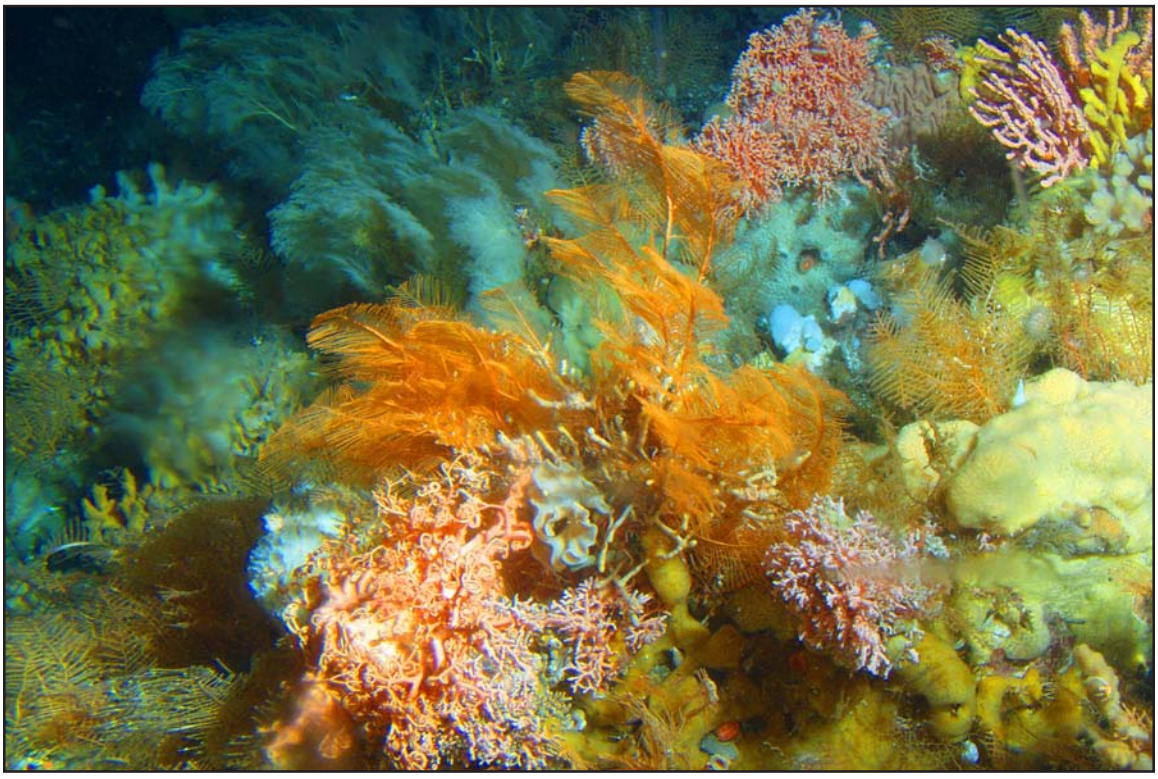
B. Ecological Framework: The Lands and Waters that Produce Our Fish and Wildlife

Introduction: Alaska's 32 Ecoregions

This section describes the rich mosaic of landscapes and wildlife in each of the state's 32 ecoregions, as delineated by Nowacki et al. (2001). Ecoregions can be defined as large areas of land and waters containing vegetation communities that share species and ecological dynamics, environmental conditions, and interactions that are critical for their long-term persistence. This section also touches on other important facets of Alaskan ecoregions: their people, land use, and land management. In the land management tables for each ecoregion, private ownership includes private individuals and entities, such as Native corporations. Local ownership includes city and borough governments, and "percent of ecoregion" refers to the portion of the ecoregion in the United States.

A description of each ecoregion follows the statewide map on page 27. This map combines the Bailey and Omernik approach to ecoregion mapping in Alaska and was developed cooperatively by the USFS, NPS, USGS, TNC, and personnel from many other agencies and private organizations.



Newly discovered coral and sponge gardens off the Aleutian Islands A. Lindner, NOAA Fisheries

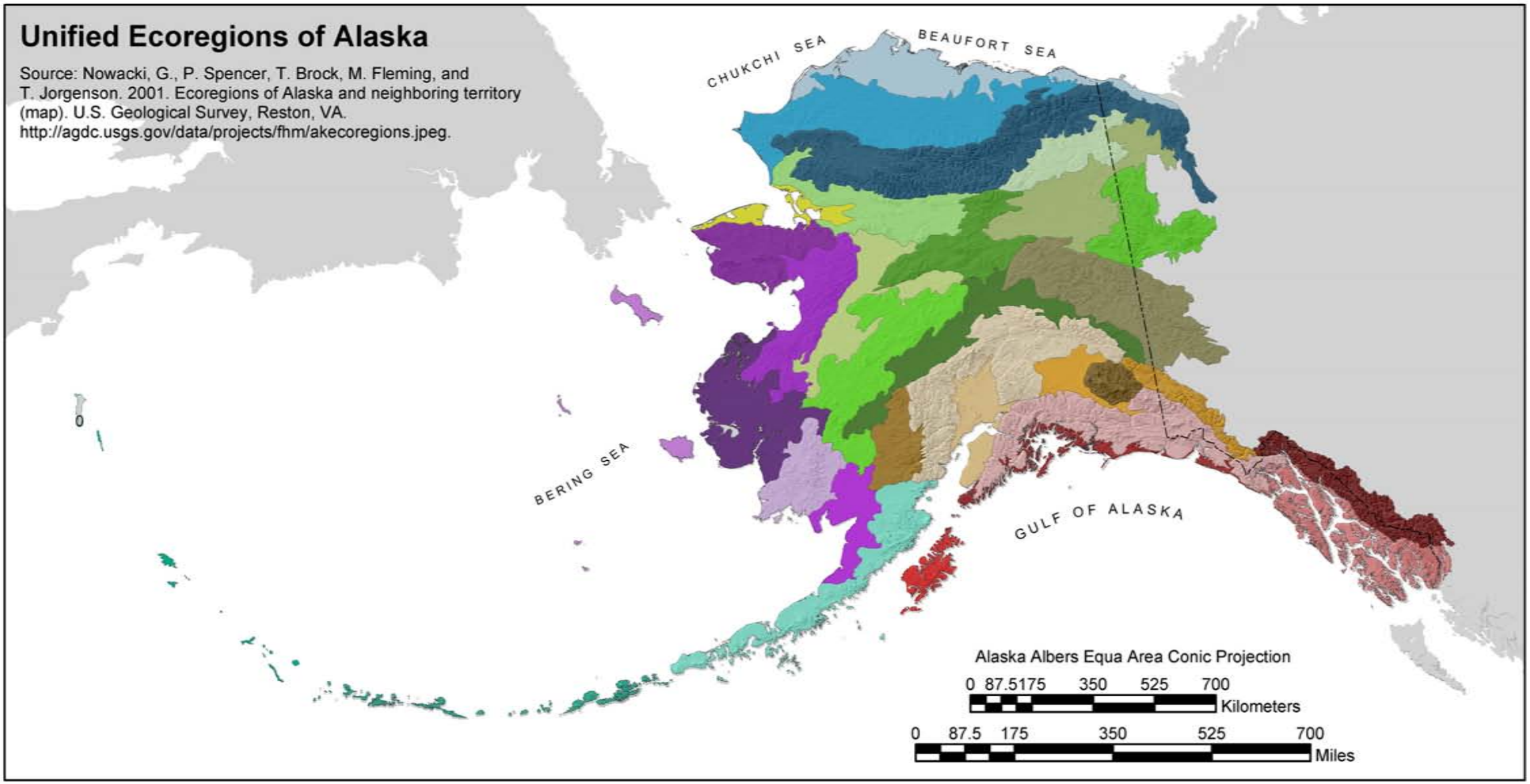


Figure 1. Statewide ecoregions map

Polar Arctic Tundra

Beaufort Coastal Plain

Area: 15,862,580 acres (6,419,385 hectares)
Alaska 92%, Canada 8%

Landscape:

Beaufort Coastal Plain in winter USFWS

The Beaufort Coastal Plain is a treeless, windswept landscape stretching across the Alaska coast of the Arctic Ocean and into Canada. The ecoregion is characterized by an abundance of lakes, wetlands, and permafrost-related features such as pingos, ice-wedge polygon networks, peat ridges, and frost boils. Permafrost is almost continuous across the region, so soils typically are saturated and have thick organic horizons. The plain gradually ascends from the coast southward to the foothills of the Brooks Range. Numerous large, braided rivers, originating in the Brooks Range, drain northward across the coastal plain. Small streams dry up or freeze completely in the winter. Thousands of shallow rectangular lakes cover the coastal plain in a north-northwest orientation due to winds on the shorelines. These thaw lakes cover up to 50% of the Arctic coastal plain. Small sand dunes irregularly occur along the coast.

Due to the abundance of lakes and saturated soils, over 82% of the ecoregion is considered wetland. Vegetation is dominated by wet sedge tundra in drained lake basins, swales, and floodplains, and by tussock tundra and sedge-*Dryas* tundra on gentle ridges. Low willow thickets grow on well-drained riverbanks.

A dry, polar climate produces short, cool summers and long, cold winters. Proximity to the Arctic Ocean and abundant sea ice contribute to the cool, frequently foggy, summers. Annual precipitation is low [4 to 6 inches (10 to 15 centimeters)] and mostly falls as snow during the winter. The average annual temperature varies from 8 to 14 °F (–13 to –10 °C).

Wildlife and Fish:

Many species of waterfowl nest on the coastal plain, including Greater White-fronted Geese; Snow Geese; Tundra Swans; Brant; Common, King, and Spectacled Eiders; and Yellow-billed Loons. Numerous seabirds, including Glaucous Gulls and Black Guillemots, can be found here in the summer. Ptarmigan and Long-tailed Jaegers move from the foothills to the plains to breed.

Polar Arctic tundra is important to shorebirds, both nationally and internationally. The bulk of the U.S. breeding population of Long-billed Dowitcher, Dunlin, and Semipalmated, Pectoral, Buff-breasted and

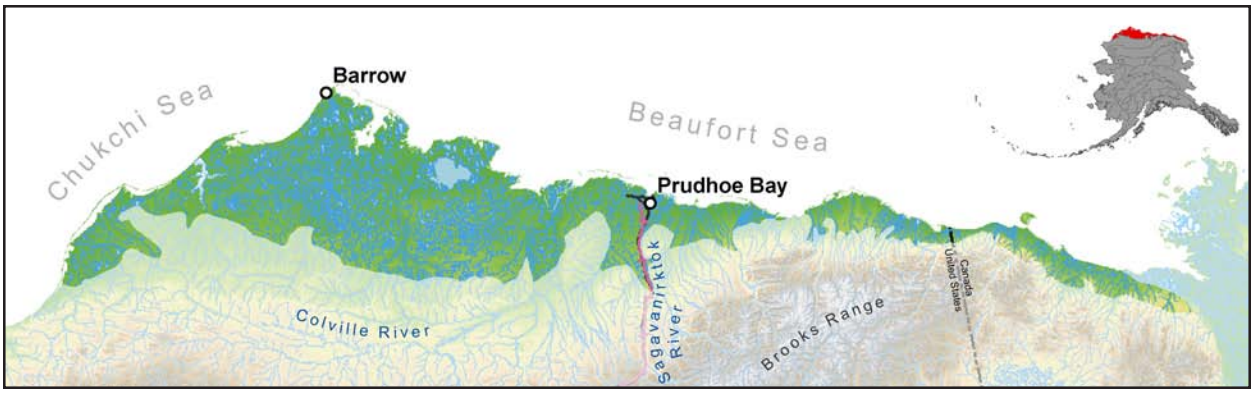


Figure 2. Beaufort Coastal Plain ecoregion

Stilt Sandpipers occurs here. In total, more than two dozen shorebird species breed here, with over 6 million birds estimated to breed on the National Petroleum Reserve-Alaska alone. Many shorebird species also use the coastal areas of the region for staging prior to migrating to southern parts of the Western Hemisphere, Southeast Asia, Oceania, Australia and New Zealand.

Arctic cisco R. West, USFWS

Four caribou herds (Central Arctic, Porcupine, Teshekpuk Lake, and Western Arctic) use this ecoregion, seeking its windier areas for relief from insects. The Central Arctic, Porcupine, and Teshekpuk Lake herds calve on the coastal plain, while the largest herd, the Western Arctic, calves in the Utukok Uplands. Other herbivores include muskoxen, lemmings, barren ground shrews, singing voles, and arctic ground squirrels. The main mammalian predators near the coast are arctic foxes and polar bears; gray wolves and brown bears occur throughout the ecoregion. Marine mammals found in the nearshore areas include walruses in low densities; minke, beluga, gray, and bowhead whales; and bearded, spotted, and ringed seals. The coastal waters in this region are an important feeding area of the endangered bowhead whale during the fall.

Arctic cisco, broad whitefish, least cisco, and Dolly Varden char overwinter in the larger rivers that do not freeze completely.

People:

Villages are located along the coast or inland a few miles on rivers. Most residents are Inupiaq. The largest communities are Barrow, Wainwright, and Nuiqsut. People have traditionally depended on bowhead and beluga whales, seals, and walruses, caribou, edible plants and waterfowl for subsistence in this ecoregion. Many oil field workers live temporarily in and around Prudhoe Bay.

Land Use:

Most development is related to oil exploration and extraction. Subsistence activities are similar to those that have been practiced for centuries. More than 90% of the habitat within the ecoregion remains intact, with development largely restricted to the town of Barrow and other villages, and oil fields at Prudhoe Bay and Kuparuk.

Land Management:

The federal government manages 73% of this ecoregion, with management primarily by the Bureau of Land Management (BLM) at the National Petroleum Reserve-Alaska. The State of Alaska owns over 18%. The North Slope Borough has jurisdiction over most of this ecoregion.

