A total of 75 avian SGCN can consistently use Arctic tundra habitats, including Willow Ptarmigan, Rock Ptarmigan, dozens of passerines (e.g., American Pipit, Arctic Warbler, Bluethroat, Golden-crowned Sparrow, Horned Lark, Lapland Longspur, Northern Wheatear, Red-throated Pipit, Smith's Longspur, Snow Bunting, White-crowned Sparrow), and raptors (e.g., Gyrfalcon, Short-eared Owl, Snowy Owl). Several seabirds (e.g., Kittlitz's Murrelet, Long-tailed Jaeger, Parasitic Jaeger), a large number of shorebirds (e.g., American Golden-plover, Bar-tailed Godwit, Buff-breasted Sandpiper, Long-billed Dowitcher, Pectoral Sandpiper, Red Knot, Red-necked Stint, Semipalmated Sandpiper, Surfbird, Upland Sandpiper, Wilson's Snipe, Western Sandpiper, Whimbrel) and waterbirds (e.g., Taverner's Cackling Goose, King Eider, Long-tailed Duck, Northern Pintail, Sandhill Crane) can also breed and forage in Arctic tundra.

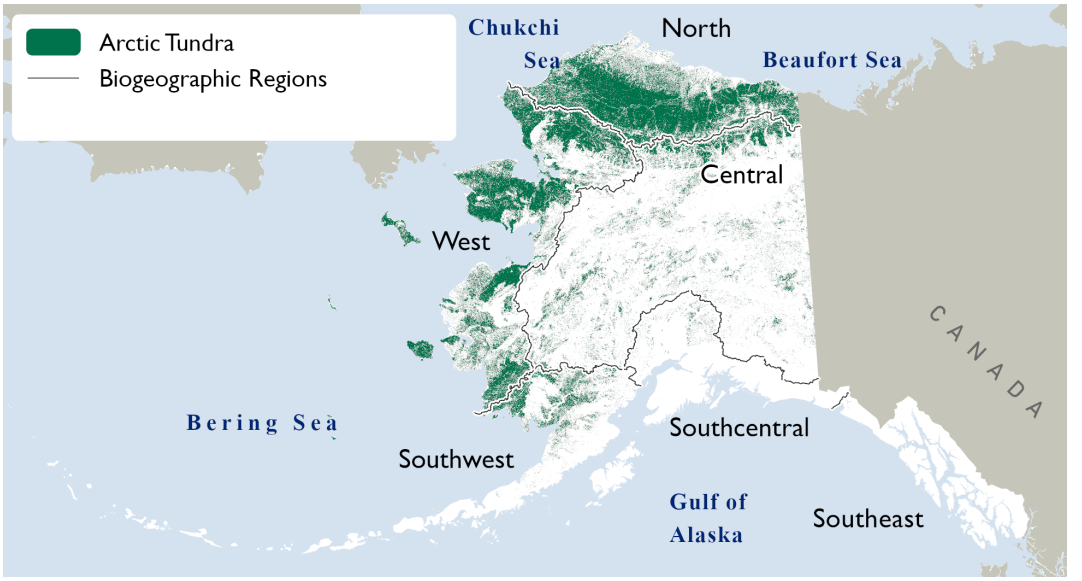


Figure 6.20. Distribution of Arctic tundra in Alaska. M. Geist, ACCS.

Cliff, Scree, and Rock

Temperate Cliff, Scree, & Rock Vegetation

USNVC Synonym: Western North American Cliff, Scree, & Rock Vegetation

ACCS.

Biogeographic region	Species richness
Central	11
Northern	0
Southcentral	15
Southeast	10
Southwest	16
Western	0

Temperate cliff, scree, and rock vegetation occurs in exposed settings throughout the Southeast and Southcentral biogeographic regions and extends into the Central and Southwest regions where they overlap with the Alaska and Aleutian ranges (Figure 6.21). These sparsely vegetated habitats develop on scree, talus, outcrops, cliffs, and bedrock shields. Plants establish in protected microsites, and communities range from lichen-encrusted bedrock to a sparse cover of graminoids, dry-site mosses, and fruticose lichens. Prostrate shrubs and wind- and cold-adapted forbs are occasional components. Sites are regularly exposed to the disturbances of wind, substrate and snow creep, and freeze-thaw action. On mountain summits where woody vegetation is advancing due to a warming climate, the extent of high-alpine rocky habitat is expected to be reduced.

Temperate cliff, scree, and rock vegetation covers 11,158 square miles (1.9%) of Alaska (Table 6.1). Cliff, scree, and rock vegetation in the temperate zone statewide can provide high- and moderate-value habitat for only a small number (16) of wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is low and ranks 33rd, which is second to last in richness

among the 41 habitats assessed (due to seven tied ranks; Table 6.3). The Southwest and Southcentral regions have the greatest wildlife species richness in temperate cliff, scree, and rock habitats, with richness values of 16 and 15, respectively (see table above). Richness values drop in the Central and Southeast regions to 11 and 10, respectively, and these rocky habitats have not been mapped in the other two biogeographic regions.

The terrestrial species that can use these harsh rocky environments have adapted to survive in difficult conditions with limited vegetation and cover. Statewide, collared pika and hoary marmot are the two characteristic mammal SGCN that can be regularly associated with this habitat. A total of 14 avian SGCN can also occur consistently in this habitat type, including these characteristic species: Rock Ptarmigan, Northern Wheatear, Snow Bunting, Golden Eagle, Gyrfalcon, Peregrine Falcon, Rough-legged Hawk, Surfbird, and Kittlitz's Murrelet. The Black Swift is another avian SGCN that can use this habitat type in Southeast Alaska.

Figure 6.21. Distribution of temperate cliff, scree, and rock vegetation in Alaska. M. Geist, ACCS.

Boreal Cliff, Scree, and Rock Vegetation

USNVC Synonym: North American Boreal Cliff, Scree, & Rock Vegetation

A, Underwood, ADF&G.

Biogeographic region	Species richness
Central	34
Northern	11
Southcentral	15
Southeast	0
Southwest	13
Western	12

Boreal cliff, scree, and rock vegetation occurs primarily in exposed settings throughout the Central, Southcentral, and Southwest biogeographic regions; this habitat has also been mapped in the Western and Northern regions (Figure 6.22). The nature of this sparsely vegetated habitat and the factors driving its establishment and maintenance in rocky terrain are the same as described above under the "Temperate Cliff, Scree, and Rock Vegetation" section.

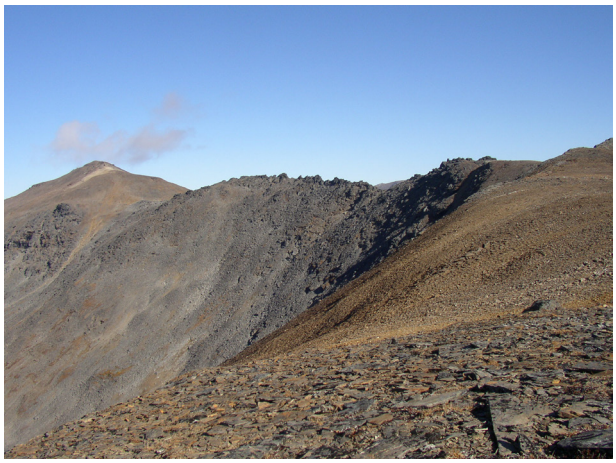
Boreal cliff, scree, and rock vegetation covers 14,225 square miles (2.5%) of Alaska (Table 6.1). Cliff, scree, and rock vegetation in the boreal zone statewide can provide high- and moderate-value habitat for 19 wildlife SGCN that have adapted to harsh conditions with limited vegetation and cover. Across all terrestrial and marine habitats evaluated, this species richness number is low and ranks 32nd (3rd from last) among the 41 habitats assessed (due to seven tied ranks; Table 6.3). The Southcentral and Central regions have the greatest wildlife species richness in boreal cliff, scree, and rock habitats, with richness values of 15 and 14, respectively (see table above). The richness numbers in the Southwest, Western, and Northern regions, however, are only slightly lower (13, 12, and 11, respectively). These boreal rocky habitats have not been mapped in the Southeast region.

Statewide, the three characteristic mammal species that can occur regularly in boreal cliff, scree, and rock vegetation are collared pika, little brown myotis, and Alaska marmot. This habitat type also can also be used regularly by 16 avian species, such as these characteristic species: Rock Ptarmigan, Snow Bunting, Northern Wheatear, Horned Lark, Golden Eagle, Gyrfalcon, Rough-legged Hawk, Peregrine Falcon, Gray-crowned Rosy Finch, and Kittlitz's Murrelet. Wandering Tattler is also considered to use this habitat regularly in the Western region.

Figure 6.22. Distribution of boreal cliff, scree, and rock vegetation in Alaska. M. Geist, ACCS.

Arctic Cliff, Scree, and Rock Vegetation

USNVC Synonym: Arctic Scree, Rock, & Cliff Barrens



ACCS.

Biogeographic region	Species richness
Central	17
Northern	17
Southcentral	13
Southeast	0
Southwest	19
Western	26

Arctic cliff, scree, and rock vegetation occurs in exposed settings north of the latitudinal treeline in the Northern biogeographic region and beyond the longitudinal extent of treeline in Western and Southwest Alaska (Figure 6.23). The type has also been mapped sparingly in the Southcentral and Central regions. The nature of this habitat and the factors driving the establishment and maintenance of these sparsely vegetated habitats in rocky terrain are the same as described above under the "Temperate Cliff, Scree, and Rock Vegetation" section. Where permafrost is ice-rich in Arctic settings, soils in this habitat are susceptible to solifluction and cryoturbation.