Table 1. Beaufort Coastal Plain land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	66.5%
Federal	DOD	<1.0%
Federal	USFWS	6.5%
Local	Local	<1.0%
Private		8.7%
State	DNR	18.3%

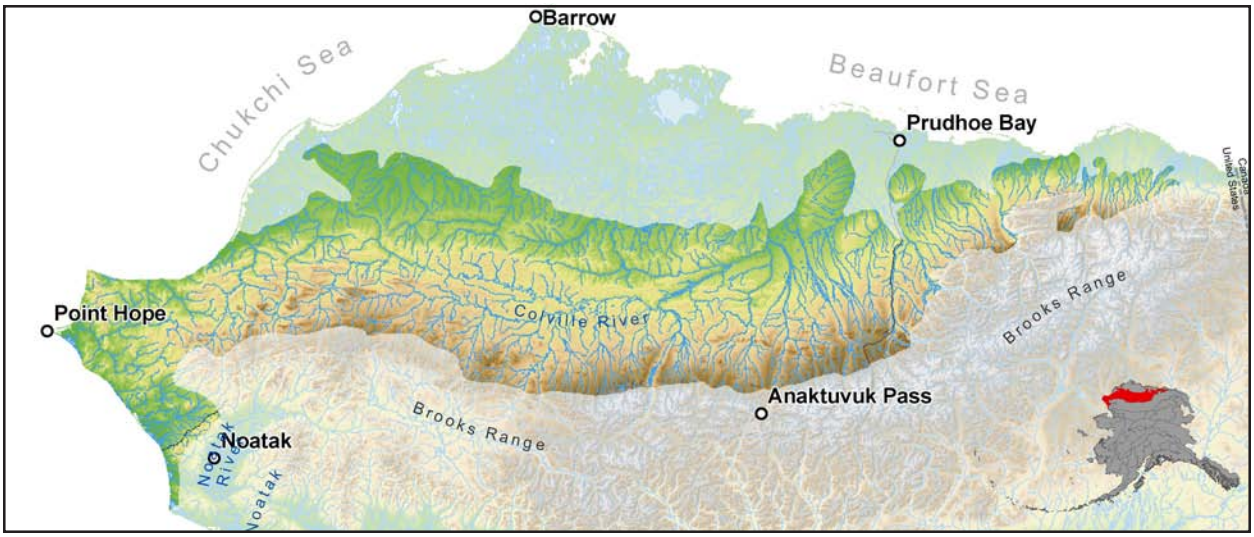


Figure 3. Brooks Foothills ecoregion

Brooks Foothills

Area: 28,474,479 acres (11,523,464 hectares)

Landscape:

Composed of gently rolling hills and broad, exposed ridges, the Brooks Foothills ecoregion stretches from Point Hope at the Chukchi Sea eastward, almost to the Canadian border. Long, linear ridges, buttes, and mesas composed of tightly folded sedimentary rocks divide narrow alluvial valleys and glacial moraines. Above a thick, continuous layer of permafrost are ice-related features, such as gelifluction lobes, pingos, and ice-wedge polygon networks. Because the permafrost impedes drainage, soils are usually saturated and have fairly thick organic horizons. Lakes are infrequent, but many swift streams and rivers originating in the Brooks Range cross through the foothills, occasionally braiding across gravel flats. Some streams freeze solid each winter, creating large aufeis deposits that last well into summer.

A dry polar climate dominates the land, but is somewhat warmer and wetter than the climate of the Beaufort Coastal Plain. The average annual precipitation ranges from 6 to 10 inches (15–25 centimeters), and average annual temperature ranges from 9 to 20 °F (–13 to –7 °C).

Peregrine Falcon USFWS

Vegetation along rivers is dominated by willow. The rest of the ecoregion is dominated by vast expanses of mixed shrub-sedge tussock tundra. *Dryas* tundra occurs on ridges, and calcareous areas support sedge-*Dryas* tundra. Wetlands are present in more than 83% of the ecoregion.

Wildlife and Fish:

The Brooks Foothills provide habitat for wide-ranging mammals. The Western Arctic, Porcupine and Central Arctic caribou herds migrate through the foothills to reach their calving grounds in the Utukok Uplands (Western Arctic herd) and Beaufort Coastal Plain (Porcupine and Central Arctic herds). The foothills contain denning sites for brown bears and wolves. Additionally, the area is important to muskoxen, arctic ground squirrels, Smith's Longspurs, and Peregrine Falcons. The moist tundra provides nesting habitat for Baird's, Stilt and Buff-breasted Sandpipers and small mammals such as the insular vole. The Colville River bluffs contain nesting and feeding habitat for the Peregrine Falcon and other raptors. Arctic

char, lake trout, and whitefish are found in many foothill lakes. Dolly Varden spawn and overwinter in larger rivers. Arctic grayling are year-round residents in both lakes and streams. Dolly Varden and five species of Pacific salmon spawn in some west coast rivers.

At the west end of the ecoregion at the Chukchi Sea, bowhead, beluga, and minke whales can be observed in the nearshore waters, and bearded and ringed seals haul out at the sea ice edge. Black-legged Kittiwakes nest at Cape Lisburne.

People:

Few people live in this ecoregion, though it provides important subsistence resources for Alaskans living on the Arctic coast. The largest communities are Point Hope and Kivalina.

Land Use:

Most development is related to oil exploration and extraction. Subsistence activities continue as they have for centuries. The Brooks Foothills remains an almost continuous block of habitat, bisected once by a corridor containing the Dalton Highway and the oil pipeline.

Land Management:

The State of Alaska owns over 24% of this ecoregion, and the federal government holds 62%. The BLM is the primary land manager, with the National Petroleum Reserve-Alaska making up 41% of the ecoregion. The North Slope Borough has jurisdiction over most of this ecoregion.

Table 2. Brooks Foothills land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	54.5%
Federal	NPS	1.6%
Federal	DOD	0.0%
Federal	USFWS	6.1%
Local	Local	<1.0%
Private		13.2%
State	DNR	24.5%

Brooks Range

Area: 38,590,824 acres (15,617,493 hectares)
Alaska 82.4%, Canada 17.6%

Landscape:

Eastward from the Delong Mountains near the Chukchi Sea, the Brooks Range ecoregion reaches across Alaska, finally curving southeast into Canada to include the British Mountains. Representing the northern extension of the Rocky Mountains, the range is characterized by steep mountains composed of uplifted sedimentary and metamorphic rock with scattered glaciers above above 5,940 feet (1,800 meters). Within the ecoregion, elevations range from 1,640 to 8,530 feet (500 to 2,600 meters). The high central portion of the range has steep angular summits draped with rubble and scree. To the west and east, the topography becomes less rugged, with more flat-topped summits. High-energy streams and rivers cut through narrow ravines with steep headwalls, creating a branched pattern in the terrain. In the central and eastern part of the Brooks Range are numerous large lakes that were created from glacial moraine dams.

The dry polar climate has short, cool summers and long, cold winters, with average annual temperatures of 10 to 22 °F (–12 to –6 °C). Average annual precipitation ranges from 6 to 13 inches (15 to 33 centimeters). All soils, except for a few south-facing slopes, are underlain by permafrost. Wildfire is common.

The Brooks Range is the main divide between the Arctic and Interior Alaska, and vegetation on either side of the range reflects this. Valleys and lower mountain slopes on the north side of the range are

covered by mixed shrub-sedge tussock tundra with willow thickets along rivers and streams. Many of the highest ridges are barren or ice-covered. On the south side, lower mountain slopes and valleys possess sedge tussocks and shrubs. Sparse conifer-birch forests and tall shrubs are restricted to larger valleys on the south side of the range in Alaska, but the Arctic tree line extends across the range in Canada. The steepest slopes remain barren due to instability. Upper and intermediate slopes contain alpine heath communities; lower slopes have moist sedge-tussock meadows; and shrub communities form in thickets along major rivers. Wetlands occupy at least 20% of the ecoregion.

Brooks Range in summer USFWS

Wildlife and Fish:

Dall sheep, gray wolves, brown bears, Alaska marmots, and caribou inhabit the mountains. Birds, such as Golden Eagles, Horned Larks, and Smith's Longspurs, and small mammals, such as singing voles, are found in the wide valley floors. Deep lakes provide habitat for Arctic char, lake trout, Arctic grayling, and whitefish, while ground water springs provide spawning habitat for Dolly Varden and chum salmon. Arctic grayling and slimy sculpin live in most of the area's waterways.

People:

The Brooks Range is sparsely populated. Traditionally, Inupiat lived in the west, and Koyukon and Gwichin Athabascans in the east. Anaktuvuk Pass is the largest community.

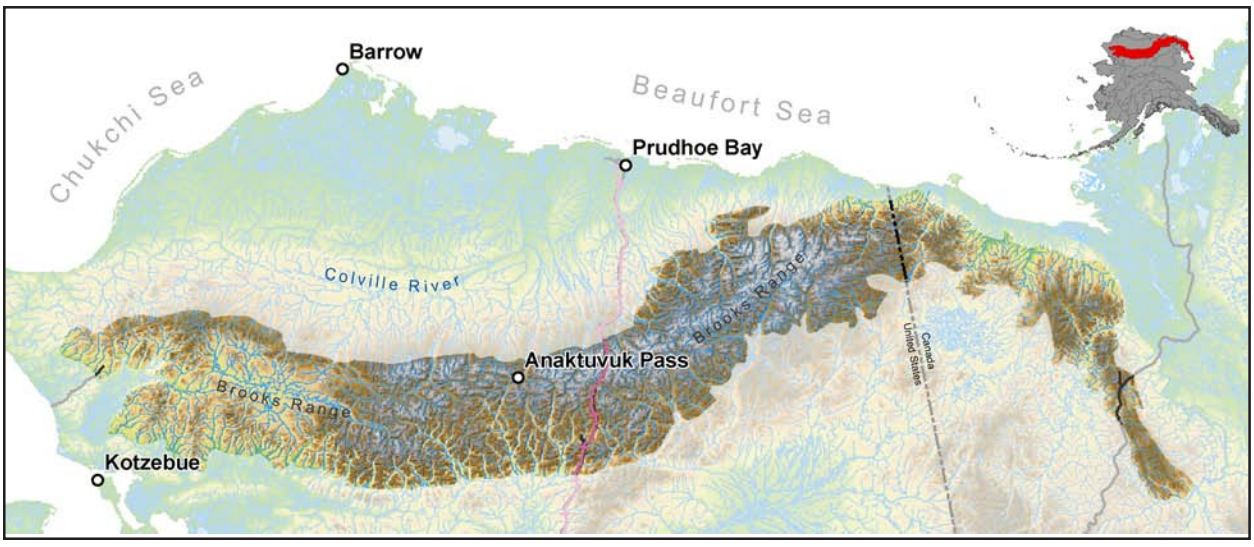


Figure 4. Brooks Range ecoregion

Land Use:

Most development is related to oil exploration and extraction. The Dalton Highway bisects the ecoregion, acting as the primary land transportation route to the oil and gas fields to the north. This ecoregion remains almost entirely intact, except for development at Red Dog Mine, the Dalton Highway, and the trans-Alaska pipeline. Subsistence activities are important uses of the land and waters, as they have been for centuries.

Land Management:

Over 17% of this ecoregion is in Canada, where a portion has been designated as Ivvavik National Park. The majority of the Alaska portion of the ecoregion has been legislatively set aside as national parks and wildlife refuges: Gates of the Arctic National Park, Noatak National Park, Kobuk Valley National Park, and the Arctic National Wildlife Refuge. The NPS and USFWS together manage over 75% of the Alaska lands. The BLM has designated several Areas of Critical Environmental Concern.[11] The State of Alaska owns more than 13% of the ecoregion. Private ownership is very low. The North Slope and Northwest Arctic boroughs have jurisdiction over parts of this ecoregion.

Table 3. Brooks Range land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	7.7%
Federal	NPS	50.0%
Federal	USFWS	31.9%
Private		2.0%
State	DNR	13.4%

Bering Taiga

Nulato Hills

Area: 14,433,528 acres (5,841,169 hectares)

Landscape:

The low, rolling Nulato Hills form a divide between the Bering Sea and the Yukon River, with streams on the east side flowing into the river and those on the west draining into Norton Sound. An ancient mountain range has been eroded down to these southwest-northeast oriented hills with a maximum elevation of 4,040 feet (1,230 m) and narrow valleys rising from sea level. Some valleys have thaw lakes, and permafrost underlies most of the ecoregion.

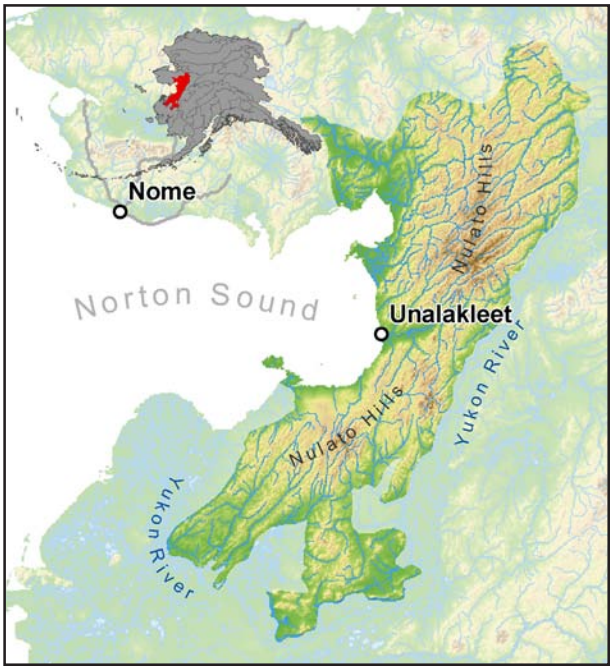


Figure 5. Nulato Hills ecoregion

The vegetation pattern is largely based on the elevation and terrain. Higher elevations are barren or alpine tundra of *Dryas*-lichen or sedge-ericaceous shrubs. As one descends in elevation, the vegetation changes to dwarf shrubs, followed by taller willow-birch-alder shrublands. Spruce and birch forests occur at lowest elevations. Wildfires are a common disturbance in this ecoregion.

[11] An area designated pursuant to the federal Land Policy and Management Act of 1976, where special management attention is required to protectand prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards.

The moist polar climate is somewhat moderated by the Bering Sea, though the presence of sea ice early in the winter allows direct passage of cold air from Siberia. The average annual temperature ranges from 23 to 28 °F (–5 to –2 °C), and the average annual precipitation is 12 to 16 inches (30 to 40 centimeters).

Nulato Hills in winter S. Steinacher, ADF&G

Wildlife and Fish:

As part of the ice-free Beringia corridor linking North America and Asia in the past, this ecoregion still possesses species more common in Eurasia than the rest of Alaska. Yellow and White Wagtails, Bluethroats, and Red-throated Pipits are found here. Species more common to Alaska also live here—moose, brown bears, caribou, arctic foxes, and Alaska hares. River otters occur in the major river valleys. Polar bears; spotted, bearded, and ringed seals; beluga and minke whales; and walruses are seen near the coast and on adjacent ice floes. Five species of Pacific salmon ascend area rivers to spawn. Dolly Varden spawn and overwinter in most rivers, and Arctic grayling are resident in larger streams. Bering cisco and Alaska blackfish are common residents of the fresh waters.

People:

Native Alaskans in the area include Inupiat, Koyukon Athabascans, and Central Yup'iks. The largest communities are Unalakleet and Mountain Village.

Land Uses:

Subsistence remains an integral part of the people and economy of this ecoregion, with an emphasis on caribou and fish. Mining exploration and prospecting continue on a limited basis.

Land Management:

The federal government manages over 85% of the Nulato Hills. The BLM has responsibility for most of the federal lands and has designated several Areas of Critical Environmental Concern. The majority of the USFWS lands are part of Yukon Delta National Wildlife Refuge. Private landowners, primarily Native corporations, own more land than the state.

Table 4. Nulato Hills land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	67.0%
Federal	DOD	<1.0%
Federal	USFWS	18.4%
Local	Local	<1.0%
Private		11.2%
State	DNR	3.4%

Yukon-Kuskokwim Delta

Area: 18,965,040 acres
(7,675,047 hectares)

Landscape:

The Yukon-Kuskokwim Delta in southwest Alaska results from the deposition of heavy sediment loads from the glacial Yukon and Kuskokwim Rivers. Abundant thermokarst lakes, meandering streams, and highly productive brackish marshes and wet meadows characterize the flat coastal plain. Isolated basalt hills and volcanic cinder cones less than 400 feet (120 meters) punctuate the landscape. Discontinuous permafrost

impedes drainage and contributes to shallow organic soils. Large tidal fluctuations near the coast, along with occasional storm tide surges, flood coastal areas with salt water, creating invertebrate-rich coastal marshes.

Fall tundra USFWS

Wet tundra communities on the coastal plain primarily consist of sedge mats, moss, and low-growing shrubs. Uplands due to peat mounds, sand dunes and volcanic soils support dwarf scrub communities of birch and ericaceous shrubs. Inland bogs contain tussock-forming sedges and sedge-moss communities. Willow thickets form along rivers and on better-drained slopes, and alders and stunted spruce and birch grow along the major streams.

The Bering Sea somewhat moderates the moist polar climate, though sea ice in winter allows cold Siberian winds into this ecoregion. Average annual precipitation is 15 to 22 inches (38 to 56 centimeters), and the average annual temperature varies from 25 to 31 °F (–4 to –1 °C).

Wildlife and Fish:

The combination of lakes, streams, tidal flats, wet tundra, and sedge flats supports abundant populations of waterfowl and shorebirds; more than 20 species of waterfowl and 10 species of shorebirds breed here. The Yukon-Kuskokwim Delta supports 50% of the world's Black Brant, the majority of the world's Emperor Swans, all of North America's nesting Cackling Canada Geese, and the highest densities of nesting Tundra Swans. Long-tailed Duck, Scaup, Common Eider, Spectacles Eider, Northern Pintail, Green-winged Teal, and Northern Shoveler can also be found here. Hundreds of thousands of shorebirds use the coastal littoral and wetland areas during spring and fall migration. Breeding shorebirds include Bristle-thighed Curlew; Black-bellied Plover; Bar-tailed Godwit; Ruddy and Black Turnstone; Red-necked Phalarope; Long-billed Dowitcher; Red Knot, Semipalmated, and Western Sandpiper; and Dunlin.

The coastal portions of the ecoregion provide feeding grounds for beluga and minke whales; Pacific walruses; and bearded, spotted, ribbon and ringed seals. Large runs of anadromous fishes, including Arctic lamprey, Dolly Varden, humpback and broad whitefish, Bering cisco, and five species of Pacific salmon, migrate up the Yukon and Kuskokwim Rivers annually. Northern pike, Arctic grayling, whitefish and rainbow trout are resident in many streams. Blackfish, sticklebacks and whitefish are abundant in low-lying watersheds. Sheefish, Bering cisco and broad whitefish are important for subsistence. Terrestrial mammals include river otters, brown bears, moose, and wolves.

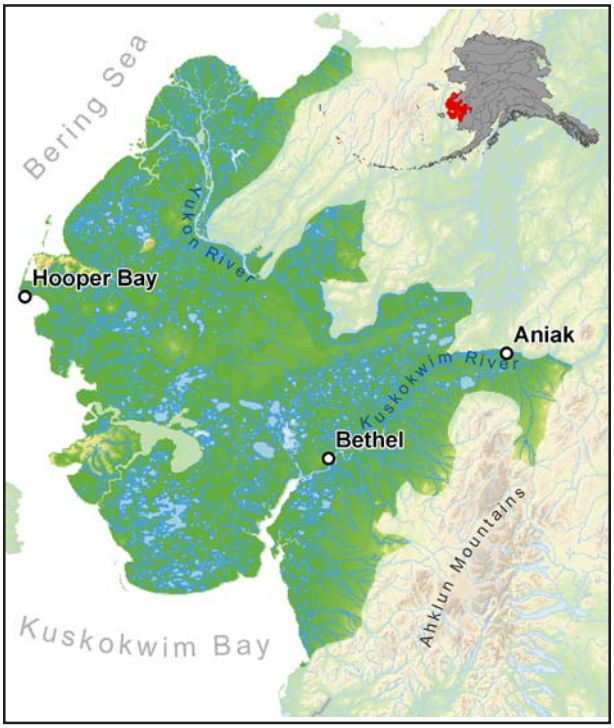


Figure 6. Yukon-Kuskokwim Delta ecoregion

People:

This ecoregion is the heart of the area inhabited traditionally by the Yup'ik people. Bethel is the largest community.

Land Use:

This ecoregion is almost entirely intact, with

minimal development around several small communities along the rivers and coast. A commercial salmon fishery employs some people, and subsistence fishing and hunting is prevalent.

Land Management:

The federal government manages 74% of the land in this ecoregion, almost entirely as the Yukon Delta National Wildlife Refuge. Private landowners are the other major landowner, with Native corporations holding most of that land.

Table 5. Yukon-Kuskokwim Delta land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	<1.0%
Federal	USFWS	73.7%
Local	Local	<1.0%
Private		24.1%
State	DNR	1.9%

Ahklun Mountains

Area: 9,565,938 acres (3,871,282 hectares)

Landscape:

Located in the southwest part of the state, the Ahklun and Kilbuck Mountains define the divide between the drainages into Kuskokwim and Bristol Bays. These mountains are steep and sharp, with elevations reaching 4,950 feet (1,500 meters). Past glaciers carved broad U-shaped valleys, and a few small glaciers still persist. Great northeast-trending faults have cut through the underlying sedimentary and volcanic rock, and large "finger" lakes fill valleys on the south side of the mountains. Permafrost is generally absent from soils covered by forests, but exists in most low-lying areas and in high mountains.

Figure 7. Ahklun Mountains ecoregion

The Bering Sea influences the continental climate of this ecoregion by moderating temperatures in the summer and allowing access for cold Siberian air across the ice pack in the winter. Annual average precipitation ranges from 102 centimeters in lowlands to 203 centimeters at higher elevations, with average annual temperatures from 33 to 39 °F (–2 to 1 °C).

The Ahklun Mountains separate two extensive wetland complexes (Yukon-Kuskokwim Delta to the north and Bristol Bay Lowlands to the south) along the southern Bering Sea, and wetlands of sedge-tussock tundra occupy up to 55% of the ecoregion. Vegetation in the higher elevations is largely dominated by lichen tundra and dwarf scrub communities with ericaceous shrubs. The proportion and size of the willow, birch, and alder shrubs increases at lower elevations. In valleys, shrublands and wetlands are mixed with forests of white spruce, balsam poplar, or mixed white spruce and paper birch.

Wildlife and Fish:

The large lakes and rivers have rainbow trout, grayling, lake trout, Arctic char, Dolly Varden, whitefish, and northern pike. Five species of Pacific salmon spawn in the river systems, with abundant runs of sockeye salmon to headwater lakes. Beavers are found in the lakes and wetlands, and Wood Frogs inhabit diverse habitats.

The different habitats at varying elevations support a wide range of terrestrial species. Moose and arctic hares thrive in the shrubby habitats. Caribou and brown bear can be found throughout the ecoregion, but black bear populations are limited to the northern and eastern parts. Common small game and furbearers include muskrat, river otter, fox, wolverine, mink, and porcupine. Ground squirrels and marmots are abundant in alpine tundra. Birds nesting in the area include a wide variety of waterfowl, gulls, Bald Eagles, Golden Eagles, Arctic Terns, various loons, Spotted and Least Sandpipers, Semipalmated Plovers, Willow Ptarmigan, Spruce Grouse, Rusty Blackbirds, and Blackpoll Warblers.

Cape Newenham on the Togiak National Wildlife Refuge
M. Smith, USFWS

The coastline and islands of this ecoregion provide important habitat for marine mammals and seabirds. Common Murre, Pigeon Guillemot, and Black-legged Kittiwake colonize here. The Walrus Islands group gets it name from the large number of bachelor walruses that haul out on its beaches each summer. The largest concentration occurs on Round Island, where Steller sea lions also haul out. Harbor seals are also found here. This area is unique as the only region where ranges of the closely related harbor seal and spotted seal overlap. These marine waters support the largest Pacific herring stock in Alaska, as well as larval and juvenile red king crab. Gray, beluga, killer, and minke whales feed along the coast.

People:

Yup'ik groups from Bristol Bay and the Yukon-Kuskokwim Delta live here. Salmon, freshwater fish, seals, beluga whales, caribou, migratory waterfowl, eggs and plants are traditional foods derived from this ecoregion. Most of the population lives in Togiak on Togiak Bay.

Land Use:

This ecoregion is almost entirely intact, with minimal development around several small communities along the rivers and coast. Sockeye salmon are the most important fish commercially. Whitefish are an important subsistence species in the Tikchik Lakes.

Land Management:

A majority (58.4%) of the land in the Ahklun Mountain ecoregion is owned by the federal government. The USFWS manages most of the federal lands as Togiak National Wildlife Refuge. The State of Alaska owns a third of the ecoregion. The Ahklun Mountain ecoregion contains most of the largest state park in the nation, Wood-Tikchik State Park, and the entire Walrus Islands State Game Sanctuary is here. No borough has been organized in this ecoregion.

Table 6. Akhlun Mountains land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	6.9%
Federal	USFWS	51.5%
Private		8.4%
State	DNR	33.2%

Bristol Bay Lowlands

Area: 7,903,937 acres (3,198,679 hectares)

Landscape:

Past glaciation in the surrounding Ahklun Mountains and Aleutian Range resulted in this flat-to-rolling moraine and outwash-mantled lowland around Bristol Bay in Southwest Alaska, with elevation ranging from sea level to 500 feet (150 meters). These lowlands contain numerous morainal and thaw lakes and ponds. Streams originate mostly from headwater lakes in ice-carved basins and empty into large meandering rivers, which terminate in broad estuarine areas around Bristol Bay. Much of the shoreline of Bristol Bay is characterized by mixed sand and gravel beaches and exposed tidal mudflats.

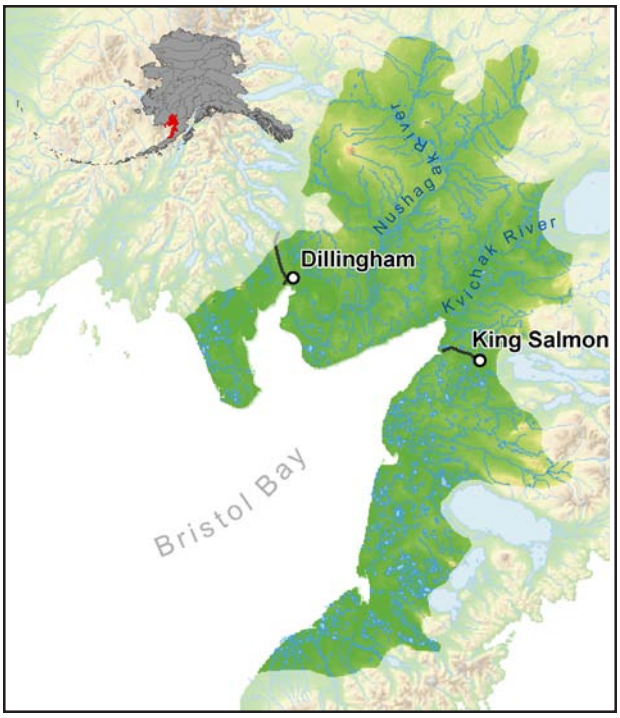


Figure 8. Bristol Bay Lowlands ecoregion

Due to wet organic soils throughout the ecoregion, moist and wet tundra dominates the landscape. Low and dwarf shrub communities of willow, birch, and alder and mosses and tussock-forming sedges characterize these wetlands. Spruce and birch forests occur along major rivers and streams. Sand dunes are present along bluffs on the coast and riverbanks.

The climate is transitional between maritime and continental. Average winter lows range from 5 to 14 °F (–15 to –10 °C), while average winter highs hover around freezing. Average summer lows are just above freezing, while average summer highs are 64 °F (18 °C). Precipitation ranges from 13 to 32 inches (33–81 centimeters). Ice occasionally spans the Bering Sea in winter, allowing cold Siberian air to flow into this ecoregion. Discontinuous permafrost is present.

Wildlife and Fish:

The many lakes, ponds, rivers, and wetlands in the Bristol Bay Lowlands make it an important staging, migration, and nesting area for waterfowl and shorebirds. Nushagak and Egegik Bays host large concentrations of shorebirds annually, including Dunlin, Black-bellied Plover, Marbled Godwit, Bar-tailed Godwit, Rock Sandpiper, Western Sandpiper, and Least Sandpiper. The endemic Beringian Marbled Godwit breeds only in the wetlands along the north side of the Alaska Peninsula. The Bristol Bay Lowlands may host up to 25% of the North American population of Greater Scaup and roughly 10% of the breeding population of Red-throated Loons, as well as breeding Black Scoters and Long-tailed Ducks. Eiders molt in shoals near the mouth of the bay.


Marbled Godwit at shoreline G. Thomson, USFWS

Five species of Pacific salmon are present in the waters of the ecoregion, as are other anadromous species, such as steelhead, rainbow smelt and Dolly Varden. The Kvichak River may be one of the most productive sockeye systems in the world, and the Nushagak River supports the third largest king salmon run in the world. These large salmon runs feed large populations of brown bears, eagles, and osprey. Rainbow trout, Arctic grayling, whitefish, and northern pike are resident in the area's lakes and streams.

The lowlands also provide important habitat for moose, black bears, wolverines, wolves, lynx, martens, and foxes. The Mulchatna caribou herd migrates and calves throughout. Beaver are abundant in most streams and large lakes. Landbirds, including Blackpoll Warblers and Rusty Blackbirds, breed in the forests.

Bristol Bay supports a diverse assemblage of marine species. The Bristol Bay population of the beluga whale, a separate stock from the eastern Bering Sea stock, resides in the northeast bays in summer, following returning salmon and smelt. Minke whales feed in the bays and shallow coastal waters in the summer. Killer whales feed on several abundant marine mammal species in the coastal waters and bays throughout the summer. Gray whales travel in the nearshore waters during their spring migration north. Adult male walruses and harbor seals use haulouts around the bay. The waters of northeast Bristol Bay are known for their extensive clam beds and abundant benthic marine life, which in turn support a wealth of large predators such as walruses and migrating gray whales. Pacific herring and Pacific halibut also occur in the marine portions of the ecoregion, as do several shellfish species, such as scallops, crab, shrimp and many species of groundfish.

People:

Permanent settlements occur along coastal areas and major rivers. Dillingham is by far the largest community. The Bristol Bay Yup'ik settled the northern half of the region, while the Alutiiq settled the southern half. Coastal communities use whales, walruses, seals, salmon, sea lions, halibut, sea otters, clams, mussels and seaweed. Communities away from the coast use salmon, caribou, moose and plants.

Land Use:

Commercial fishing and processing and recreational hunting and fishing are the primary land uses in Bristol Bay and the Nushagak lowlands. This ecoregion is almost entirely intact, with minimal development around several towns and communities.

Land Management:

The state government manages more than 43% of the land, with less than 1% designated as critical habitat areas.[12] The federal government manages over 36%. The BLM and USFWS are the major federal land managers. Native corporations are among the most significant private landowners. The ecoregion falls in the jurisdictions of the Bristol Bay and Lake and Peninsula boroughs.

Table 7. Bristol Bay Lowlands land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	21.4%
Federal	NPS	1.7%
Federal	USFWS	13.5%
Local	Local	0.1%
Private		19.9%
State	DNR	43.4%

Bering Tundra

Kotzebue Sound Lowlands

Area: 3,462,948 acres (1,401,436 hectares)

Landscape:

This ecoregion consists of the coastal plains surrounding Kotzebue Sound on the Chukchi Sea in northwest Alaska. These lowlands, under 330 feet (100 meters), tend to be poorly drained, though terraces, low

[12]For information on legislatively designated state game refuges, game sanctuaries, and critical habitat areas, refer to Section IVD.