Arctic cliff, scree, and rock vegetation covers 12,005 square miles (2.1%) of Alaska (Table 6.1). Cliff, scree, and rock habitats in Arctic settings in all regions combined have higher terrestrial species richness than similar rocky habitats in temperate and boreal areas. These Arctic rocky habitats can provide high- and moderate-value habitat for 34 wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is low and ranks 29th among the 41 habitats assessed (Table 6.3). The Western region has notably greater wildlife species richness in Arctic cliff, scree, and rock habitats than the other biogeographic regions, with a richness value of 26 (see table above). Richness numbers drop in the Southwest, Central, Northern, and Southcentral regions to 19, 17, 17, and 13 SGCN, respectively. Arctic rocky habitats do not occur in the Southeast region.

Statewide, 11 characteristic mammal SGCN such as Alaska marmot, hoary marmot, six subspecies of Arctic ground squirrels, singing vole, and St. Lawrence Island shrew can occur regularly in these rocky habitats. Twenty-three avian SGCN can also consistently occur in this habitat, including these characteristic species: Rock Ptarmigan, Northern Wheatear, American Pipit, Horned Lark, Snow Bunting, Long-tailed Jaeger, American Golden-plover, and in the Southwest and Western regions, Kittlitz's Murrelet. In the Western region, other species, such as McKay's Bunting and Red Knot can regularly use this habitat type. Several raptor species use this habitat during the breeding season, including Golden Eagle, Rough-legged Hawk, Gyrfalcon, and Peregrine Falcon.

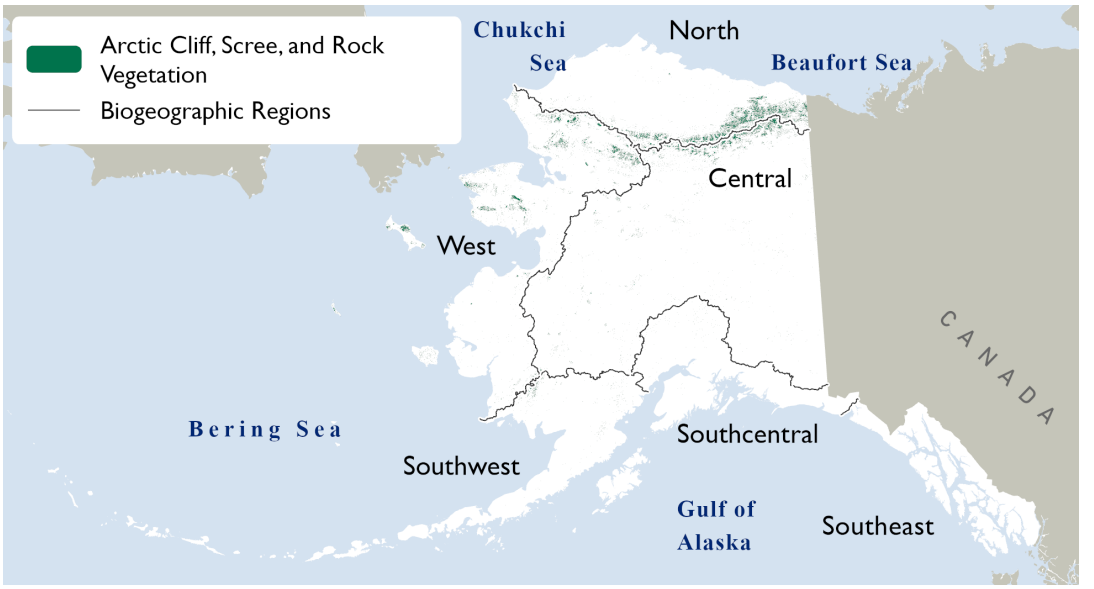


Figure 6.23. Distribution of Arctic cliff, scree, and rock vegetation in Alaska. M. Geist, ACCS.

Coastal Habitats

Temperate Salt Marsh

USNVC Synonym: North American Pacific Coastal Salt Marsh

Alaska ShoreZone.

Biogeographic region	Species richness
Central	0
Northern	0
Southcentral	43
Southeast	39
Southwest	40
Western	34

Temperate salt marshes occur in coastal settings primarily in the Southeast, Southcentral, and Southwest biogeographic regions (Figure 6.24). This habitat has also been mapped sparingly in the Western region. Tides regularly inundate these gently sloping areas, which are consequently vegetated by salt-tolerant forbs and graminoids. Low marsh areas are subject to twice-daily tidal inundation and often support a sparse cover of herbaceous species on mudflats. At the seaward margin of vegetation, the salt-loving creeping alkaligrass colonizes bare mud. Moving inland, dominance transitions to Nootka alkaligrass and succulent, annual forbs (e.g., Danish scurvygrass, saltmarsh starwort, seaside arrowgrass, goose tongue). The mid-marsh occupies the reach of land inundated only at the highest tides. It typically supports dense swards of Lyngbye's or Ramensk's sedge with largeflower speargrass occupying higher or more well-drained ground. The high marsh ranges from the level of seasonal high tides to the maximum reach of storm surges and salt spray.

Accordingly, there is a general shift to species with minimal tolerance of saline conditions, such as dunegrass, Bering's tufted hairgrass, red fescue, and low shrubs (e.g., sweetgale, dune willow). Due to their landscape position, salt marshes are highly susceptible to impacts from development, oil spills, sea level rise, and earthquake-induced slides and tsunamis.

Temperate salt marsh covers only 244 square miles (<0.1%) of Alaska (Table 6.1). Salt marshes in the temperate zone statewide can provide high- and moderate-value habitat for 66 wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderately high and ranks 14th (tied with boreal floodplain forest) among the 41 habitats assessed (Table 6.3). The highest wildlife species richness in temperate salt marshes occurs in the Southcentral, Southwest, and Southeast regions, with richness values of 43, 40, and 39 respectively (see table above). Richness drops to 34 SGCN in the Western region. Temperate salt marshes do not occur in Central and Northern regions.

Salt marshes can provide high-quality foraging habitat for shorebirds, seabirds, and some mammals and are available in early spring when other habitats are still snow covered. Statewide, 10 mammal SGCN can regularly use temperate salt marshes, including these characteristic species: little brown myotis, silver-haired bat, muskrat, North American river otter, and various small mammal species. A total of 56 avian SGCN can forage or nest in salt marsh habitats including a large number of shorebirds (see below), passerines (e.g., Black Swift, Savannah Sparrow, Song Sparrow), raptors (e.g., Short-eared Owl, Northern Hawk-owl), seabirds (e.g., Aleutian Tern, Glaucous Gull, Glaucous-winged Gull, Herring Gull, Short-billed Gull), and waterbirds (e.g., Tule Greater White-fronted Goose, Northern Pintail, Sandhill Crane). Twenty-seven shorebird SGCN can occur consistently in this habitat type, including these characteristic species: American Golden-Plover, Black-bellied Plover, Black Turnstone, Dunlin, Greater Yellowlegs, Hudsonian Godwit, Least Sandpiper, Lesser Yellowlegs, Long-billed Dowitcher, Marbled Godwit, Pectoral Sandpiper, Red Knot, Red-necked Phalarope, Rock Sandpiper, Semipalmated Sandpiper, Sharp-tailed Sandpiper, Short-billed Dowitcher, Western Sandpiper, and Whimbrel. Of the aquatic SGCN, crabs are prevalent in temperate salt marshes.

Figure 6.24. Distribution of temperate salt marsh in Alaska. M. Geist, ACCS.

Temperate Intertidal Vegetation

USNVC Synonym: Temperate Pacific Seaweed Intertidal Vegetation and Temperate Pacific Seagrass Intertidal Vegetation

Alaska ShoreZone.

Biogeographic region	Species richness
Central	0
Northern	0
Southcentral	33
Southeast	25
Southwest	33
Western	25

Temperate intertidal vegetation occurs in coastal settings primarily in the Southeast, Southcentral, and Southwest biogeographic regions. This habitat has also been mapped sparingly in the Western region (Figure 6.25). This habitat type is dominated by seaweed, vascular plants, and lichens that are tolerant of periodic inundation by saltwater. The vertical distribution of vegetation is influenced by tidal regime, with species establishing in relation to their saltwater tolerance. The low intertidal zone, which may only be exposed once a day, is often vegetated with a band of scouler's surfgrass or eelgrass, which is an important source of food for species such as Emperor and Pacific Black Brant Geese during migration and the nonbreeding season. The mid-intertidal zone commonly supports brown kelps, brown rockweed, and green and red seaweeds. Marine lichens form bands in the high-intertidal to supratidal zone. Black seaside lichen forms the lowest band, indicating the wave break zone. White and orange seaside lichens may form bands in the higher, supratidal zone (above the mean high-water level), which is exposed to storm surge and salt spray. Intertidal vegetation is exposed to daily inundation of saline water, wave action, and, at times, extreme wind and cold. Herbivory by invertebrates can strongly impact intertidal areas; for example, sea urchin grazing on kelp can completely depopulate an area of macroalgae. In some protected inlets of Southeast Alaska, oyster and kelp mariculture occur in the subtidal but may impact the adjacent intertidal zone. Due to their topographic position, intertidal zones are highly susceptible to impacts from oil spills, sea level rise, and earthquake-induced slides and tsunamis. They can also be impacted by coastal infrastructure.

Temperate intertidal vegetation covers only 68 square miles (<0.1%) of Alaska (Table 6.1). Intertidal zones in the temperate zone statewide can provide high- and moderate-value habitat for 46 wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderately low and ranks 25th among the 41 habitats assessed (Table 6.3). The highest wildlife species richness for temperate intertidal vegetation occurs in the Southcentral and Southwest regions, with a richness value of 33 for both regions (see table above). Richness values drop in the Southeast and Western regions to 25 SGCN in both regions. Temperate intertidal vegetation does not occur in the Central and Northern regions.