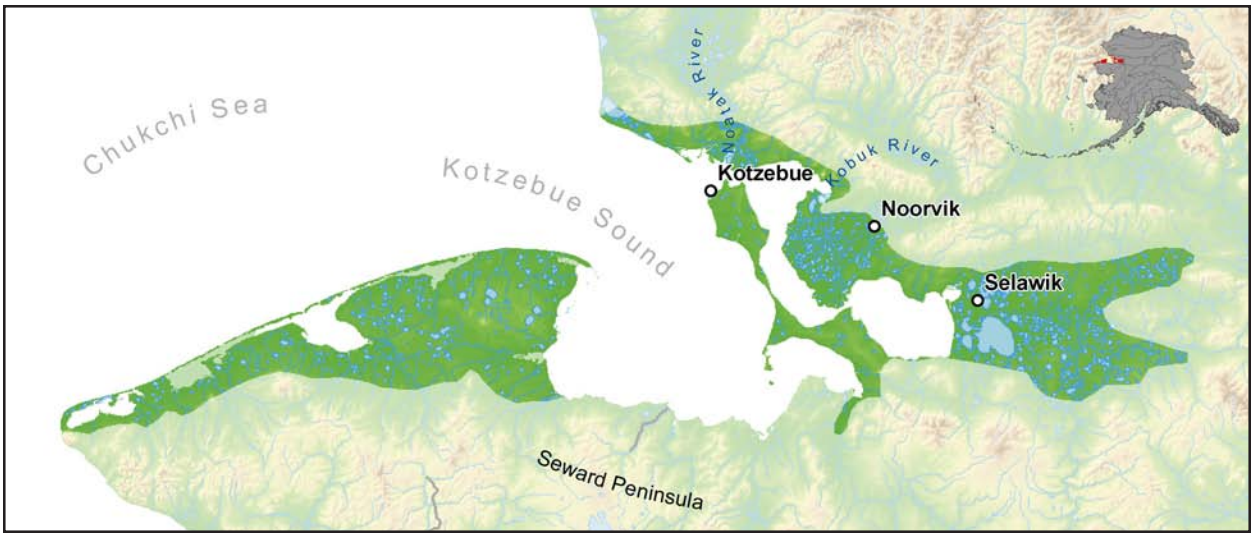


Figure 9. Kotzebue Sound Lowlands ecoregion

hills, and sand dunes do drain well. Permafrost is deep under some areas and absent from others. Ice-related features dominate the landscape, with pingos around the Selawik River and numerous thaw lakes throughout. Because most soils are wet, or standing water is present, wet tundra communities of sedge mats dominate. In the better-drained areas, such as peat ridges and on top of polygonal features, white spruce, willows, alder, and paper birch can occur. Grasses grow on the dunes along the coast. The major disturbance is flooding of rivers in the spring or during summer storms or along the coast due to tidal inundation.

A dry, polar climate produces short, cool summers and long, cold winters, though moister and warmer than in areas along the rest of the Chukchi Sea or the Arctic Ocean. Annual precipitation ranges 4 to 12 inches (18 to 30 centimeters). The average annual temperature varies from 20 to 23 °F (–7 to –5 °C).

Wildlife and Fish:

Arctic Loon and brood W. Troyer, USFWS

The vast amounts of water in this ecoregion make it prime habitat for nesting waterfowl and shorebirds. Spectacled Eiders, Ruddy Turnstones, and Black Turnstones are common breeders here. The Arctic Loon, which breeds only in western Alaska, is found in this ecoregion. Predators include Snowy Owls, arctic foxes, and polar bears. Kotzebue Sound is the northern limit of the range for king, sockeye, and silver salmon. The longest-lived and largest sheefish in Alaska are found in the Kobuk-Selawik river systems. Dolly Varden and chum salmon migrate past the Baldwin Peninsula en route to the Noatak and Kobuk Rivers. Hotham Inlet provides habitat for fourhorn sculpin, saffron cod and several species of whitefish. Northern pike and whitefish are abundant in the lower Kobuk and Selawik river drainages, and Arctic char are found in several lakes near Cape Espenberg.

In the nearshore marine waters, bowhead, gray, minke, and beluga whales can be found. Spotted, bearded, and ringed seals are found in abundance throughout this region. The large lagoon systems provide sheltered water and abundant prey for seals of all age classes.

People:
Historically, the Inupiaq people settled this area. Kotzebue is the largest town, and small communities and seasonal camps are located along the coast and rivers.

Wetlands near Cape Espenberg USFWS

Land Use:
Subsistence remains an integral part of the culture and economy of this ecoregion, with an emphasis on caribou, walrus, seals, beluga whales, waterfowl, and salmon. Mining exploration and prospecting continue on a limited basis. A chum salmon commercial fishery exists on the Noatak and Kobuk Rivers.

Land Management:
The federal government manages 79% of this ecoregion, with the NPS and USFWS as the primary land managers. The major federal units are Bering Land Bridge National Preserve and Selawik National Wildlife Refuge. Private landowners hold 21% of the ecoregion. The Northwest Arctic Borough has jurisdiction over part of this ecoregion.

Table 8. Kotzebue Sound Lowlands land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	10.4%
Federal	NPS	37.4%
Federal	USFWS	31.1%
Local	Local	<1.0%
Private		21.0%
State	DNR	<1.0%

Seward Peninsula
Area: 11,699,545 acres (4,734,741 hectares)
Landscape:
The Seward Peninsula juts out of western Alaska, separating the Bering Sea from the Chukchi Sea. This peninsula was once part of the ice-free migration corridor between North America and Asia. Ice now spans the Bering Strait much of the year, so bitterly cold air from Siberia sweeps across this mostly treeless landscape. The terrain varies from coastal plains to convex hills with broad valleys to isolated groups of glaciated mountains reaching heights of 4,600 feet (1,400 meters). Streams occupy the larger valleys, and many small inland and coastal lakes exist.

Figure 10. Seward Peninsula ecoregion

A continuous permafrost layer of varying thickness keeps most soils wet, shallow, and organic. Ice-related features, such as pingos and patterned ground, occur across the landscape. Vegetation is principally tundra, with alpine *Dryas*-lichen tundra and barrens at high elevations and moist sedge-tussock tundra at lower elevations. This region is the transition between Arctic and sub-Arctic tundra, and diversity of tundra plants is high due to this location, the past connection to Asia, and the presence of both acidic

volcanic rock and limestone. Better-drained areas support low-growing ericaceous and willow-birch shrubs, and willow, birch, and spruce-hardwood forests occur in river valleys. Wildfires are a common occurrence, spreading across the tundra in the summer after the grasses dry.

The moist polar climate is characterized by cold and windy winter conditions and summer fog along the coastline. The average annual precipitation is 10 to 20 inches (25 to 51 centimeters) in the lowlands and more than 40 inches (100 centimeters) in the mountains. The average annual temperature varies from 21 to 26 °F (–6 to –3 °C).

Solomon River S. Steinacher, ADF&G

Wildlife and Fish:

As part of the ice-free Beringia corridor linking North America and Asia in the past, this ecoregion still possesses birds more common in Eurasia than the rest of Alaska. Bluethroats and Yellow and White Wagtails are found here. The numerous lakes and ponds attract abundant waterfowl, including the rare Arctic Loon. More typical Alaskan coastal plain breeders include Spectacles Eiders and Ruddy and Black Turnstones. One of only two known breeding grounds of the Bristle-thighed Curlew occurs on the peninsula. Cliff-nesting alcids, such as Common and Thick-billed Murres and Tufted Puffins, and Black-legged Kittiwakes nest in colonies along the coastline.

Common terrestrial mammals include arctic foxes, singing voles, and tundra hares. Reindeer and muskox were both introduced. Polar bears; ribbon, spotted, bearded, and ringed seals; bowhead, gray, beluga, killer, and minke whales; harbor porpoises; and walruses are observed near the coast and on adjacent ice floes. Five Pacific salmon species occur here, with pink salmon the most numerous. Sheefish occur in the northeast corner of this ecoregion, and Arctic char reside in some of its high altitude lakes. Both of these species, as well as Bering cisco, are common. Dolly Varden and Arctic grayling are widespread throughout the area. The Alaska blackfish is a reminder of the former link to Asia.

People:

This ecoregion is the historic range of the Inupiaq people. Miners who arrived in the area in the late 1900s founded the largest town, Nome. Sixty percent of the current population lives in Nome, with the rest dispersed in small communities throughout the ecoregion.

Land Use:

Subsistence remains an integral part of the culture and economy of this ecoregion, with an emphasis on caribou, seals, beluga and bowhead whales, berries, and greens. Mining exploration and prospecting continue on a limited basis. This ecoregion is almost entirely intact, with minimal development around Nome and several small villages along the rivers and coast.

Land Management:

The federal government owns 53% of the Seward Peninsula. The BLM manages most of that land. The NPS manages its lands as Bering Land Bridge National Preserve. The state owns more than 30% of the ecoregion. Private landowners, primarily Native corporations, hold more than 16%. The Northwest Arctic Borough has jurisdiction over part of this ecoregion.

Table 9. Seward Peninsula land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	39.4%
Federal	NPS	13.2%
Federal	USFWS	<1.0%
Local	Local	<1.0%
Private		16.1%
State	DNR	30.8%

Bering Sea Islands

Area:
2,347,545 acres (950,038 hectares)

Landscape:
Five major islands—St. Lawrence, Nunivak, St. Matthew, and the two Pribilof Islands of St. George and St. Paul—and their adjacent islets dot the inner shelf of the Bering Sea and constitute the Bering Sea Islands ecoregion. The largest island, St. Lawrence, is 1,278,000 acres, and the smallest, St. George, is just 22,150 acres. The relatively shallow marine waters surrounding these islands host a high concentration of benthic invertebrates.

The climate is a mix of polar and maritime, with the season determining which one predominates. Sea ice forms on the inner shelf of the Bering Sea, and dry polar air from Siberia travels across the ice pack to these islands. After the ice breaks up in the spring, cool, moist maritime conditions are typical through the summer. Soils are thin and rocky and underlain by thin to moderately thick permafrost.

The intercontinental access available during past glaciation and annual ice pack has contributed to vegetation with North American and Asian affinities. These rocky volcanic islands are treeless and characterized by moist tundra meadows of sedges, grasses, low shrubs, and lichens. The shorelines are a mix of rocky sea cliffs and sand dunes.

Red-legged Kitttiwake colony USFWS

Wildlife and Fish:
These islands possess globally important populations of seabirds, waterfowl, and marine mammals. The Pribilof Islands provide habitat for approximately 3 million seabirds, including nearly the entire world population of Red-legged Kittiwakes. Other large breeding colonies exist on the islands for the Black-legged Kittiwake, Parakeet Auklet, Crested Auklet, Least Auklet, Northern Fulmar, Red-faced Cormorant, Pigeon Guillemot, Leach's and Fork-tailed Storm-petrels, and Common and Thick-billed Murres. In the winter, an ice-free area south of St. Lawrence Island hosts the entire population of Spectacles Eiders. King and Common Eiders and Long-tailed Duck feed along the southern coast of that island in the summer and winter along the edge of the ice pack. The Pribilof Rock Sandpiper only breeds on Bering Sea islands. McKay's Bunting, the only

passerine endemic to Alaska, breeds only on St. Matthew and Hall Islands.

Figure 11. Bering Sea Islands ecoregion

The Bering Sea shelf supports king, Tanner, and hair crabs. One of the richest pockets of invertebrate life in the Bering Sea is found near St. Lawrence Island, where extremely productive benthic communities, including bivalve mollusks and amphipods, support marine mammals and waterfowl. A diverse mix of marine fish, including pollock, halibut, salmon, and forage fish, such as herring, Pacific sandlance, capelin, and lanternfish (Myctophids), also contribute to the abundance of birds and mammals. Breeding and wintering walruses inhabit the open ocean near St. Lawrence Island. Bowhead whales winter in the region near St. Lawrence Island. The ice-associated seals—ringed, bearded, spotted, and ribbon—can be found at the northern islands. The Pribilof Islands provide critical breeding grounds for Steller sea lions and approximately 80% of the world's northern fur seals. An important gray whale feeding area is located just north of St. Lawrence Island in the Chirikov Basin. Blue, bowhead, minke, beluga, killer, sei, northern right, humpback, and gray whales swim through the waters of the Bering Sea shelf. Dolly Varden, chum, coho and pink salmon spawn on St. Lawrence and Nunivak Islands. Resident populations of Arctic grayling, whitefish, and northern pike live in the area's lakes and streams.

Few terrestrial mammals naturally occur on the islands; reindeer and muskoxen have been introduced. The Pribilof Island (St. Paul) and St. Lawrence Island shrews are endemic and limited in range to those islands. Declines in population levels of seabirds, some fish and shellfish, and marine mammals are likely a result of trophic changes in the Bering Sea ecosystem due to commercial harvest of fish and whales over the last 40 years, as well as climate change.

People:

Alaskan and Siberian Yupik people settled the larger islands closer to the Alaska mainland. Most of the population of this ecoregion lives in one of the four communities on St. Lawrence Island and the Pribilof Islands.

Land Use:

Commercial fishing and subsistence fishing and hunting are the main uses of natural resources in this ecoregion. These islands remain largely undeveloped except for small villages; however, pollution from the U.S. Department of Defense remains on St. Lawrence Island.

Land Management:

Private ownership of the land in this ecoregion makes up a larger percentage (56.8%) than for any other ecoregion because one Native corporation owns most of St. Lawrence Island. The USFWS is the other major landowner, with most of Nunivak Island and parts of St. Paul and St. George managed as national wildlife refuges (Yukon Delta and Alaska Maritime National Wildlife Refuges).

Table 10. Bering Sea Islands land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	<1.0%
Federal	USFWS	43.2%
Private		56.8%

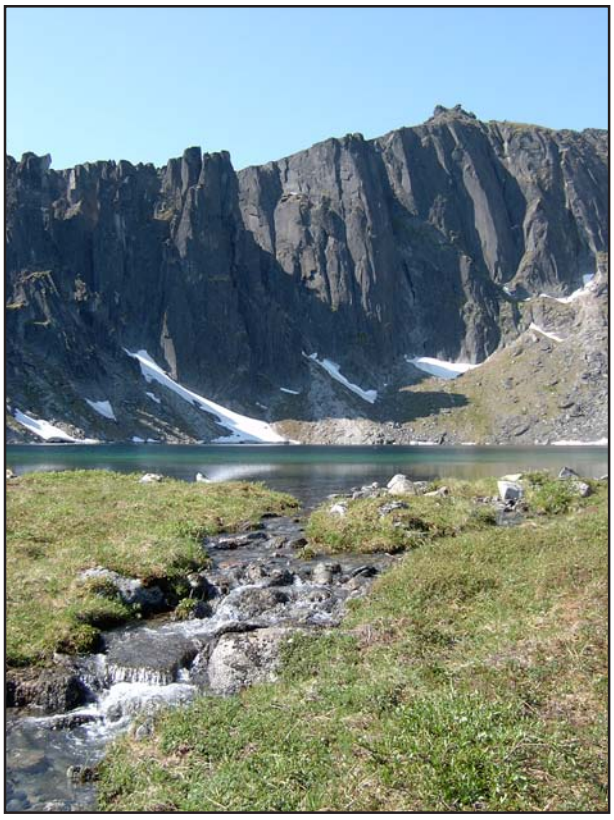
Intermontane Boreal

Kuskokwim Mountains

Area: 21,092,700 acres (8,536,099 hectares)

Landscape:

The Kuskokwim Mountains are rolling mountains with elevations generally below 4,000 feet (1,210 meters). Swift streams and rivers meander through the deep narrow valleys, following fault lines and highly eroded bedrock seams of the southwest-northeast trending ridges. Meandering streams and rivers have resulted in oxbow lakes in the valleys. Thaw lakes occur in the valleys and cirque lakes occur in the mountains.



Sunshine Mountains J. Whitman, ADF&G

Permafrost is almost continuous under this ecoregion, but varies in thickness from thin to moderate. Most lowlands and high mountains are underlain by permafrost, but forested lands or those covered by grasses and alders do not have permafrost beneath. The continental climate is relatively dry, with average annual precipitation of 12 to 22 inches (30 to 56 centimeters). Influence from the Bering Sea can bring more moisture to the southwest portion of the ecoregion in the summer. The average annual temperature ranges from 22 to 29 °F (–6 to –2 °C).

Boreal forests characterize the Kuskokwim Mountains. The lowlands contain black spruce and tamarack, while stands of white spruce, white birch, and trembling aspen occur on the slopes and uplands. Areas affected by recent forest fires have tall willow, birch, and alder shrubs. Smaller willow and alder shrubs can also occur in alpine areas, along with sedges and tundra.

Wildlife and Fish:

The boreal forest supports a large variety of birds and terrestrial mammals. Sharp-shinned Hawks, Golden Eagles, Horned Larks, Surfbirds, and White-tailed Ptarmigan inhabit the alpine areas. Landbirds using this ecoregion include Olive-sided Flycatchers, Blackpoll Warblers, Boreal Owls, Great Gray Owls, and Rusty Blackbirds.

Furbearers include marten, mink, short-tailed and least weasels, and Canada lynx. Brown bear densities are low to moderate, while moose and beaver are abundant. Several small caribou herds live in this ecoregion, and northern bog lemmings can be found here. Five species of salmon migrate up the Kuskokwim River to spawn in tributary streams. The deep lakes provide habitat for lake trout. Sheefish, whitefish, Dolly Varden, northern pike and Arctic grayling are common freshwater residents.

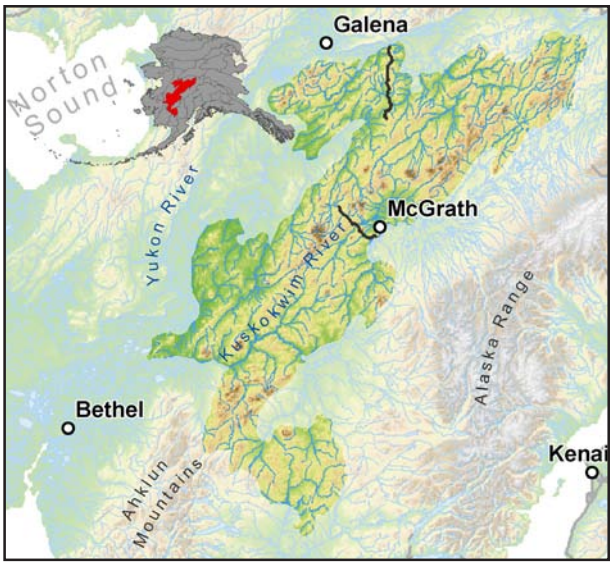


Figure 12. Kuskokwim Mountains

People:
The Native people of this ecoregion are Koyukon and Holikachuk Athabascans. McGrath is the largest community.

Land Use:
This ecoregion is almost entirely intact, with minimal development around several small villages. Subsistence and recreational hunting and fishing occur throughout the ecoregion. The mining industry still has a presence.

Land Management:
Governments manage most of the land in this ecoregion, with the federal government holding more than a third and the state owning over 55%. The primary federal managers are the BLM and USFWS. The BLM has designated several Areas of Critical Environmental Concern, and portions of several national wildlife refuges occur in the ecoregion.

Table 11. Kuskowkim Mountains land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	32.1%
Federal	NPS	<1.0%
Federal	DOD	<1.0%
Federal	USFWS	6.1%
Local	Local	<1.0%
Private		6.2%
State	DNR	55.5%

Yukon River Lowlands
Area: 12,782,700 acres (5,173,088 hectares)
Landscape:
The Yukon River Lowlands encompass the lower stretches of the Yukon and Koyukuk Rivers in west-central Alaska. Glacial sediments were deposited along these rivers during the last glacial retreat, contributing to the formation of nearly flat bottomlands between the Kuskokwim Mountains and the Nulato Hills.

Permafrost under this ecoregion is thin and discontinuous and continuing to retreat due to long-term climate warming. This thawing results in thaw lakes and collapse-scar bogs. Remaining patches of permafrost, combined with poor soil drainage, the gentle topography, and moist summers, contributes to the prevalence of wet organic soils. A mosaic of black spruce stands, birch-ericaceous shrubs, and sedge-tussock bogs occurs in these conditions. Many of these flat organic areas contain a dense concentration of lakes and ponds.

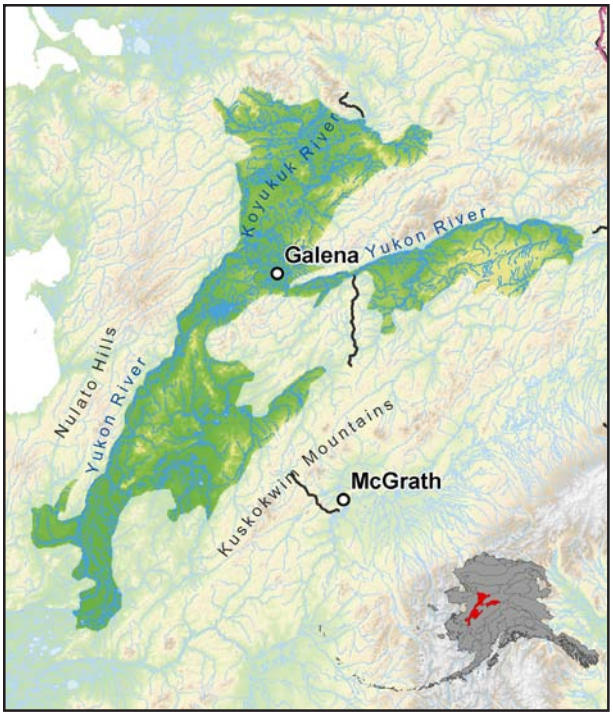


Figure 13. Yukon River Lowlands ecoregion

Along the major rivers, highly productive stands of white spruce and balsam poplar prevail. Where the meandering streams have left oxbows or cut-off sloughs, wet sedge meadows and aquatic vegetation

occur. Tall alders and willows dominate active floodplains and river bars. Seasonal changes in water levels affect these lowlands, with water levels dropping in the fall during freeze-up and then flooding during spring breakup due to ice jams.

Wetlands, Innoko National Wildlife Refuge USFWS

Wildlife and Fish:

The wet habitats of these lowlands support many birds, mammals, and fish. Common Loons, Horned and Red-necked Grebes, Trumpeter Swans, and Common Goldeneyes breed near the lakes and wetlands. The forests along the river valleys attract Ruffed Grouse, Belted Kingfishers, Alder Flycatchers, and Hammond's Flycatchers. Landbirds inhabiting this ecoregion include Olive-sided Flycatchers, Blackpoll Warblers, Boreal Owls, Great Gray Owls, and Rusty Blackbirds.

This ecoregion also provides prime habitat for mink, marten, muskrat, moose, and river otter. Smaller mammals include red squirrels, northern bog lemmings, yellow-cheeked voles, and the recently discovered tiny shrew. Several caribou herds range throughout the broad expanse of these lowlands, as do populations of black bear.

The rivers and streams commonly contain coho, chum, and king salmon. Northern pike and whitefish are common in lowland drainages, and Arctic lamprey migrate up the Yukon River in vast numbers in the fall.

People:

Koyukon and Holikachuk Athabascans are the traditional inhabitants of this ecoregion. The largest communities are Galena, Nulato, and Tanana.

Land Use:

The Yukon River provides transportation of people and supplies through the ecoregion to locations in eastern and northern Alaska. This ecoregion is almost entirely intact, with minimal development around small villages. Subsistence and recreational hunting and fishing occur throughout the ecoregion.

Land Management:

The largest landowner is the federal government, with the USFWS responsible for the majority. The ecoregion contains all or part of four national wildlife refuges—Koyukok, Innoko, Nowitna, and Yukon Delta. The BLM has designated the Arms Lake Research Natural Area and Dulbi-Kaiyuh Area of Critical Environmental Concern here. Native corporations own most of the privately held land.

Table 12. Yukon River Lowlands land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	10.2%
Federal	USFWS	63.1%
Private		18.4%
State	DNR	8.3%

Kobuk Ridges and Valleys

Area: 13,624,124 acres (5,513,607 hectares)

Landscape:

The ecoregion consists of several large rivers (Kobuk, Noatak, Huslia, and Selawik), their broad valleys, and numerous small mountain ranges south of the Brooks Range. Past ice sheets from glaciers in the Brooks Range carved out immense U-shaped valleys. The mountain ranges vary from the the low, rounded Selawik Hills, which top out at 3,300 feet (1,000 meters), to the steeper, taller Baird and Schwatka Mountains, with a maximum elevation of 8,570 feet (2,600 meters).

The valleys conduct cold air from the Brooks Range during the winter, which deepens the cold of the winters. The dry, continental climate is characterized by long, cold winters and short, cool summers.

Permafrost is almost continuous under this ecoregion, but varies in thickness from thin to moderate. The presence of permafrost and floodplains contributes to poorly drained soils and wet conditions along the rivers. These areas are dominated by black spruce in bogs. Better-drained places along the rivers support white spruce and balsam poplar. White spruce, paper birch, and trembling aspen grow on uplands. Toward the western part of this ecoregion, trees become smaller and occur in stands that are less dense and restricted to lower elevations.

Throughout the ecoregion, mountain peaks are either barren or have alpine tundra. Tall willow, birch, and alder communities can also be found in this ecoregion. Relatively warm and dry summers and frequent lightning storms during that season combine to make forest fires a common disturbance in these mountains.

Wildlife and Fish:

The rivers and lakes in this ecoregion support freshwater and anadromous fish species and represent the northernmost range of king, sockeye, and silver salmon. Chum salmon runs are strong in the Kobuk and Noatak Rivers. The longest-lived and largest sheefish in Alaska are found in the Kobuk-Selawik river systems. Large runs of least cisco and broad and humpback whitefish ascend the Noatak and Kobuk Rivers to spawn. Dolly Varden spawn and overwinter in both rivers. Northern pike and whitefish are common residents in lowland drainages.

The boreal forest supports a large variety of birds and terrestrial mammals. The mixed forests are inhabited by breeding landbirds, such as Gray Jays, Boreal Chickadees, Boreal Owls, and Great Gray Owls.

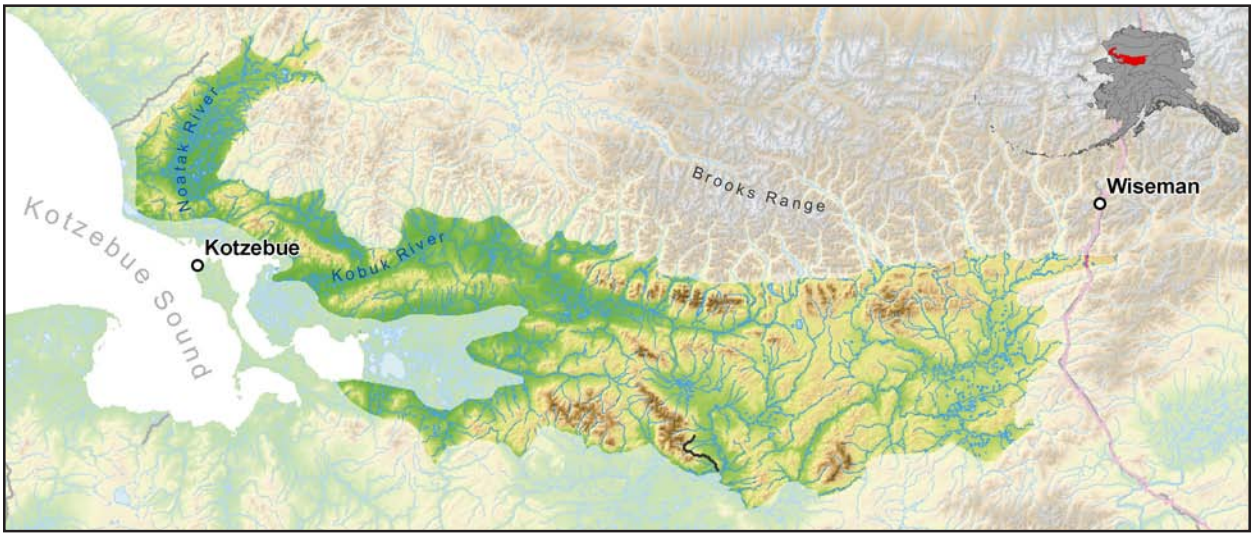


Figure 14. Kobuk Ridges and Valleys ecoregion

Furbearers include marten, mink, short-tailed and least weasels, and Canada lynx. This ecoregion represents the northern extent of American beaver and muskrat in Alaska. Arctic ground squirrels inhabit the high mountainous areas. The Western Arctic caribou herd winters in the southern portion of this ecoregion and migrates through the ecoregion to reach calving and summering grounds to the north. Top-level predators include brown bears, wolverines, and gray wolves.

Kobuk River John Hyde, ADF&G

People:

The Inupiaq people are the principal Native Alaskan inhabitants of this ecoregion, but the Koyukon Athabascans have used the resources at the eastern end. Kiana, Noatak, and Ambler are the largest communities.

Land Use:

This ecoregion is almost entirely intact, with minimal development around several small villages. Subsistence remains an integral part of the culture and economy, with an emphasis on terrestrial mammals, especially caribou and moose, and salmon. Mining exploration and prospecting continue on a limited basis.

Land Management:

The federal government manages 71% of this ecoregion, with the BLM, USFWS, and NPS as the major managers. The BLM has designated several Research Natural Areas[13] and Areas of Critical Environmental Concern. The ecoregion contains portions of several national parks and wildlife refuges. The most significant in size are Selawik and Kanuti National Wildlife Refuges and Noatak and Kobuk Valley National Parks and Preserves. The Northwest Arctic Borough has jurisdiction over part of this ecoregion.

Table 13. Kobuk Ridges and Valleys land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	31.7%
Federal	NPS	17.5%
Federal	DOD	<1.0%
Federal	USFWS	22.4%
Local	Local	<1.0%
Private		12.9%
State	DNR	15.5%

[13]An area that has received a special designation because of its importance for educational and/or research purposes.