Statewide, two subspecies of North American river otter and 44 avian SGCN can routinely use this habitat. Avian SGCN that can use intertidal vegetation include Glaucous-winged Gull, Herring Gull,

Short-billed Gull, Peregrine Falcon, and Black Merlin in the Southeast region and Emperor Goose in the Southwest region. The intertidal habitats of coastal Alaska provide important food resources in the form of mollusks, crustaceans, worms, and biofilm for large numbers of shorebirds during spring and fall migration. Shorebird SGCN that can regularly use these intertidal habitats include these characteristic species: Black Oystercatcher, American Golden-Plover, Black-bellied Plover, Pacific Golden-Plover, Marbled Godwit, Hudsonian Godwit, Bar-tailed Godwit, Whimbrel, Black Turnstone, Ruddy Turnstone, Red Knot, Semipalmated Sandpiper, Western Sandpiper, Pectoral Sandpiper, Rock Sandpiper, Dunlin, Long-billed Dowitcher, Short-billed Dowitcher, Greater Yellowlegs, and Lesser Yellowlegs. Additional avian species that can use this habitat include American Pipit, Snow Bunting, Black Scoter, Dusky Canada Goose, and Tule Greater-white Fronted Goose. Of the aquatic SGCN, crabs and sea stars are commonly found in intertidal zones.

Figure 6.25. Distribution of temperate intertidal vegetation in Alaska. M. Geist, ACCS.

Arctic Salt Marsh

USNVC Synonym: Arctic Tidal Salt Marsh

M. Flemming, ACCS.

Biogeographic region	Species richness
Central	0
Northern	43
Southcentral	0
Southeast	0
Southwest	45
Western	57

Arctic salt marsh occurs in coastal settings primarily in the Northern and Western biogeographic regions, and this habitat has also been mapped sparingly in the Southwest region (Figure 6.26). Salt marshes are subject to regular tidal inundation and are dominated by salt-tolerant forbs

and graminoids. Vegetation communities vary depending on the frequency and duration of tidal inundation. Along coastlines that are not rising or falling, the vegetation pattern is zonal, with plants establishing according to their tolerance to salinity and inundation. Along coastlines experiencing subsidence and erosion due to thermokarst, the vegetation pattern can be a relict of the preexisting, nontidal habitat type. In the low marsh, mudflats are dominated by the clonal, halophytic graminoids creeping alkaligrass and Hoppner's sedge, along with the halophytic, succulent forbs saltmarsh starwort and Danish scurvygrass. In sheltered lagoons and brackish estuaries, the mid-marsh may support a continuous cover of emergent vegetation with the salt-tolerant herbs pendantgrass, Fisher's tundragrass, fourleaf mare's tail, and Ramensk's sedge. Along higher ground exposed only to storm surge and salt spray, prostrate oval-leaf willow and herbs with minimal salt tolerance are common. Arctic salt marshes are regularly inundated by storm surges, which flood low-lying inland tundra. Permafrost degradation and an increase in ice-free days have exposed the coastline to coastal erosion, ice-rafting, and storm surges for a greater period of time, thereby exacerbating the cumulative impacts of these processes.

Arctic salt marsh covers only 2,856 square miles (0.5%) of Alaska (Table 6.1). Salt marshes in the Arctic, however, can provide high- and moderate-value habitat for a relatively large number (74) of wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is relatively high and ranks 10th among the 41 habitats assessed (Table 6.3). The highest wildlife species richness for Arctic salt marsh habitats occurs in the Western region, with a richness value of 57 (see table above). Richness numbers drop in the Southwest and Northern regions to 45 and 43 SGCN, respectively. Arctic salt marshes do not occur in the other three biogeographic regions.

Arctic salt marshes can provide breeding and foraging habitats for a diversity of wildlife species, particularly shorebirds, seabirds, and waterbirds. Statewide, 63 avian SGCN can use this habitat type to forage and nest during the short snow-free season in Alaska. Characteristic bird taxa include passerines (e.g., Lapland Longspur, Savannah Sparrow), raptors (e.g., Peregrine Falcon), seabirds (e.g., Aleutian Tern, Arctic Tern, Glaucous Gull, Long-tailed Jaeger, Parasitic Jaeger, Pomarine Jaeger, Glaucous-winged Gull, Sabine's Gull, Short-billed Gull), and shorebirds. This highly productive coastal habitat is important to many of Alaska's shorebirds (e.g., Black-bellied Plover, Pacific-Golden Plover, Whimbrel, Bar-tailed Godwit, Black Turnstone, Ruddy Turnstone, Dunlin, Rock Sandpiper, Pectoral Sandpiper, Semipalmated Sandpiper, Western Sandpiper, Long-billed Dowitcher, Red-necked Phalarope, Red Phalarope, Wilson's Snipe). Additional bird species that use Arctic salt marshes include waterbirds (e.g., Black Brant, Cackling Goose, Emperor Goose, King Eider, Long-tailed Duck, Northern Pintail, Red-throated Loon, Spectacled Eider, Yellow-billed Loon). The wood frog along with 10 mammal SGCN can also regularly use this habitat type, including these characteristic species: Alaska hare, Arctic fox, muskrat, Nearctic brown lemming, and barren ground shrew. Of the aquatic SGCN, crabs are prevalent in Arctic salt marshes.

Figure 6.26. Distribution of Arctic salt marsh in Alaska. M. Geist, ACCS.

Temperate Coastal Beach and Dune

USNVC Synonym: Pacific Coastal Beach & Dune

A. Underwood, ADF&G.

Biogeographic region	Species richness
Central	0
Northern	0
Southcentral	45
Southeast	41
Southwest	50
Western	0

Temperate beaches and dunes occur in coastal settings in the Southeast and Southcentral biogeographic regions and extend into the Southwest region through Bristol Bay (Figure 6.27). These habitats are sparsely vegetated grasslands and herbaceous meadows occupying the elevational range from the upper intertidal zone to the inland extent of salt spray. Plant species diversity tends to increase with substrate stability and distance from the tideline. Mobile, lower beach substrates are commonly vegetated by seaside sandplant, dunegrass, seaside ragwort, oysterleaf, and beach pea. Along the upper beach, there are additional grasses, such as red fescue, meadow barley, largeglume bluegrass, largeflower speargrass, Pacific reedgrass, and Bering's tufted hairgrass. Stable beach meadow communities are complimented by a diversity of herbs, including cowparsnip, Scottish licorice-root, Pacific hemlock parsley, seacoast angelica, and salt-tolerant sedges (e.g., largehead sedge, Gmelin's sedge, Mackenzie's sedge, longawned sedge). Sitka spruce saplings may establish in meadows that are out of the range of storm surges and salt spray due to isostatic rebound or regional tectonics. Owing to their topographic position, dunes and beaches are highly susceptible to impacts from oil spills and human use.

Temperate coastal beach and dune covers only 65 square miles (<0.1%) of Alaska (Table 6.1). Beaches and dunes in the temperate regions statewide can provide high- and moderate-value habitat for 69 wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderately high and ranks 12th among the 41 habitats assessed (Table 6.3). The highest wildlife species richness in temperate coastal beach and dune habitats occurs in the Southwest region, with a richness value of 50 (see table above). Richness is notably lower in the Southcentral and Southeast regions, with values of 45 and 41, respectively. Temperate beaches and dunes do not occur in the Western, Central, and Northern regions.

Statewide, 50 avian SGCN can regularly use these coastal habitats, including shorebirds, seabirds, waterfowl, passerines, and raptors. Shorebird species that can occur in this habitat include these characteristic species: American Golden-Plover, Black-bellied Plover, Pacific-golden Plover, Killdeer, Marbled Godwit, Hudsonian Godwit, Whimbrel, Black Turnstone, Ruddy Turnstone, Red Knot, Surfbird, Sanderling, Semipalmated Sandpiper, Western Sandpiper, Spotted Sandpiper, Least Sandpiper, Rock Sandpiper, Dunlin, Short-billed Dowitcher, Wilson's Snipe, Greater Yellowlegs, and Lesser Yellowlegs. Many gulls and terns (e.g., Aleutian Tern, Glaucous-winged Gull, Short-billed Gull, Herring Gull) depend on beaches and dunes for primary nesting and foraging habitat. Waterbird species that can regularly use this habitat include Black Brant, Aleutian Cackling Goose, Emperor Goose, Northern Pintail, and Sandhill Crane. Several passerines (e.g., Bank Swallow, Lapland Longspur, Savannah Sparrow) and raptors (e.g., Bald Eagle, Short-eared Owl, Snowy Owl) can use this habitat type regularly. All five amphibian SGCN (Columbia spotted frog, long-toed salamander, northwestern salamander, western toad, and wood frog) can also use these habitats. Fifteen mammal SGCN can also regularly use this habitat type including these characteristic species: root voles, little brown myotis, silver-haired bat, North American river otter, Arctic ground squirrel, and cinereus shrew.

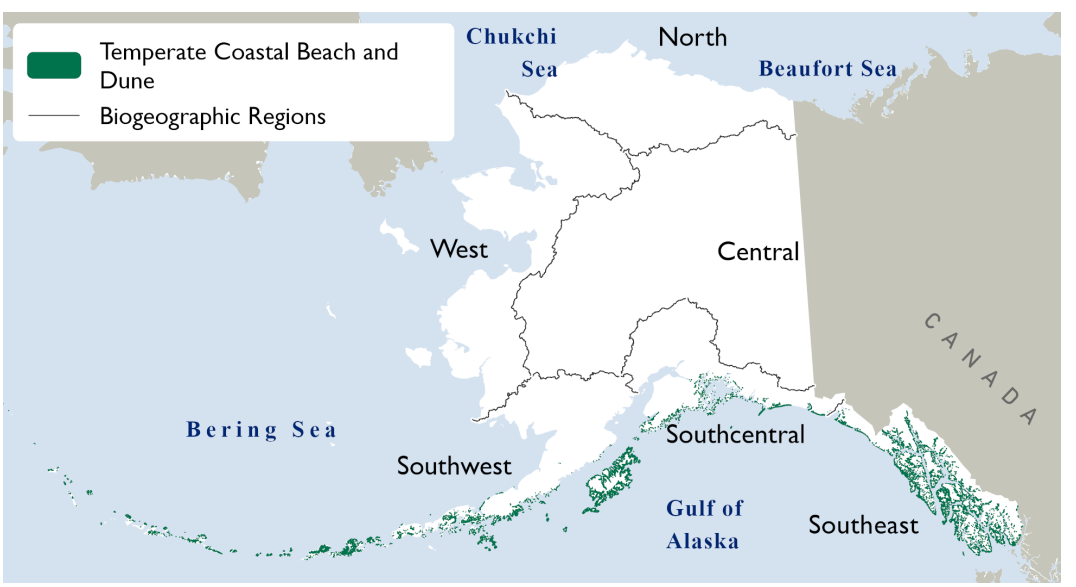


Figure 6.27. Distribution of temperate coastal beach and dune in Alaska. M. Geist, ACCS.

Temperate Coastal Cliff and Bluff

USNVC Synonym: Pacific Coastal Cliff & Bluff

A. Underwood, ADF&G.

Biogeographic region	Species richness
Central	0
Northern	0
Southcentral	30
Southeast	22
Southwest	40
Western	0

Temperate coastal cliff and bluff habitat occurs in the Southeast and Southcentral biogeographic regions and extends into the Southwest region through the Kodiak Island Archipelago and the southern coast of the Alaska Peninsula (Figure 6.28). See also the description of "Marine Habitat, Mainland and Island Cliffs and Bluffs," which occurs in all three oceanic regions. This habitat type forms sparse yet diverse plant communities on sea cliffs, bluffs, scree slopes, and rocky coastlines exposed to salt spray and ocean wave action. Vascular plants typically have some salt tolerance, and communities consist of creeping and succulent forbs, low grasses, dwarf shrubs, and stunted trees. These plants are restricted to small cracks in rock or slight, sheltered depressions. Lichen and moss cover tends to be high in this habitat type. Sitka spruce tolerates salt spray, and stunted individuals may grow from cracks in rocky headlands. Exposure to wave, wind, and sheet erosion may create unstable substrates subject to failure.

Temperate coastal cliff and bluff covers only 20 square miles (<0.1%) of Alaska (Table 6.1). Coastal cliffs and bluffs in the temperate zone are the least species-rich of the coastal habitats and can provide high- and moderate-value habitat for 42 wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderately low and ranks 27th (tied with offshore marine waters) among the 41 habitats assessed (Table 6.3). By far, the highest wildlife species richness in temperate coastal cliff and bluff habitats occurs in the Southwest region, with a richness value of 40 (see table above). Richness numbers are dramatically lower in the Southcentral and Southeast regions, with values of 30 and 22, respectively. Temperate coastal cliffs and bluffs do not occur in the Central region and have not been mapped in the Western and Northern regions.

Coastal cliffs and bluffs provide important nesting habitat and protection from predators for numerous seabirds that are obligate breeders in this habitat type. Statewide, these cliffs and bluffs provide habitat for one mammal SGCN (North American river otter) and 41 avian SGCN. Seabirds that can be regularly associated with this habitat include several species of auklets, murres, puffins, kittiwakes, gulls, storm-petrels, and cormorants, as well as Aleutian Tern, Pigeon Guillemot, and Northern Fulmar. Shorebird SGCN that can use temperate coastal cliff and bluff include these characteristic species: Black Oystercatcher, Black Turnstone, Rock Sandpiper, Ruddy Turnstone, Semipalmated Sandpiper, Sanderling, Surfbird, and Wandering Tattler. Several passerines (e.g., Gray-crowned Rosy Finch, Snow Bunting, Bank Swallow), geese (Aleutian Cackling Goose and Emperor Goose), and raptors (e.g., Gyrfalcon, Peregrine Falcon) can also use this habitat type.

Figure 6.28. Distribution of temperate coastal cliff and bluff in Alaska. M. Geist, ACCS.

Arctic Coastal Shore

USNVC Synonym: North American Arctic Coastal Shore

A. Underwood, ADF&G.

Biogeographic region	Species richness
Central	0
Northern	10
Southcentral	35
Southeast	0
Southwest	36
Western	26

Arctic coastal shore habitats occur in the Northern and Western biogeographic regions and extend into the Southwest region through Bristol Bay (Figure 6.29). The habitat has also been mapped sparingly in the Southcentral region. These habitats are sparsely vegetated grasslands and herbaceous meadows above the maximum reach of high tides. While not regularly inundated, these habitats are exposed to wind, salt spray, storm surges, and rafted ice. Plant species diversity tends to increase with substrate stability and distance from the tideline. Mobile, lower beach substrates are commonly vegetated by seaside sandplant, dunegrass, beach pea, and oysterleaf. More stable upper beach and dune communities may include grasses (e.g., Lapland reedgrass, red fescue, Bering's tufted hairgrass) and forbs (e.g., boreal yarrow, boreal sagebrush, Tilesius' wormwood, Pacific hemlock parsley, Lake Huron tansy). Permafrost degradation and an increase in ice-free days in Northern and Western regions of Alaska have exposed the coastline to coastal erosion, ice-rafting, and storm surges for a greater period of time, thereby exacerbating the cumulative impacts of these processes. Off-road vehicle use along beaches is frequent near villages and towns.

Arctic coastal shore covers only 191 square miles (<0.1%) of Alaska (Table 6.1). Arctic coastal shore habitats statewide can provide high- and moderate-value habitat for 52 wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderate and ranks 21st (tied with temperate fen) among the 41 habitats assessed (Table 6.3). The highest wildlife species richness in Arctic coastal shore habitats occurs in the Southwest and Southcentral regions, with richness values of 36 and 35, respectively (see table above). Richness numbers drop in the Western region to 26 SGCN and drop again to 10 in the Northern region. Arctic coastal shore habitats do not occur in the Central and Southeast regions.

Arctic coastal shore habitats provide important foraging and breeding grounds for seabirds, shorebirds, and waterbirds. Statewide, the 47 avian SGCN that can regularly use this habitat include several species of gulls and terns (e.g., Glaucous Gull, Glaucous-winged Gull, Short-billed Gull, Aleutian Tern), shorebirds (e.g., Dunlin, Sanderling), and waterbirds (e.g., King Eider, Pacific Common Eider, Long-tailed Duck). McKay's Bunting, Song Sparrow, Gyrfalcon, Snowy Owl, and several other species of passerines and raptors can also occur regularly in this habitat. Five mammal SGCN can be associated with this habitat type, including Arctic fox, Arctic ground squirrel, root vole, barren ground shrew, and in the Western region, Pribilof Island shrew.

Figure 6.29. Distribution of Arctic coastal shore in Alaska. M. Geist, ACCS.

Freshwater Aquatic Habitats

Rivers and Streams

ACCS.

Biogeographic region	Species richness
Central	24
Northern	22
Southcentral	25
Southeast	29
Southwest	24
Western	31

Alaska's flowing waters range from small, ephemeral streams to intermittent or groundwater-fed channelized rivers, as well as large, braided glacial and meandering systems. Perennial rivers and streams support numerous aquatic species, including both anadromous and resident fish. Mainstems and tributaries provide critical spawning, rearing, and overwintering habitats, with the type and ratio of substrate materials determining habitat suitability for aquatic species during different life stages. Rivers and streams can be broadly categorized as glacial and nonglacial. Glaciers feed into nearly all major rivers in Alaska and provide the headwaters to some of the state's largest rivers. In these rivers, the glacial input determines the chemical and physical characteristics of the water, depending on the extent of glacial input relative to other inputs, such as snowmelt and groundwater. Glacial meltwater has high levels of bioavailable nutrients, which fuel high, sustained levels of primary productivity. These waters also have seasonally variable levels of instream flow and channel adjustments from erosional and depositional processes are common. Nonglacial, or clearwater rivers and streams exhibit low turbidity, high clarity, and flow derived primarily from groundwater and precipitation. Different from glacial waterways, clearwater systems have less variable interannual flow, relatively narrower channel widths, stable and well-defined beds and banks, low sediment loads, and increased habitat complexity in the form of pools, riffles, runs, and large woody debris. Overwintering habitat for anadromous fish in clearwater streams can be reduced due to the smaller volume of water available; however, upwelling in groundwater-fed streams and perennial spring pools provide some of Alaska's most important winter habitats for freshwater aquatic species.

Although rivers and streams are not mapped in the Alaska Vegetation Map data (Nawrocki et al. 2025) used to determine the areal coverage of wildlife habitats in Alaska, these are important habitats for wildlife. Statewide, rivers and streams can provide high- and moderate-value habitat for 53 amphibian, bird, and mammal SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderate and ranks 20th (tied with agricultural and developed lands) among the 41 habitats assessed (Table 6.3). The highest wildlife species richness in rivers and streams occurs in the Western and Southeast regions, with richness values of 31 and 29, respectively (see table above). The notably lower species richness numbers in rivers and streams in the other four biogeographic regions are strikingly similar, ranging from 25 to 22.

Statewide, the three species of amphibians that can regularly use rivers and streams are Columbia spotted frog, western toad, and wood frog. Thirty-two avian species can consistently occur in or forage above this habitat type, including Bank Swallow, Black Swift, Tree Swallow, Bald Eagle, and obligate riverine species (e.g., Harlequin Duck). Numerous species of gulls, terns, shorebirds, and waterbirds also depend on flowing waters. The 18 mammal species that can regularly use flowing waters or the aerial space occupied by insects above streams include bats (e.g., little brown myotis, California myotis, long-eared myotis, long-legged myotis, silver-haired bat), muskrat, North American river otter, and several small mammals (e.g., taiga vole, cinereus shrew, tundra shrew, western water shrew, Glacier Bay water shrew). Because of a lack of comprehensive distribution data for all rivers in the state, fish and aquatic invertebrate SGCN were not included in the species richness assessment of this habitat; however, Alaska's rivers are teeming with aquatic life and provide habitat for almost all freshwater SGCN for at least part of their life cycles. Salmon and trout are prevalent throughout Alaska rivers and streams. Aquatic life stages of insects such as mayflies, stoneflies, caddisflies, and midges also occur in Alaska's rivers and are important food items for juvenile anadromous salmon and resident juvenile and adult trout.