Ray Mountains

Area: 12,662,345 acres (5,124,381 hectares)

Landscape:

The Ray Mountains lie south of the Brooks Range and are bounded by the Yukon River valley on the south and east. These mountains are composed of metamorphic rock that has formed into east-west trending ranges. Few lakes occur in these mountains, but meandering streams originate in numerous small ponds. Because few glaciers existed in this ecoregion during the Pleistocene ice age and none remain today, streams and rivers run clear. A discontinuous permafrost layer varies from thin to moderate thickness.

Figure 15. Ray Mountains ecoregion

Black spruce forests dominate these mountains, with black spruce bogs occurring in lowlands near the Yukon River. Stands of white spruce, birch, and aspen occur on warm, south-facing slopes with good drainage and along floodplains with alders and willows. Shrub birch and *Dryas*-lichen tundra characterize the alpine areas. The relatively warm summers of the continental climate contribute to some forest fires, though summers are relatively moist. Winters are cold and dry.

Wildlife and Fish:

Several small caribou herds inhabit these mountains. Lynx and marten are typical in the boreal forest, and moose, brown bears, wolves, and red fox are also found here. Landbirds found in this ecoregion include Olive-sided Flycatchers, Blackpoll Warblers, Boreal Owls, Great Gray Owls, and Rusty Blackbirds. The mountain streams provide important habitat for Arctic grayling and also support Dolly Varden and king, chum, and coho salmon.

People:

This ecoregion has a few communities, mainly populated by Koyukon Athabascans; Manley Hot Springs and Rampart are the largest.

Land Use:

Subsistence and recreational hunting and fishing occur here. The transportation corridor for the trans-Alaska pipeline also passes through this ecoregion. This ecoregion is almost entirely intact, with a small amount of development around communities and along the Dalton and Elliott Highways.

Land Management:

The state owns almost 32% of the ecoregion, with a small portion managed as Tanana Valley State Forest. The BLM manages 43% and has designated several Areas of Critical Environmental Concern. Most of the land managed by the USFWS is within Yukon Flats National Wildlife Refuge.

Bog and scattered spruce USFWS

Table 14. Ray Mountains land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	43.0%
Federal	USFWS	17.5%
Local	Local	<1.0%
Private		7.8%
State	DNR	31.7%

Tanana-Kuskokwim Lowlands

Area: 15,818,518 acres (6,401,667 hectares)

Landscape:

The Tanana-Kuskokwim Lowlands ecoregion forms an arch north of the Alaska Range and Lime Hills. This alluvial plain slopes down to the north, with numerous rivers radiating from the mountains and eventually draining into the Tanana or Kuskokwim Rivers. These meandering rivers with side sloughs are the dominant landscape feature in this ecoregion. Oxbow lakes exist where river routes have changed. Glacial moraines and morainal lakes across the lowlands are evidence of past glaciation.

Tetlin National Wildlife Refuge USFWS

Permafrost under this ecoregion is thin and discontinuous and continuing to retreat due to long-term climate warming. This thawing results in thaw lakes, collapse-scar bogs, and fens. Remaining patches of permafrost, combined with poor soil drainage and the gentle topography, contribute to high surface moisture despite the rain shadow cast by the Alaska Range. In addition, ground water-charged seeps and springs commonly occur in gravel deposits.

The general wetness of the ecoregion offers prime conditions for the boreal forest. Black spruce occurs in bogs, and white spruce and balsam poplar are found along rivers. Birch-ericaceous shrubs and sedge tussocks occur on cold, wet flatlands underlain by permafrost. Tall shrub communities of willow, birch, and alder can be found throughout the ecoregion. Warmer, south-facing slopes have stands of white spruce, white birch, and trembling aspen.

The climate is classified as dry continental. Average annual temperatures vary from 22 to 30 °F (–6 to –1 °C). Average annual precipitation ranges from 10 to 24 inches (25 to 62 centimeters). Warm, dry summers with lightning storms frequently produce wildfires. Spring flooding is also common.

Wildlife and Fish:

The wet habitats of these lowlands support many birds, mammals, and fish. Common Loons, Horned and Red-necked Grebes, Trumpeter Swans, and Common Goldeneyes breed near the lakes and wetlands. The forests along the river valleys attract Ruffed Grouse, Belted Kingfishers, Alder Flycatchers, and Hammond's Flycatchers. Landbirds in this ecoregion include Olive-sided Flycatchers, Blackpoll Warblers, Boreal Owls, Great Gray Owls, and Rusty Blackbirds.

This ecoregion also provides prime habitat for mink, marten, muskrat, moose, and river otter. Smaller mammals include red squirrels, northern bog lemmings, and yellow-cheeked voles. Several caribou herds range throughout these lowlands, as do populations of black bear. The rivers and streams commonly contain pike, sheefish, whitefish, and chum and king salmon.

People:

These bottomlands have attracted people for centuries for the food sources and transportation routes provided by the rivers. Native people are mainly Koyukon, Tanana, and Kuskokwim Athabascans. The western half of the ecoregion contains many villages that depend on the river, winter trails, and aviation for transportation. The eastern half contains the Alaska Highway, and thus, has a greater population. Fairbanks is the largest town, and North Pole, Tok, and Delta Junction are important communities along the Alaska Highway.

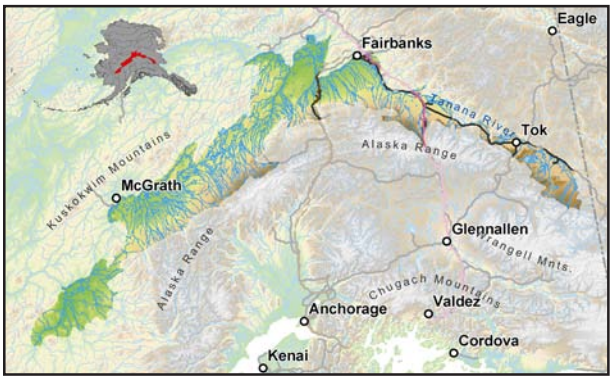


Figure 16. Tanana-Kuskokwim Lowlands ecoregion

Land use:

The greater population in the east has a more diversified economy than the west. Use of the land includes transportation of people and oil, timber production, and limited agriculture. Subsistence and recreational hunting and fishing occur throughout the ecoregion. Tourism also plays a large role and is based mainly on the landscape and wildlife values of the greater region.

Land Management:

The State of Alaska owns 45% of this ecoregion and manages a small portion of it as game refuges and state forest. The federal government owns 40%, with the main managers being the BLM, Department of Defense, and NPS. This ecoregion contains part of Denali National Park. Private landowners hold 15% of the land. The Fairbanks North Star and Denali boroughs have jurisdiction over parts of this ecoregion.

Table 15. Tanana-Kuskokwim Lowlands land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	15.7%
Federal	NPS	13.9%
Federal	DOD	7.2%
Federal	USFWS	3.2%
Local	Local	<1.0%
Private		15.1%
State	DNR	44.6%

Yukon-Tanana Uplands

Area: 25,331,894 acres (10,251,677 hectares)
Alaska 62.2%, Canada 37.8%

Landscape:

The Yukon-Tanana Uplands are rounded mountains and hills located between the Yukon and Tanana Rivers and spanning the Alaska-Yukon Territory border. The underlying geology results in exposed bedrock and coarse rubble on ridges and colluvium on lower slopes. Rivers cut deep, narrow V-shaped valleys into the uplands. Elevations range from 1,650 feet (500 meters) in the valleys to more than 4,950 feet (1,500 meters) on the peaks. Small lakes occur primarily in valleys where drainage has been blocked. Discontinuous permafrost lies beneath north-facing slopes and valley bottoms, so the terrain can be hummocky in these areas. In the valley bottoms, the permafrost is thin, ice-rich, and near its melting point.

Black spruce favors north-facing slopes underlain with permafrost; spruce also occurs with sedge tussocks and scrub bogs in valley bottoms. White spruce, birch, and aspen dominate south-facing slopes.

White spruce, balsam poplar, alder, and willows occur in floodplains on better-drained sites. Low birch-ericaceous shrubs and *Dryas*-lichen tundra are the primary vegetation above tree line, and some peaks are barren.

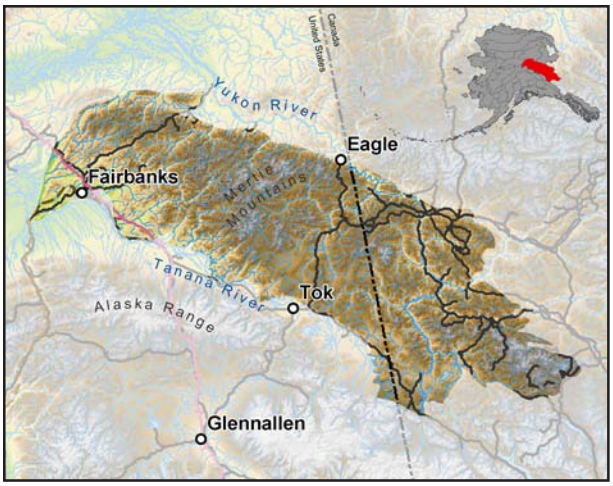


Figure 17. Yukon-Tanana Uplands ecoregion

The continental climate features long, very cold winters and dry, warm summers. Summer lightning storms are frequent; the region has the highest incidence of lightning strikes in Alaska and the Yukon Territory, so forest fires are very common. In the lower elevations, mean annual precipitation is about 13 inches (32.5 centimeters), but precipitation increases from east to west and with increasing elevation. Mean January temperatures can drop to –22 °F (–30 °C), and mean July temperatures are near 61 °F (16 °C). Mean annual temperature is 23 °F (–5 °C).

Wildlife and Fish:

The open, mixed deciduous-conifer forests support a large variety of birds, including Smith's Longspurs, Gray Jays, Boreal Chickadees, Northern Flickers, Red-tailed Hawks, and Boreal Owls. Peregrine Falcons favor cliffs in the area. Dall sheep, hoary marmots, and arctic ground squirrels inhabit the high mountainous areas. Top-level predators include black and brown bears, wolverines, and gray wolves, and smaller predators are marten, mink, short-tailed and least weasels, and Canada lynx. Small mammals include long-tailed and yellow-cheeked voles and northern flying squirrels. Caribou and moose are also found in this ecoregion.


Northern Flicker USFWS

The clear headwater streams in this ecoregion are important spawning areas for chinook, chum, and coho salmon. Northern pike, whitefish, and burbot are common in the larger lakes and rivers, and Arctic grayling tend to be found in smaller streams.

People:

Athabascans, including Tanacross, Tanana, and Han groups, have inhabited this ecoregion for centuries. The largest Alaska communities in this ecoregion are Fox, Ester, and Eagle.

Land Use:

Historically, mining has been a major industry here, with open pit, underground, and placer operations. Timber is harvested along the south side of the ecoregion. Major transportation routes lie to the south of the ecoregion and through the west and east ends, promoting recreation and tourism. Subsistence harvest occurs throughout the region.

Land Management:

Over one-third (37.8%) of this ecoregion is in Canada. The State of Alaska owns half of the Alaska portion and has designated a small portion of it as state forest, refuges, and recreation areas. The federal government manages 24.2%, with the BLM managing a majority of that land. The BLM manages three wild and scenic rivers, Steese National Conservation Area, and White Mountains National Recreation Area. The NPS's major unit in this ecoregion is Yukon-Charley Rivers National Preserve. The Fairbanks North Star Borough has jurisdiction over part of this ecoregion.

Table 16. Yukon-Tanana Uplands land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	30.5%
Federal	NPS	8.1%
Federal	DOD	1.4%
Federal	USFWS	1.6%
Local	Local	<1.0%
Private		6.8%
State	DNR	49.9%

Yukon-Old Crow Basin

Area: 17,934,802 acre (7,258,115 hectares)
Alaska 77.8%, Canada 22.2%

Beaver Creek D. Spencer, USFWS

Landscape:

The Yukon-Old Crow Basin is characterized by meandering rivers and sloughs, sandbars, oxbow and thaw lakes, and marshy flats that occur along the Yukon, Porcupine, Chandalar, Christian, Sheenjek, and Old Crow Rivers. The rolling uplands surrounding the flats have fewer water bodies. The Old Crow Basin in the Yukon Territory, at elevations below 990 feet (300 meters), with surrounding uplands between 990 and 1,980 feet (300 and 600 meters), has numerous squarish lakes oriented southeast to northwest. The Alaska portion of the ecoregion, often called the Yukon Flats, ranges in elevation from 300 to 820 feet (90 to 250 meters).

The dry, continental climate is colder in the winter than surrounding ecoregions, due to the influence of Arctic high-pressure systems, and warmer in the summer as surrounding mountains block many cooler weather systems. In the Old Crow Basin, average annual precipitation varies from 7 to 10 inches (17 to 25 centimeters), and the mean annual temperature ranges from 10 to 16 °F (–9 to –12 °C). Temperatures and precipitation levels are slighter higher in the Alaska portion. Due to the dryness of the basin, water levels in lakes and bogs are maintained primarily by spring flooding of the rivers. Warm summers create conditions favorable for frequent forest fires.

Flooding and poor drainage due to nearly continuous permafrost keep soils wet. Vegetation varies with soil drainage. Wet grass marshes and low shrub swamps occur in the flats among the streams, rivers, and lakes. Open black spruce stands also grow at lower elevations, with white spruce growing on better drained sites. Paper birch, balsam poplar, and aspen are most likely found in early successional stands following fires. Extensive thickets of birch, willow, and some alder occur in openings and under trees from lower elevations to above tree line. Sedge and cottongrass tussocks are found throughout the ecoregion.

Wildlife and Fish:

The Yukon Flats have been called the most productive Arctic habitat on the continent (McNab and Avers 1994). The rich aquatic habitats attract millions of waterfowl and provide prime habitat for moose, river otters, beavers, and muskrats. Species breeding here include Lesser Scaup; Northern Pintail; Scoter; Widgeon; Sandhill Crane; Arctic, Red-throated and Common Loons; and Horned and Red-necked Grebes. Most of the Canvasback Ducks that nest in Alaska do so on the Yukon Flats.

The Porcupine caribou herd inhabits the northeast portion of this ecoregion. Snowshoe hare and lynx occur here, with their populations linked in a cycle of abundance and scarcity.

The rivers support king, silver, and chum salmon. Resident fish include northern pike, sheefish, burbot, whitefish, and Arctic grayling.

People:

Several small villages occur in the Yukon Flats area, including those of the Gwichin Athabascans, who have traditionally lived there. The largest communities are Fort Yukon and Venetie. Salmon, freshwater fish, caribou, moose, smaller mammals and plants are traditional subsistence foods.