Lakes and Ponds

ACCS.

Biogeographic region	Species richness
Central	33
Northern	34
Southcentral	41
Southeast	42
Southwest	46
Western	53

Alaska's lakes and ponds range from small alpine ponds underlain by bedrock to Arctic thermokarst lakes, as well as large bodies of water occupying glacial troughs carved during the Pleistocene. Lake and pond habitats vary with substrate, bathymetry, and shoreline contour. In the relatively still waters of lakes and ponds, flow regimes of inlets and outlets and basin contours influence nutrient cycling, hydraulic retention time, and biological productivity. Glacially carved lakes tend to be deep and bedrock-bound, with permanent surface water connections. Most of the state's larger lakes, particularly those in the Southwest and Southcentral regions, resulted from glaciation and are important to both resident and anadromous fish species for overwintering. For example, while Kenai Lake and Iliamna Lake differ in their glacial and nonglacial inputs, both are connected to rivers supporting large and valuable runs of salmon.

Unlike glacial lakes, lakes and ponds of thermokarst, fluvial, and volcanic origin generally lack connecting tributaries. These isolated waterbodies may instead be connected by seasonal surface or subsurface flow. For example, thermokarst ponds are often connected by the subsurface flow of groundwater over perennially frozen soil (permafrost) and through connections to deeper aquifers via taliks (areas of unfrozen ground in an otherwise frozen landscape). In the north, the depth of lakes and ponds is important for the survival of aquatic species. In general, waterbodies less than six feet deep will freeze to the bottom, leaving no free water for the survival of resident fish.

Although lakes and ponds are not mapped in the Alaska Vegetation Map data (Nawrocki et al. 2025) used to determine the areal coverage of wildlife habitats in Alaska, these are important habitats for wildlife. Lakes and ponds in Alaska can provide high- and moderate-value habitat for a relatively large number (86) of wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is relatively high and ranks 7th among the 41 habitats assessed (Table 6.3). The highest wildlife species richness in lakes and ponds occurs in the Western region, with a richness value of 53 (see table above). Richness numbers drop in the Southwest, Southeast, and Southcentral regions, with values of 46, 42, and 41, respectively. Richness numbers drop again in the Northern and Central regions to 34 and 33 SGCN, respectively.

Statewide, all five amphibian SGCN can use these habitats for foraging or breeding. Numerous seabirds (e.g., terns, gulls), waterbirds (e.g., geese, eiders, ducks, grebes, scoters, loons), and passerines (e.g., swallows, blackbirds) can heavily use lakes and ponds or the aerial space above them for foraging during the breeding season. Several bat species (e.g., little brown myotis, California myotis, long-eared myotis, long-legged myotis, silver-haired bat), and other mammals including muskrat, North American river otter, and small mammals (e.g., taiga vole, western water shrew, Glacier Bay water shrew) can also use lakes and ponds for foraging, breeding, or year-round habitat. Because of a lack of comprehensive distribution data for all Alaska lakes, fish and aquatic invertebrate SGCN were not included in the species richness assessment of this habitat. That said, while species assemblages differ by watershed, all freshwater aquatic SGCN can be found in Alaska lakes at least for part of their life cycles.

Freshwater Aquatic Vegetation

USNVC Synonym: Western North American Freshwater Aquatic Vegetation and Boreal Freshwater Aquatic Vegetation

ACCS.

Freshwater aquatic vegetation occurs in standing and slow-moving water throughout the state and occurs in the margins of lakes and ponds and rivers and streams. This habitat type consists of rooted, submerged, and free-floating herbaceous plants. Common species of plants, listed in order of increasing water depth preference from the littoral (nearshore) to limnetic (open water) zone include aquatic mosses, duckweed, buttercups, mare's tails, quillwort, water starwort, water mudwort, water alwort, bur-reeds, bladderworts, pondweeds, pond lilies, and watermilfoil. Shallow lakes and small ponds freeze to the bottom in the winter, while vegetation in larger lakes with sufficient fetch may be damaged by scour from wind-blown and rafted ice. In developed areas, increased concentrations of nitrogen and phosphorus may prompt a shift to eutrophic conditions and a subsequent change in plant community composition towards fast-growing plant and algal species. Such lakes are particularly susceptible to the establishment of the invasive aquatic waterweed *Elodea canadensis*. Although freshwater aquatic vegetation is not mapped in the Alaska Vegetation Map data used to delineate wildlife habitats in Alaska (Nawrocki et al. 2025) and wildlife species richness was not assessed for this habitat, many of the wildlife SGCN listed for lakes, ponds, and slow-moving rivers and streams are likely to use the vegetation resources this habitat provides.

Glacial Habitats

Perennial Snow, Ice, and Glacial Outwash

USNVC Synonyms: North American Glacier & Ice Field and North American Glacial Outwash

ACCS.

Biogeographic region	Species richness
Central	4
Northern	0
Southcentral	4
Southeast	4
Southwest	6
Western	0

Glaciers and perennial snow fields occur on mountain slopes and valleys in the Southeast, Southcentral, Southwest, and Central regions (Figure 6.30). Crevasses, seracs, and moulins are common glacial features. Ice fields are broad, ice-covered areas high in the mountains, typically on nearly level to strongly sloping gradients. Soils are generally nonexistent; however, on the lower reaches of glaciers, there is often a relatively thin veneer of very to extremely cobbly, stony, or bouldery glacier sediment over glacier ice. Vegetation is absent except in low-elevation ablation zones, where early-successional species can become established on thick till overlying glacial ice. Glacial outwash consists of recently deglaciated material at the terminus of and downstream of a receding glacier. Surface organics are typically absent or very thin and extremely patchy. Mineral soils are deep, rocky, and excessively drained. Vegetation is sparsely distributed but can include patches of early successional plants such as alder shrubs, Drummond's mountain avens, lichens, and bryophytes.

Perennial snow, ice, and glacial outwash covers 26,279 square miles (4.5%) of Alaska (Table 6.1). These glacial habitats statewide can provide high- and moderate-value habitat for only seven wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number ranks 34th and is the lowest among the 41 habitats assessed (due to seven tied ranks; Table 6.3). The wildlife species richness numbers in perennial snow, ice, and glacial outwash are highest in the Southwest, Southcentral, Southeast, and Central regions, with values ranging from six to four (see table above). These glacial habitats have not been mapped in the Western and Northern regions.

The sparse terrestrial vegetation associated with glacial habitats provides limited resources for wildlife. Statewide, the wildlife SGCN that can regularly use these glacial habitats includes two mammals (Alaska and hoary marmots) and five birds (Kittlitz's murrelet, Spotted Sandpiper, Wandering Tattler, Bank Swallow, and Gray-crowned Rosy Finch). Kittlitz's murrelets and harbor seals can forage regularly in the glacially influenced marine waters adjacent to freshwater glacial habitats.

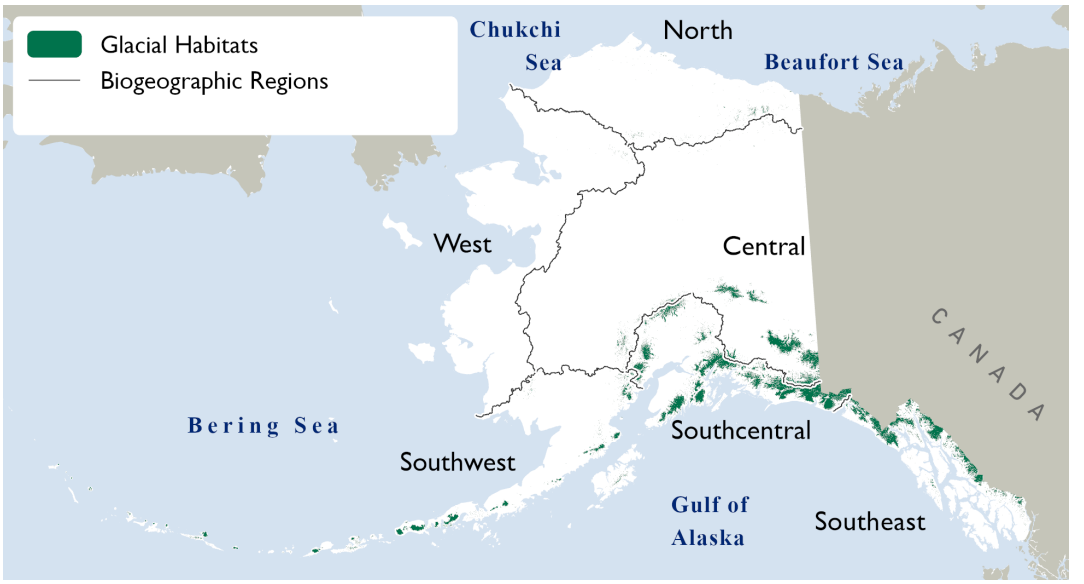


Figure 6.30. Distribution of perennial snow, ice, and glacial outwash in Alaska. M. Geist, ACCS.

Human-Modified Habitats

Recently Disturbed or Modified

ACCS.

Biogeographic region	Species richness
Central	32
Northern	0
Southcentral	39
Southeast	44
Southwest	31
Western	16

Recently disturbed or modified habitats are broadly categorized as lands that have experienced wildland fire or logging within the last five years, which removes or reduces forest cover and resets plant succession (Figure 6.31). The structure and species composition of habitats following fire depends on the initial habitat type as well as the extent and severity of the most recent burn. Sites with severely burned substrates tend to support a greater density of herbaceous plants, broadleaf shrubs, seedlings, and trees that differ from the species that were dominant before fire. Sites with less severely burned substrates tend to be recolonized by resprouting from rootstocks of shrub and tree species that survived the burn. Herbs such as bluejoint reedgrass, Altai fescue, fireweed, and fire-associated liverworts and mosses are characteristic of the lower strata. Shrubs and trees capable of basal suckering (e.g., willow, birch, aspen, cottonwood) comprise the mid-level strata. Standing dead and downed trees can be common and may overtop live vegetation. Soils generally have a thin layer of surface organic material. Recently logged habitats are similar to recently burned habitats as they also represent an early successional phase in which the removal of the tree canopy allows colonization of ruderal forbs and graminoids. Similar to a severe wildfire, physical disturbance

associated with logging can result in removal of surface organic material and excessive erosion on sloped terrain.

Recently disturbed or modified areas cover 7,039 square miles (1.2%) of Alaska (Table 6.1). Disturbed areas statewide can provide high- and moderate-value habitat for 67 wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderately high and ranks 13th among the 41 habitats assessed (Table 6.3). Wildlife species richness in recently disturbed or modified areas is highest in the Southeast region, with a richness value of 44 (see table above). Richness values are slightly lower in the Southcentral region (39) and then drop further in the Central, Southwest, and Western regions to 32, 31, and 16, respectively. These disturbed habitats have not been mapped in the Northern region.

Recently burned and logged areas provide various resources for wildlife with coarse woody debris and varying levels of overstory cover, depending on the degree of disturbance. Statewide, four amphibians, 42 birds, and 21 mammals can be regularly found in disturbed or modified areas. Columbia spotted frog, long-toed salamander, western toad, and wood frog are the amphibians that can use recently burned and logged habitats. Bird species that can consistently use these early successional habitats with standing dead trees include upland gamebirds (e.g., Sooty Grouse, Spruce Grouse, Willow Ptarmigan), woodpeckers (American Three-toed Woodpecker, Black-backed Woodpecker), passerines (e.g., American Tree Sparrow, Dark-eyed Junco, Savannah Sparrow, Western Wood Pewee), raptors (e.g., American Kestrel, Red-tailed Hawk, Short-eared Owl), and shorebirds (e.g., Killdeer, Greater Yellowlegs, Upland Sandpiper, Wilson's Snipe). Mammals that can be found in disturbed areas are silver-haired bat, American marten, snowshoe hare, and several species of mice, lemmings, voles, and shrews.

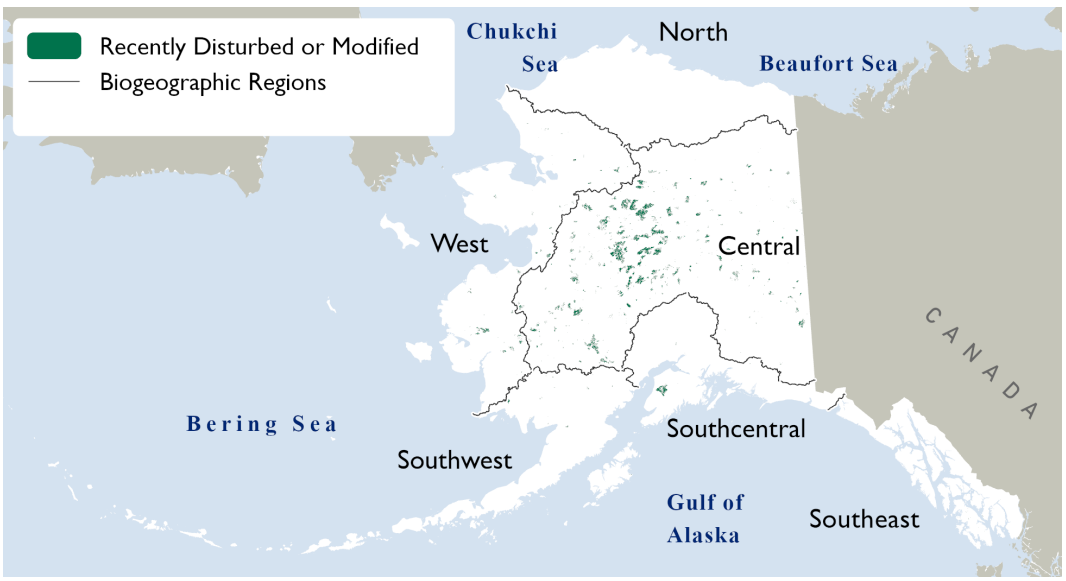


Figure 6.31. Distribution of recently disturbed or modified habitat in Alaska. M. Geist, ACCS.

Agricultural and Developed Lands

ACCS.

Biogeographic region	Species richness
Central	21
Northern	6
Southcentral	30
Southeast	36
Southwest	22
Western	17

Herbaceous agricultural vegetation includes areas of pasture, hay, or crops cultivated for livestock grazing or the production of annual or perennial crops (Figure 6.32). This class also includes all land being actively tilled. Developed lands are categorized by intensity of use and proportion of impervious substrates. High-intensity developed areas are where people reside or work in high numbers. Examples include apartment complexes, row houses, and commercial and industrial developments. In these areas, impervious surfaces account for 80% to 100% of the total land cover. Low-intensity developed areas have a mixture of constructed materials and vegetation. These areas most commonly include single-family housing units where impervious surfaces account for 20% to 49% of total cover. Moderately developed areas are characterized by a mixture of constructed materials and vegetation. These areas include single-family housing units where impervious surfaces account for 50% to 79% of the total land cover. Developed open spaces are characterized by vegetation in the form of lawn grasses with some constructed materials. Impervious surfaces account for less than 20% of the total land cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetics. Roads include improved and unimproved corridors designed for vehicle traffic. Impervious surfaces such as asphalt, concrete, or gravel account for 80% to 100% of the total land cover. Human-modified barrens are areas of bedrock, volcanic material, strip mines, gravel pits, and other accumulations of earthen material. In these areas, vegetation generally accounts for less than 15% of the total land cover.

Agricultural and developed lands cover only 912 square miles (0.2%) of Alaska (Table 6.1). Statewide, these lands can provide high- and moderate-value habitat for 53 wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderate and ranks 20th (tied with rivers and streams) among the 41 habitats assessed (Table 6.3). The highest wildlife species richness in agricultural and developed lands occurs in the Southeast and Southcentral regions, with richness values of 36 and 30, respectively (see table above). Richness values drop in the Southwest, Central, and Western regions to 22, 21, and 17, respectively, and then drop further to six SGCN in the Northern region.

Agricultural lands provide habitat for many avian and mammal species that can use these areas during migration or the breeding season. Development intensity affects the wildlife use of these developed lands, but they can still support a number of wildlife SGCN. Statewide, all five of Alaska's amphibian SGCN can occur in agricultural and developed areas. A total of 34 avian SGCN can

regularly use these habitats, including these characteristic species: Barn Swallow, Boreal Chickadee, Common Raven, Lapland Longspur, Pine Siskin, Savannah Sparrow, Snow Bunting, Song Sparrow, Tree Swallow, Yellow-rumped Warbler, American Kestrel, Bald Eagle, Western Screech-Owl, Killdeer, Upland Sandpiper, Sandhill Crane, and five species of gulls. Fourteen mammal SGCN can occur consistently in these human-modified habitats including five species of bats and these characteristic and adaptable species: Arctic fox, northwestern deermouse, meadow jumping mouse, northern bog lemming, voles, and shrews.

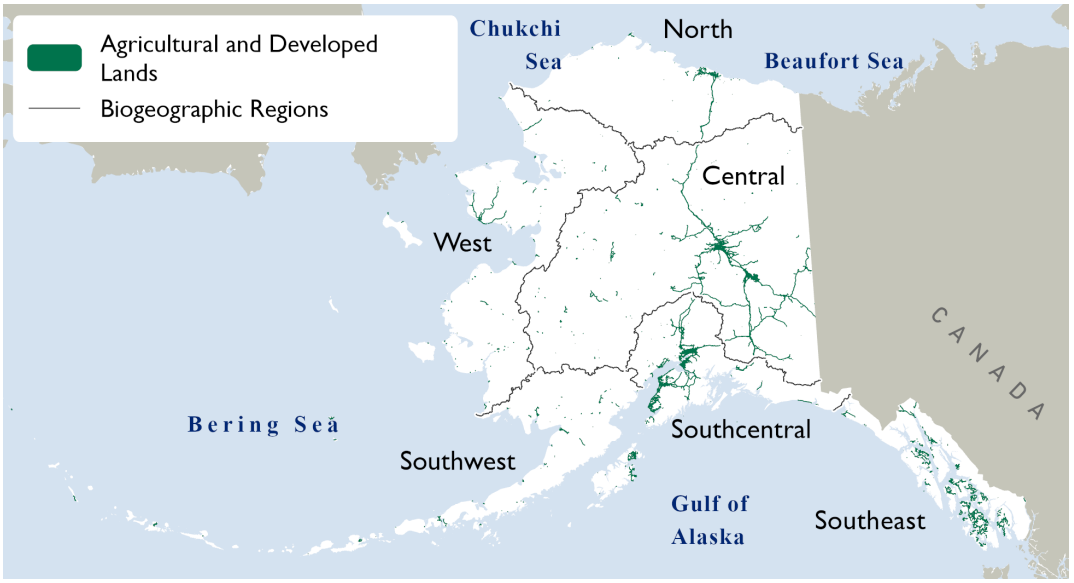


Figure 6.32. Distribution of agricultural and developed lands in Alaska. M. Geist, ACCS.

Marine Habitats

As noted above, the eight broad-scale marine and intertidal habitat types described in this chapter were not mapped, but they were assessed for habitat-value and species richness for marine birds and mammals in the three oceanic regions surrounding Alaska.

Mainland and Island Mudflats

Alaska ShoreZone.

Oceanic region	Species richness
Beaufort-Chukchi Sea	24
Bering Sea	27
Gulf of Alaska	28

Mudflats develop along low-energy coastlines of Alaska's mainland and islands. Substrates are typically fine-grained sands and subject to regular tidal inundation. The sparse vegetation associated with mudflats is described in the "Arctic Salt Marsh" and "Temperate Salt Marsh" sections above.