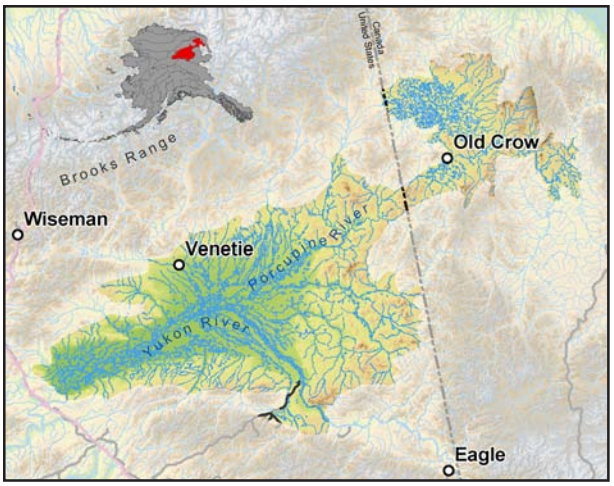


Figure 18. Yukon-Old Crow Basin ecoregion

Land Use:

Mining has occurred in the Canadian portion of the ecoregion, with open pit, underground, and placer operations. In the Alaska portion, this ecoregion is almost entirely intact, with limited development around several small communities. The Yukon River provides transportation of people and supplies. Subsistence and recreational hunting and fishing occur throughout the ecoregion.

Land Management:

Over one-fifth (22.2%) of this ecoregion is in Canada and includes the Canadian Ivvavik and Vuntut National Parks. The U.S. federal government manages roughly three-quarters of the Alaska portion of the ecoregion, with USFWS as the primary land manager. Most of those holdings are managed as Yukon Flats National Wildlife Refuge, and part of the Arctic National Wildlife Refuge is found in the northern part of the ecoregion. Private ownership is high in this ecoregion.

Table 17. Yukon-Old Crow Basin land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	9.8%
Federal	NPS	<1.0%
Federal	USFWS	62.4%
Local	Local	<1.0%
Private		22.9%
State	DNR	4.3%

Davidson Mountains

Area:

8,335,732 acres (3,373,425 hectares)
Alaska 86%, Canada 14%

Landscape:

South of the Brooks Range rise the rugged Davidson Mountains reaching heights of 8,000 feet (2,420 meters). Large, glacially originated rivers, such as the Sheenjek, and their broad floodplains dissect the mountains and drain to the Yukon River. The climate is continental with long, cold winters and short, cool summers. Permafrost is continuous under this ecoregion, but varies in thickness from thin to moderate.

This ecoregion represents the northern extent of boreal forests in Alaska. The presence of permafrost and floodplains contributes to poorly drained soils and wet conditions along the rivers. These areas are

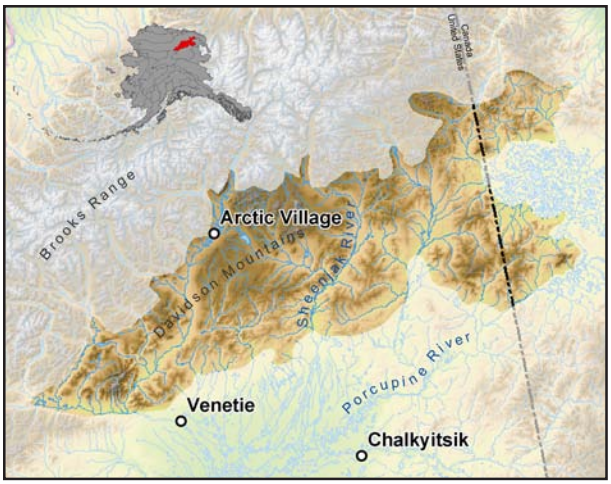


Figure 19. Davidson Mountains ecoregion

dominated by black spruce bogs. Better-drained places along the rivers support white spruce and balsam poplar. White spruce, paper birch, and trembling aspen grow on uplands. Mountain peaks are either barren or have alpine tundra.

Tall willow, birch, and alder communities can also be found in this ecoregion. Relatively warm and dry summers and frequent lightning storms during that season combine to make forest fires a common disturbance in these mountains.

Mancha Creek near Mancha Pinnacles D. Cline, USFWS

Wildlife and Fish:

The boreal forest supports a large variety of birds and terrestrial mammals. The mixed forests are inhabited by breeding landbirds, such as Gray Jays, Boreal Chickadees, and Boreal Owls. Landbirds inhabiting this ecoregion include Olive-sided Flycatchers, Blackpoll Warblers, Rusty Blackbirds, Great Gray Owls, and Boreal Owls.

Furbearers include marten, mink, short-tailed and least weasels, and Canada lynx. Dall sheep, hoary marmots, and Arctic ground squirrels inhabit the high mountainous areas. This is part of the Porcupine caribou herd's overall range. Top-level predators include brown bears, wolverines, and gray wolves.

Northern pike, whitefish, and Arctic grayling are common in the lakes and rivers.

People:

Gwich'in Athabascans inhabit this ecoregion on both sides of the border. The only Alaska community in this ecoregion is Arctic Village.

Land Use:

This ecoregion is almost entirely intact, with limited development. Subsistence and limited recreation remain the primary uses of the land.

Land Management:

Fourteen percent of this ecoregion is in Canada, and part of that has been designated as Ivvavik National Park. The U.S. federal government manages almost two-thirds of the Alaska portion of this ecoregion. Of

that total, the USFWS manages more than 70% as the Arctic or Yukon Delta National Wildlife Refuges. The other major landowners on the U.S. side of the border are private individuals and Native corporations.

Table 18. Davidson Mountains land use status

Owner	Agency	Percent of Ecoregion
Federal	BLM	<1.0%
Federal	USFWS	72.1%
Private		18.5%
State	DNR	9.2%

North Ogilvie Mountains

Area: 12,896,610 acres (5,219,187 hectares)
Alaska 24.4%, Canada 75.6%

Landscape:
The North Ogilvie Mountains span the Alaska-Yukon border, with most of their mass in Canada. These flat-topped hills are remnants of a former plain that has been eroded for a long period of time. Most elevations are between 2,970 and 4,450 feet (900 to 1,350 meters), with the highest peak at 5,940 feet (1,800 meters). Limestone and other sedimentary rock underlies most of the area. These rocks are exposed as angular outcrops on ridge tops and scree material on upper slopes. Lakes are not common in these mountains, but ponds and thermokarst basins occur in the valley bottoms. Numerous streams originate here and flow to the Porcupine, Yukon, and Peel Rivers through deeply cut valleys.

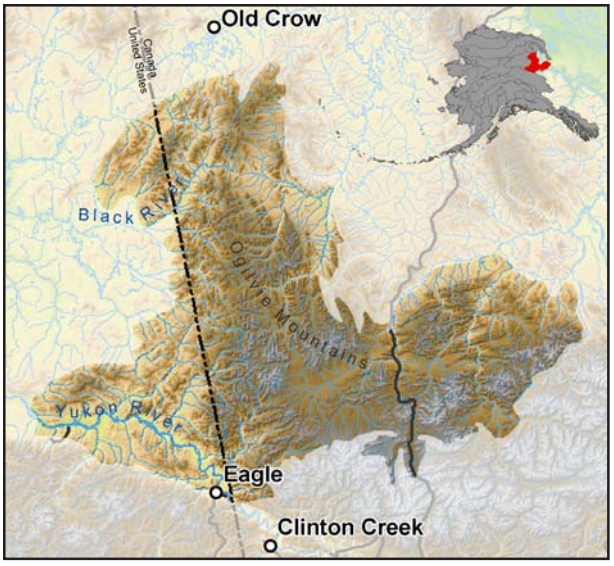


Figure 20. North Ogilvie Mountains ecoregion

Frequent landslides and soil creep disturb the steeper upper slopes. Soils are deeper and more stable on lower slopes, where permafrost is almost continuous. The presence of permafrost is evidenced by pingos, earth hummocks, peat polygons, and stone stripes. Sedge-tussock tundra is the most prevalent vegetation type in the ecoregion. Shrub birch and willow also form extensive communities and can be found from lower elevations to above tree line. Black spruce and some paper birch occur on low elevation wetlands. White spruce is found in protected areas and well-drained river valleys. Recent floodplains and warmer sites with good drainage support aspen and balsam poplar.

The continental climate results in long, cold winters and short, cool summers. Annual precipitation is 20 inches (50 centimeters) in the hills and 26 inches (65 centimeters) in the higher elevations with annual snowfall at 51 inches (130–205 centimeters). The mean annual temperature ranges from 19 to 16 °F (–7 C to –9 °C), but temperature inversions may make valleys colder.

Wildlife and Fish:
The North Ogilvie Mountains are home to the Porcupine caribou herd, brown bears, wolverine, and gray wolves. Dall sheep and pikas inhabit the alpine areas, and moose can be found in the river valleys. Northern collared lemmings are in the northern part of the ecoregion. Landbirds found in this ecoregion include Olive-sided Flycatchers, Blackpoll Warblers, Great Gray Owls, Boreal Owls, and Rusty Blackbirds. Chum and king salmon migrate through the Yukon River en route to spawning areas in Canada. Arctic grayling are common in streams.

People:
There are very few permanent communities in the Alaska portion of these mountains, with the town of Eagle at the southern boundary being the largest. Newer residents, as well as the descendents of the Gwich'in Athabascans, rely on salmon, caribou, moose, small mammals, and plants for subsistence.

Land Use:
Gold, silver, platinum, and tin have been mined in these mountains, though not extensively. Energy-related resources, including coal, petroleum, and uranium, also occur here, but have not been tapped yet.

Rusty Blackbird USFWS

Land Management:
Over three-fourths (75.6%) of this ecoregion is in Canada and is included as parts of Ivvavik National Park and Fishing Branch Territorial Park. On the U.S. side of these mountains (24.4% of the ecoregion), the BLM and the NPS are the major land managers. Yukon-Charley Rivers National Preserve is the largest federal unit. Private landowners hold 23% of the ecoregion.

Table 19. North Ogilvie Mountains land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	35.7%
Federal	NPS	29.2%
Federal	USFWS	10.1%
Private		22.9%
State	DNR	2.1%

Alaska Range Transition
Lime Hills
Area: 7,095,672 acres (2,871,579 hectares)

Landscape:
The Lime Hills ecoregion lies at the southwest end of the Alaska Range. The topography reflects the transition from the rugged Alaska Range to a more rolling landscape. Here, peaks over 6,500 feet (1,970 meters) are found in the east, while lower ridges and broad valleys characterize the rest of the ecoregion. The influence of heavy glaciation is evident in the repeated sharp mountain ridges, thin deep lakes, and broad U-shaped valleys, primarily oriented northeast to southwest. Several large rivers begin in this ecoregion, passing through broad valleys lined with wetlands.

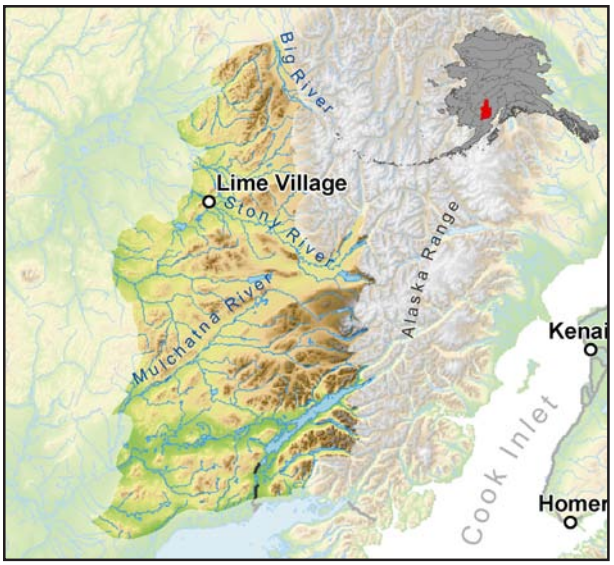


Figure 21. Lime Hills ecoregion

Permafrost exists in isolated areas in the ecoregion. Maritime influences of the Bering Sea and Gulf of Alaska moderate the continental climate of the Lime Hills. The average annual precipitation ranges from 22 to 30 inches (56 to 76 centimeters), with average annual temperatures from 27 to 32 °F (–3 to 0 °C).

Higher elevations are barren or covered with alpine tundra and heath. Communities of tall and low shrubs and assemblages of willow, birch, and alder dominate most of the Lime Hills. Spruce forests and spruce-aspen-birch forests occur at lower elevations. Wildfires are frequent.

Wildlife and Fish:

The Lime Hills provide habitat for many of the larger species—moose, brown bears, and the Mulchatna caribou herd. White-tailed Ptarmigan and Golden Eagles can be found in the alpine tundra. Northern bog lemmings are common in the more poorly drained areas. Dolly Varden, sockeye, king and coho salmon spawn in most of the area's rivers. Rainbow trout and Arctic grayling are common residents in streams, and Arctic char are common in lakes.

People:

Tanaina Athabascans are the traditional inhabitants. The largest communities are Nondalton and Port Alsworth.

Golden Eagle G. Atwell, USFWS

Land Use:

The ecoregion remains primarily intact, with some development around communities and along the shores of Lake Clark. The major uses of this ecoregion remain subsistence, with a growing tourism industry based on recreational hunting and fishing.

Land Management:

The State of Alaska owns most of this ecoregion. Management by the federal government is split between the NPS and the BLM. Lake Clark National Park and Preserve constitutes 18% of the ecoregion. Private and local ownership is low.

Table 20. Lime Hills land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	14.3%
Federal	NPS	18.3%
Federal	DOD	<1.0%
Local	Local	<1.0%
Private		4.5%
State	DNR	62.6%

Cook Inlet Basin

Area: 7,186,358 acre (2,908,279 hectares)

Landscape:

Bisected by Cook Inlet, the Cook Inlet Basin is encompassed by the Aleutian Range to the west, the Alaska Range to the north, and the Talkeetna, Chugach, and Kenai Mountains to the east. Elevation within the basin spans from sea level to 1,980 feet (600 meters). The gently sloping lowlands were extensively glaciated during the Pleistocene epoch. Hundreds of small lakes, swamps, and bogs occur on ground moraines. Several large rivers, including the Susitna, Kenai, and Matanuska, drain glaciers in the surrounding mountains. The basin experiences a mix of maritime and continental climates. Temperatures range from the winter average minimum 5 °F (–15 °C) to the summer average maximum 64 °F (18 °C), and annual precipitation is 15 to 27 inches (38–68 centimeters), with snowfall 63 to 100 inches (160–255 centimeters).

Spruce and hardwood forests dominate the landscape, but the varying climatic influences, sporadic permafrost, and rolling topography support diverse vegetation. Lowlands with wet, organic soils support black spruce stands, and ericaceous shrubs are dominant in open bogs. Uplands have mixed forests of white and Sitka spruce, aspen and birch. Tall scrub communities, dominated by willow and alder, occur in floodplains. A mixture of wetland habitats occurs, from low scrub bog communities to freshwater wet graminoid communities, with a dominance of bluejoint grass in many wetlands.

Disturbance from wildfire in the ecoregion varies from low in the northern parts to moderate on the Kenai Peninsula. An outbreak of spruce bark beetle (*Dendroctonus rufipennis* [Kirby]) over the past decade has heavily affected the southern portions of the ecoregion, killing up to 80% of mature spruce stands.