In the three Alaska oceanic regions combined, intertidal mudflats can provide high- and moderate-value habitat for 33 wildlife SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is low and ranks 30th (tied with mainland and island rocky shores) among the 41 habitats assessed (Table 6.3). The highest wildlife species richness for intertidal mudflats occurs in the Gulf of Alaska, with 28 SGCN (see table above). Species richness is similar in the Bering Sea and Beaufort-Chukchi Seas regions, with values of 27 and 24, respectively.

Statewide, mudflats can provide important migration staging areas during spring and fall and/or foraging habitat during the breeding season for 25 shorebird SGCN, including Whimbrel, Surfbird, Red Knot, Gray-tailed Tattler, eight species of sandpipers, four species of plovers, three species of godwits, two species of dowitchers, both species of turnstones, and both species of yellowlegs. Seven seabird and waterbird SGCN can occur in mainland and island mudflat habitats, including Aleutian Tern, Glaucous Gull, Glaucous-winged Gull, Herring Gull, Short-billed Gull, Parasitic Jaeger, and Steller's Eider. Mudflats (at high tide) can provide important foraging habitat for one marine mammal SGCN (Pacific harbor seal).

Mainland and Island Rocky Shores

Alaska ShoreZone.

Oceanic region	Species richness
Beaufort-Chukchi Sea	13
Bering Sea	30
Gulf of Alaska	26

Rocky shores develop along high-energy coastlines of Alaska's mainland and islands. Substrates are subject to regular tidal inundation and are characterized by boulders, pebbles, and pools of salty water. The vegetation associated with rocky shores is described in the "Temperate Intertidal Vegetation" section above.

In the three Alaska oceanic regions combined, rocky shores can provide high- and moderate-value habitat for 33 SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is low and ranks 30th (tied with mainland and island mudflats) among the 41 habitats assessed (Table 6.3). The highest wildlife species richness in rocky shore habitats is associated with the Bering Sea region, with a richness value of 30 (see table above). Richness drops slightly to 26 SGCN in the Gulf of Alaska and then drops to 13 SGCN in the Beaufort-Chukchi Seas region.

Statewide, 20 seabird and waterbird, eight shorebird, and five marine mammal SGCN can be regularly found using rocky shore habitats. Breeding seabird and waterbird SGCN that can consistently use rocky shores on islands include Cassin's Auklet, Dovekie, Fork-tailed Storm-petrel, Horned Puffin, Glaucous-winged Gull, Leach's Storm Petrel, Least Auklet, Pacific Common Eider, Parakeet Auklet, Pigeon Guillemot, Red-faced Cormorant, Tufted Puffin, and Whiskered Auklet. Two marine mammal species (northern fur seal and Steller sea lion) also consistently use rocky shore habitats on islands. Additional seabird and marine mammal SGCN that can inhabit rocky shore habitats include Black-legged Kittiwake, Common Tern, Glaucous Gull, Herring Gull, Pelagic Cormorant, Short-billed Gull, Parasitic Jaeger, northern sea otter, Pacific harbor seal, and Pacific walrus. Eight shorebird SGCN can consistently use rocky shore habitats, including Black Oystercatcher, Whimbrel, Surfbird, Rock Sandpiper, the 2 turnstone species, and both tattler species.

Mainland and Island Cliffs and Bluffs

Alaska ShoreZone.

Oceanic region	Species richness
Beaufort-Chukchi Sea	11
Bering Sea	22
Gulf of Alaska	18

Cliffs and bluff habitats are located immediately adjacent to the beach along the coastlines of Alaska's mainland and islands. While these habitats are subject to coastal processes such as wind, storm wave erosion, and salt spray, they are not subject to regular tidal inundation. The sparse yet diverse plant communities are described in the "Temperate Coastal Cliff and Bluff" section above.

These near-vertical habitats in the three Alaska oceanic regions combined provide protected nesting habitat for many species of seabirds. Coastal cliff and bluff habitats can provide high- and moderate-value habitat for 23 avian SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is low and ranks 31st among the 41 habitats assessed (Table 6.3). The highest wildlife species richness for coastal cliffs and bluffs occurs in the Bering Sea region, with a richness value of 22 (see table above). Richness drops slightly to 18 SGCN in the Gulf of Alaska region and drops further to 11 SGCN in the Beaufort-Chukchi Seas region.

Statewide, seabirds that can routinely use cliffs and bluffs for breeding on the mainland include Black-legged Kittiwake, Common Murre, Glaucous Gull, Glaucous-winged Gull, Herring Gull, Short-billed Gull, Horned Puffin, Kittlitz's Murrelet, Marbled Murrelet, Northern Fulmar, Pelagic Cormorant, Thick-billed Murre, and Tufted Puffin. Seabirds that can commonly nest on cliffs and bluffs on offshore islands include Black Guillemot, Cassin's Auklet, Crested Auklet, Dovekie, Least Auklet, Parakeet Auklet, Pigeon Guillemot, Red-faced Cormorant, Red-legged Kittiwake, and Whiskered Auklet.

Mainland and Island Cobble and Sand Beaches

Alaska ShoreZone.

Oceanic region	Species richness
Beaufort-Chukchi Sea	25
Bering Sea	34
Gulf of Alaska	25

Cobble and sand beaches develop along moderate-energy coastlines of Alaska's mainland and islands. Substrates are subject to regular tidal inundation and are characterized by cobbles and sand. The upper vegetated areas of cobble and sand beaches is described in the "Temperate Coastal Beach and Dune" section above.

Cobble and sand beaches in the three Alaska oceanic regions combined can provide high- and moderate-value habitat for 39 marine SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is low and ranks 28th among the 41 habitats assessed (Table 6.3). Wildlife species richness for cobble and sand beaches is highest in the Bering Sea region, with a richness value of 34 (see table above). Richness drops in the Gulf of Alaska and Beaufort-Chukchi Seas regions, with values of 25 SGCN in each region.

Statewide, 18 shorebird, 14 seabird and waterbird, and seven marine mammal SGCN can be regularly found using these beach habitats. Shorebird SGCN that can consistently use cobble and sand beaches include Black Oystercatcher, Marbled Godwit, Whimbrel, Surfbird, Red Knot, Red Phalarope, both species of turnstones, both species of tattlers, three species of plovers, and five species of sandpipers. Seabird and waterbird SGCN that can be found in this habitat include Black Guillemot, Parasitic Jaeger, Cassin's Auklet, Dovekie, both species of kittiwakes, three species of eiders, three species of gulls, and two species of terns. Cobble and sand beaches can provide important habitat for marine mammals such as the Pacific harbor seal, spotted seal, northern fur seal, Pacific walrus, Steller sea lion, and polar bear.

Nearshore Waters

ACCS.

Oceanic region	Species richness
Beaufort-Chukchi Sea	34
Bering Sea	53
Gulf of Alaska	48

Nearshore waters are relatively shallow marine waters that range from mean low tide to an average of approximately 65 feet deep. Nearshore waters generally extend from the shoreline to three nautical miles offshore and are under state management. Nearshore areas have greater variability in salinity, temperature, suspended sediment concentrations, and ice scouring than shelf or oceanic habitats. Wave energy is generally higher in nearshore waters than in deeper waters due to wave break. Winds, freshwater input, ice current patterns, and tides drive seasonal cycles of mixing and turnover in the water column. Depending on environmental conditions, the column may be strongly stratified during one season and strongly mixed during another. Freshwater from glacial rivers carries a heavy load of fine sediments that decrease light penetration and biological productivity in turbid areas.

Where waters with contrasting density, salinity, and other characteristics meet, floating debris and kelp may mark a ripline. Such boundary areas often support greater abundance of fish, birds, and marine mammals. Kelp forests growing in the nearshore habitat provide habitat structure, living substrate, cover, microhabitats, and primary productivity. Some kelp species are perennials; however, many are annuals that die back during the winter. Although the extent of these forests varies yearly, kelp contributes substantial primary productivity and habitat complexity to the marine ecosystem. The seasonal die-off contributes a strong pulse of detritus to the ecosystem during low-light winter months, supporting detritivores and upper trophic levels when primary productivity in the water column wanes. Lower intertidal eelgrass beds, which may also be considered part of the nearshore habitat, are discussed in the "Temperate Intertidal Vegetation" section above.

In the three Alaska oceanic regions combined, nearshore waters can provide high- and moderate-value habitat for 58 SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderate and ranks 18th among the 41 habitats assessed (Table 6.3). Nearshore waters in the Bering Sea and Gulf of Alaska have the highest marine wildlife species richness, with 53 and 48 SGCN, respectively (see table above). Marine species richness drops in the Beaufort-Chukchi Seas region, with a value of 34 SGCN.

Statewide, 41 avian and 17 marine mammal SGCN can be regularly found using nearshore waters. Nearshore waters can provide habitat for many seabird SGCN, such as Black-legged Kittiwake, Parasitic Jaeger, Black Guillemot, Pigeon Guillemot, Least Auklet, Crested Auklet, Whiskered Auklet, Red-faced Cormorant, Pelagic Cormorant, Aleutian Tern, Common Murre, Thick-billed Murre,

Glaucous Gull, Glaucous-winged Gull, Herring Gull, Short-billed Gull, Kittlitz's Murrelet, and Marbled Murrelet. Waterbird SGCN that can regularly use nearshore waters include Yellow-billed Loon, Red-throated Loon, Common Loon, Surf Scoter, King Eider, Pacific Eider, Common Eider, Spectacled Eider, Steller's Eider, Western Grebe, Red-necked Grebe, and Horned Grebe. Some of the marine mammal SGCN that can use nearshore waters include beluga, common minke whale, Dall's porpoise, harbor porpoise, humpback whale, northern sea otter, Pacific harbor seal, ringed seal, spotted seal, Steller sea lion, northern fur seal, Pacific walrus, and polar bear. Because of a lack of comprehensive distribution data, fish and aquatic invertebrate SGCN were not included in the species richness assessment of this habitat; however, nearshore waters are habitat for a variety of marine fishes such as herring, smelt, and salmon.

Species of Conservation Need: Polar bear *(Ursus maritimus)*

Polar bear (USFWS Permit #MA80164B-0). J. Crawford, ADF&G.

Polar bears are the largest of all bear species and can be found in and around the seasonally ice-covered waters of the circumpolar Arctic. Adult males can weigh up to 1,200 pounds, while females can weigh up to 700 pounds. There are 19 subpopulations of polar bears worldwide, two of which—the Chukchi Sea and Southern Beaufort Sea populations—are found in Alaska. Approximately 26,000 polar bears exist among these 19 subpopulations, with roughly 2,000 bears in the Chukchi Sea and 900 bears in the Southern Beaufort Sea. Except for females with dependent cubs, polar bears live solitary lives with an average lifespan of 25 years. Female polar bears den in snow drifts in the late fall and give birth to one to three cubs approximately two months later. Polar bear diet consists primarily of ringed seals (*Pusa hispida*) and bearded seals (*Erignathus barbatus*). The primary threat to this species is the loss of sea ice habitat. The species is listed as threatened under the Endangered Species Act. ADF&G has conducted multiple studies on polar bears to understand and monitor their status, help ensure continued opportunities for subsistence, and ensure that federal regulations and permitting of activities in polar bear habitat are appropriate.

Offshore Shelf Waters

ACCS.

Oceanic region	Species richness
Beaufort-Chukchi Sea	35
Bering Sea	54
Gulf of Alaska	50

Offshore shelf waters are marine waters that are generally 65–650 feet deep, including the shelf break zone. Shelf waters are generally located greater than three nautical miles from the shoreline and are under federal management. Continental shelves slope very gently toward the ocean basin along gradients of varying widths. Shelves are typically broad along passive or spreading continental margins where there is little seismic or volcanic activity and narrower along margins of active convergence or subduction. Because of its location along an active tectonic plate margin, the continental shelf rimming the Gulf of Alaska is relatively narrow. Conversely, the continental shelves tapering to the passive basins of the Bering, Chukchi, and Beaufort seas are comparatively wide.

Shelf habitats are high-productivity environments that support a wide range of animals. Sublittoral substrates can be soft-bottomed (mud, sand, shell, and gravel), shell debris, or rocky. The benthic communities that reside here include infauna, organisms that live within sediments, and epifauna, organisms that live on sediments. In general, benthic communities contain a diversity of deposit and suspension feeders, as well as predators and scavengers, but suspension feeders dominate. Prominent species include barnacles, king crabs, bryozoans and other hydroids, shrimp, ascidians, anemones, sea pens, sea whips, brittle stars, sea cucumbers, sponges, gastropods, urchins, and shrimp. Soft-bottom communities recycle nutrients from the water column and rocky habitats. Cold-water corals form important benthic habitat in the Gulf of Alaska and off the coast of the Aleutian Islands. These coral gardens include more than 100 species of coral and are comparable in size and structure to tropical coral reefs. The Aleutian Islands have the highest coral diversity of Alaska's waters. Some of these corals have a tree-like structure and can reach heights of 10 feet and widths of 23 feet.

Offshore shelf waters in the three Alaska oceanic regions combined can provide high- and moderate-value habitat for 62 marine SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderate to moderately high and ranks 16th (tied with boreal subalpine and subarctic woodland) among the 41 habitats assessed (Table 6.3). Wildlife species richness in offshore shelf waters is highest in the Bering Sea and Gulf of Alaska regions, with richness values of 54 and 50, respectively (see table above). Marine species richness drops in the Beaufort-Chukchi Seas region, with a value of 35 SGCN.

Statewide, 40 avian and 22 marine mammal SGCN can be regularly found using offshore shelf waters. Shelf waters can provide habitat for many seabird SGCN including Fork-tailed Storm-petrel, Thick-

billed Murre, Northern Fulmar, Kittlitz's Murrelet, Horned Puffin, Dovekie, Black-footed Albatross, Short-tailed Albatross, Laysan Albatross, Red-legged Kittiwake, Black-legged Kittiwake, Short-tailed Shearwater, Buller's Shearwater, Sooty Shearwater, Pink-footed Shearwater, Least Auklet, Crested Auklet, Parakeet Auklet, Cassin's Auklet, Ivory Gull, Sabine's Gull, Ross's Gull, Long-tailed Jaeger, and Pomarine Jaeger. Waterbird and shorebird SGCN that can regularly use shelf waters include Yellow-billed Loon, Common Loon, King Eider, Spectacled Eider, Red Phalarope, and Red-necked Phalarope. Some of the marine mammals that occur in offshore shelf waters include polar bear, bearded seal, Northern fur seal, ribbon seal, ringed seal, spotted seal, Steller sea lion, Pacific walrus, beluga, bowhead whale, common minke whale, Dall's porpoise, humpback whale, North Pacific right whale, Pacific white-sided dolphin, and sperm whale. Because of a lack of comprehensive distribution data, fish and aquatic invertebrate SGCN were not included in the species richness assessment of this habitat. Offshore shelf waters, however, are habitat for rockfish, lingcod, king crab, and sea stars.

Offshore Marine Waters

ACCS.

Oceanic region	Species richness
Beaufort-Chukchi Sea	19
Bering Sea	31
Gulf of Alaska	34

Offshore marine waters refer to waters beyond the continental shelf break, greater than 650 feet deep, and are under federal management. Oceanic habitats begin at the continental slope, which marks the seaward boundary of the continental shelf. Oceanic habitats include several layers of water, each with distinct characteristics of salinity, temperature, and light intensity. The epipelagic zone, which extends between the surface and 650 feet deep, is the only area where food can be directly produced by photosynthesis in the open ocean. Below this, the source of food is primarily from detritus falling from the epipelagic zone. Minor additional food sources include vertically migrating animals and chemosynthesis at hydrothermal vents. Unlike shelf and nearshore corals, deep-sea corals do not require light to grow; instead, they acquire the nutrients they need directly from the water column. Deep-sea coral reefs primarily consist of cold-water corals, black coral, gorgonian corals, stony corals, sea whips, sea pens, and sponges.

Offshore marine waters in the three Alaska oceanic regions combined can provide high- and moderate-value habitat for 42 SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is relatively low and ranks 27th (tied with temperate coastal cliff and bluff) among the 41 habitats assessed (Table 6.3). The highest marine wildlife species richness for offshore marine waters is associated with the Gulf of Alaska and Bering Sea regions, with richness values of 34 and 31, respectively (see table above). Marine species richness drops in the Beaufort-Chukchi Seas region, with a value of 19 SGCN.

Statewide, 24 seabird and 18 marine mammal SGCN can be regularly found in offshore marine waters. These deeper, offshore waters are inhabited by characteristic seabird SGCN such as Northern Fulmar, Fork-tailed Storm-petrel, Mottled Petrel, Pomarine Jaeger, Parakeet Auklet, Ivory Gull, Ross's Gull, Horned Puffin, Tufted Puffin, Laysan Albatross, Short-tailed Albatross, Buller's Shearwater, Pink-footed Shearwater, Short-tailed Shearwater, and Sooty Shearwater. Some of the marine mammals in offshore waters include northern fur seal, Baird's beaked whale, beluga whale, bowhead whale, common minke whale, Cuvier's beaked whale, Dall's porpoise, fin whale, humpback whale, North Pacific right whale, Pacific white-sided dolphin, sei whale, sperm whale, and Stejneger's beaked whale. Because of a lack of comprehensive distribution data, fish and aquatic invertebrate SGCN were not included in the species richness assessment of offshore marine waters; however, many species of deep-sea corals are found in offshore waters.

Estuarine Waters

Alaska ShoreZone.

Oceanic region	Species richness
Beaufort-Chukchi Sea	24
Bering Sea	46
Gulf of Alaska	46

Estuaries are defined as waters where rivers meet the sea. Here, freshwater from inland rivers and streams mixes with saltwater from the ocean, forming brackish conditions. These waters fill the mouths of tidal rivers and protected bays and lagoons. The mixing of fresh and salt waters at the transition from terrestrial to marine environments results in highly productive ecosystems supporting plants and animals adapted to these unique conditions. The vegetation associated with estuaries is described in the "Temperate Salt Marsh" and "Arctic Salt Marsh" sections above.

In the three Alaska oceanic regions combined, estuarine waters can provide high- and moderate-value habitat for 55 SGCN. Across all terrestrial and marine habitats evaluated, this species richness number is moderate and ranks 19th among the 41 habitats assessed (Table 6.3). The highest wildlife species richness for estuarine waters occurs in the Gulf of Alaska and Bering Sea regions, with richness values of 46 in both regions (see table above). Marine species richness drops in the Beaufort-Chukchi Seas region, with a value of 24 SGCN.

Statewide, 27 shorebird, 13 seabird, 10 waterbird, and five marine mammal SGCN can be regularly found using estuarine waters. Shorebird SGCN that can consistently use intertidal areas in estuarine waters include Whimbrel, Red Knot, both turnstone species, both tattler species, both yellowlegs species, eight sandpiper species, four plover species, three godwit species, two dowitcher species, and two phalarope species. Seabird SGCN that can use estuarine waters consistently include Kittlitz's Murrelet, Marbled Murrelet, six gull species, two jaeger species, two cormorant species, and two

tern species. Waterbird SGCN that can regularly use estuarine waters include Surf Scoter, Common Eider, Spectacled Eider, Steller's Eider, Common Loon, Red-throated Loon, Yellow-billed Loon, and three grebe species. Marine mammal SGCN that can use these habitats include bearded seal, harbor porpoise, Pacific harbor seal, beluga, and polar bear. Because of a lack of comprehensive distribution data, fish and aquatic invertebrate SGCN were not included in the species richness assessment of this habitat; however, estuaries are used regularly by salmon smolt and crabs.

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