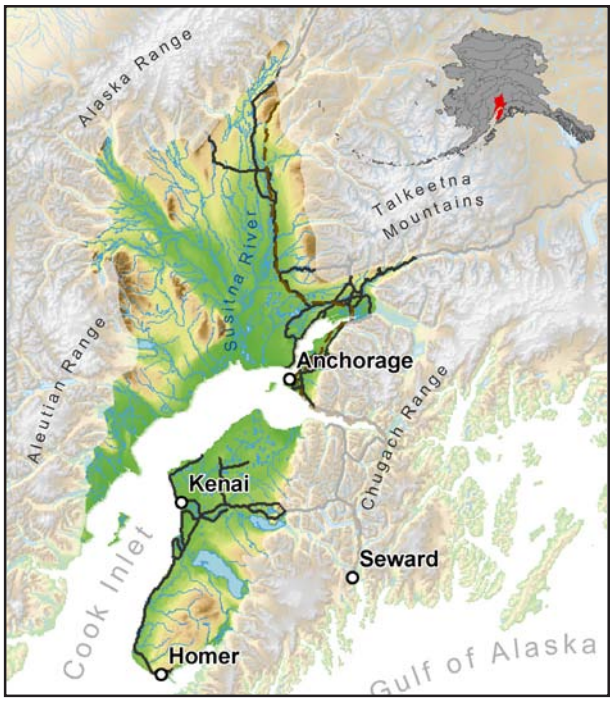


Figure 22. Cook Inlet Basin ecoregion

Wildlife and Fish:

The diversity of habitats results in a diversity of species. The numerous lakes, ponds, and wetlands attract large numbers of shorebirds and waterfowl, including tundra and Trumpeter Swans. Significant numbers of Western Sandpipers, Dunlins, Rock Sandpipers, long- and Short-billed Dowitchers, and Hudsonian Godwits use Cook Inlet for breeding, resting, or wintering. Black-legged Kittiwakes and Common Murres nest in colonies along its shores. Nearly the entire population of Wrangell Island Snow Geese migrates across the mouth of the Kenai River and Trading Bay in the spring. Sensitive landbirds in the ecoregion include Olive-sided Flycatchers and Blackpoll Warblers. The mixture of wetland habitats supports moose, brown and black bears, beavers, muskrats, pygmy shrew and northern water shrew. Extirpated on the Kenai Peninsula early in the 20th century, caribou were reintroduced there in the 1960s. The Kenai Peninsula is also home to a small relatively isolated population of brown bears.

The river systems support salmon runs, which attract bears and ravens. The Kenai River watershed has five species of Pacific salmon, including a unique run of the world's largest chinook salmon. Dolly Varden, Arctic char, rainbow trout, and whitefish also occur in the ecoregion's fresh waters.

The Cook Inlet beluga population, listed as depleted by the National Marine Fisheries Service in 2000, lives entirely within the ecoregion. Harbor seals and Dall's and harbor porpoise are also found in Cook Inlet. Minke whales feed in the bays and shallow coastal waters each summer.


Tule White-fronted Goose G. Smart, USFWS

People:

The Cook Inlet Basin is the most populated region in the state. Anchorage is by far the largest community, but neighboring towns in the Matanuska-Susitna valleys and the north side of the Kenai Peninsula also host populations that are large by Alaska standards. Traditionally, Tanaina Athabascans subsisted on abundant salmon, moose, caribou, beavers, small game and birds, migratory

waterfowl, freshwater fish, and plants. The diverse population today still makes widespread use of wildlife for hunting and fishing.

Kenai National Wildlife Refuge lakes USFWS

Land Use:

Although this ecoregion has had the greatest impacts from humans in the state, it is estimated that only about 10% of its area has been heavily altered. Most development is concentrated in several areas. Today, tourism and recreation, the oil and gas industry, limited agriculture, and government employment support most residents.

Land Management:

Cook Inlet Basin is characterized by a higher percentage of private land ownership than in most other ecoregions, but still the majority of land is publicly managed. State-managed lands constitute half of the ecoregion, and federally managed lands make up 15%. The State of Alaska has set aside lands around Cook Inlet to protect fish and wildlife habitat; these small areas have been designated critical habitat areas, game refuges, and wildlife refuges. Several recreation areas also exist here. The Kenai National Wildlife Refuge is the largest federal area. The ecoregion falls in the jurisdictions of the Kenai Peninsula Borough, Matanuska-Susitna Borough, and the Municipality of Anchorage.

Table 21. Cook Inlet Basin land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	<1.0%
Federal	NPS	1.1%
Federal	DOD	<1.0%
Federal	USFWS	13.1%
Federal	USFS	<1.0%
Local	Local	11.3%
Private		24.6%
State	DNR	49.1%

Alaska Range

Area: 25,534,440 acres (10,333,440 hectares)

Landscape:

The mountains of the Alaska Range ecoregion are high, very steep, and covered with glaciers, rocky slopes, and ice fields. Elevations vary from broad valleys at 1,980 feet (600 meters) to peaks greater than 12,870 feet (3,900 meters), with the tallest mountain in North America, Mount McKinley, rising to 20,320 feet (6,100 meters). Glaciers, which still remain in some places, have shaped these mountains, so cirques and U-shaped valleys are common features due to extensive glaciation. Streams and rivers, heavy with sediment, run swiftly down mountain ravines and braid across valley bottoms. Permafrost is discontinuous. Disturbance processes are primarily landslides and avalanches on the steep, scree-covered slopes. Active volcanoes also occur here.

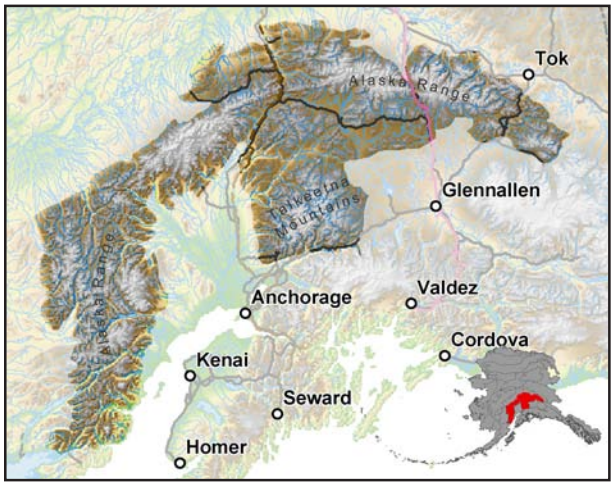


Figure 23. Alaska Range ecoregion

Due to the Alaska Range's height, a cold, continental climate prevails. The highest mountains occasionally intercept streams of Pacific moisture to help feed small ice fields and glaciers. In the lower elevations mean annual precipitation is approximately 15 inches (380 millimeters), with snowfall ranging from 60 to 120 inches (150 to 305 centimeters). At the higher peaks, average annual precipitation is 41 inches (103 centimeters), with snowfall estimated at 40 inches (101.5 centimeters).

Aeriel view of Alaska Range in winter USFWS

Vegetation is sparse, with dwarf scrub communities commonly occurring in windswept areas. Shrub communities of willow, birch, and alder occupy the more protected lower slopes and valley bottoms. Spruce forests occur in some valleys and lower slopes, with white spruce dominating and black spruce interspersed in areas with poorer drainage. About 7% of the ecoregion is wetlands.

Wildlife and Fish:

Top-level predators—brown bears, gray wolves, and wolverines—are common in the Alaska Range. They prey on Dall sheep in the alpine tundra and large migrating caribou herds in the broad valleys and passes. Small mammals include hoary marmots, singing voles and pikas. Lake trout are found in deep lakes and salmon migrate, rear, and spawn in many of the streams. Dolly Varden and Arctic grayling are resident in many streams. This may be the northern extent of the water shrew's range. Smith's Longspurs probably breed along the Denali Highway.

People:

Due to the harshness of the landscape and climate, this ecoregion is sparsely populated. Historically, several seminomadic Athabascan groups, such as the Tanaina, Ahtna and Tanacross, lived there; they relied on salmon, freshwater fish, large mammals, smaller fur-bearing mammals and edible plants. Today the largest communities are Healy, McKinley Park, Cantwell, and Chickaloon.

Land Use:

Little of this ecoregion has been developed due to the low population. The George Parks Highway bisects the ecoregion into east and west halves. Most human use is subsistence and sport hunting and fishing, though recreation and tourism are growing. Limited mining also occurs, including coal mining at Healy.

Land Management:

Half of this ecoregion is owned by the State of Alaska. The largest state designated area is the Nelchina Public Use Area. The federal government is also a major landowner (44%). The NPS manages most of its lands as Denali National Park and Preserve or Lake Clark National Park and Preserve. The Denali, Kenai Peninsula, and Matanuska-Susitna Boroughs have jurisdiction over parts of this ecoregion.

Table 22. Alaska Range land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	16.4%
Federal	NPS	26.4%
Federal	DOD	<1.0%
Federal	USFWS	<1.0%
Local	Local	<1.0%
Private		5.5%
State	DNR	50.7%

Copper River Basin

Area: 4,729,208 acres (1,913,884 hectares)

Landscape:

The Copper River Basin ecoregion occupies the former bed of Lake Ahtna. A large lake during glacial times, the lake broke through an ice dam and started the flow of the Copper River. The basin is characterized by rolling to hilly moraines and nearly level alluvial plains where the glacial lake was. Elevation ranges from 1,380 to 2,950 feet (420 to 900 meters). The basin is bounded by the Talkeetna Mountains on the west, the Wrangell Mountains on the east, the Alaska Range on the north, and the Chugach Mountains on the south.

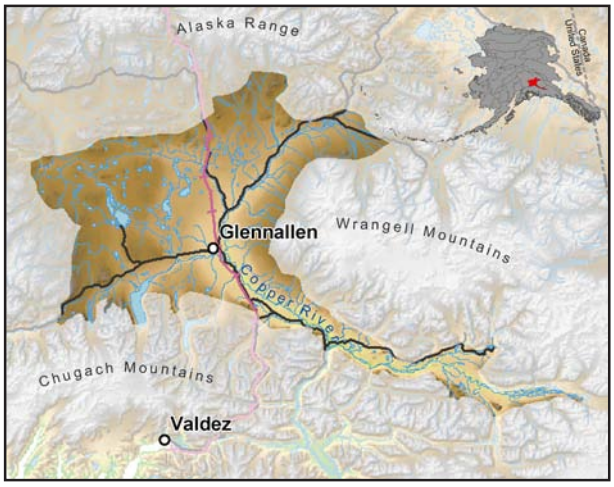


Figure 24. Copper River Basin ecoregion

Shallow, discontinuous permafrost results in poorly drained soils and numerous wetlands and thaw lakes. Black spruce forests and woodlands dominate the landscape. Wetlands, which occupy about 36% of the ecoregion, also include low scrub bog communities with birch and ericaceous shrubs and wet, graminoid, herbaceous communities dominated by sedges. Well-drained sites have coniferous forests dominated by white spruce or broadleaf forests dominated by black cottonwood and quaking aspen. Stream and river corridors are lined with cottonwood, willow, and alder. Spring floods are common along drainages.

The continental climate has steep seasonal temperature variation. The basin acts as a cold-air sink, and winter temperatures can be bitterly cold. The average annual temperature is 26 to 30 °F (–3 to –1 °C), and the average annual precipitation is 10 to 20 inches (250–500 millimeters).

Wildlife and Fish:

The Nelchina and Mentasta caribou herds occupy this basin, as do black and brown bears and wolverines. Sockeye salmon is the major anadromous fish, but king salmon also occur. Arctic grayling, lake trout, whitefish, and burbot live in lakes throughout the ecoregion.

The thaw lakes and wetlands provide excellent stopover and nesting habitat for a variety of migratory bird species that travel up the Copper River from the coast. A high number of Trumpeter Swans breed in the north-central portion. Ruffed Grouse inhabit the forests in the lower elevations.

People:

Traditionally, Ahtna Athabascans relied on salmon, freshwater fish, large mammals, smaller, fur-bearing mammals, and edible plants. Today most residents live along the three highways passing through this ecoregion. The largest towns are Copper Center, Glennallen, and Kenny Lake.

Land Use:

This area is a major transportation crossroads in Alaska for the movement of people and oil. Subsistence and recreational hunting and fishing occur throughout the ecoregion. Tourism also plays a large role. A small agriculture industry exists.

Copper River Basin T. Paul, ADF&G

Land Management:

Compared to other ecoregions, the Copper River Basin has a large percentage of privately owned land (23.6%) The state owns a third of the ecoregion and manages more than a quarter of its land as the Nelchina Public Use Area. The federal government is the largest landowner (42.5%) with management split almost equally between the BLM and the NPS. Wrangell-St. Elias National Park and Preserve makes up more than one-fifth of the ecoregion.

Table 23. Copper River Basin land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	20.2%
Federal	NPS	22.3%
Local	Local	<1.0%
Private		23.6%
State	DNR	33.9%

Aleutian Meadows

Aleutian Islands

Area: 2,929,397 acres (1,185,511 hectares)

Landscape:

Arcing 1,180 miles (1,900 km) westward from the Alaska Peninsula to the island of Attu, the Aleutian Islands are a chain of volcanic islands that were formed by the Pacific plate being forced beneath the Bering Sea plate. Fog often shrouds the steep, rubble-covered peaks, which rise to 6,230 feet (1,900 meters) above sea level. Icecaps or small glaciers occur on many of the volcanoes, and past glaciation is evident. Short, swift streams have carved fjords into the sides of the cones. High cliffs, wave-beaten platforms, boulder beaches, or small dune fields ring the islands.

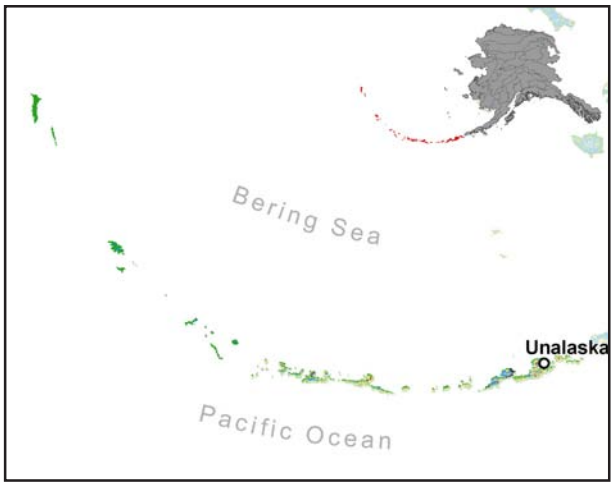


Figure 25. Aleutian Islands ecoregion

The archipelago's location over an active seismic fault results in frequent volcanic and seismic activity. Forty of the 76 volcanoes in the chain have been active in the past 250 years. Intense ocean storms are also an important disturbance process, bringing strong winds and heavy rains. A cool, maritime climate brings abundant, yet varying, precipitation throughout the chain, from 20 inches in some places to 82 inches in others (53 to 208 centimeters), with average annual temperatures from 36 to 39 °F (2 to 4 °C). The islands are permafrost free, and the winter sea ice pack does not reach here.

The islands are treeless. The flora is a blend of species from the North American and Asian continents. The alpine tundra contains species not found to the north or in Interior Alaska, including Alaska arnica, Siberian spring beauty, caltha-leaved avens, western buttercup, and Kamchatka rhododendron. Low shrub communities of willow, birch, and alder dominate mountain flanks and coastlines, interspersed with ericaceous-heath, *Dryas*-lichen, and grass communities. Uplands are characterized by peat and mats of heath tundra with sedges. Several plants are endemic to the Aleutians: Aleutian draba, Aleutian chickweed, Aleutian wormwood, Aleutian shield-fern (endangered under the U.S. Endangered Species Act) and Aleutian saxifrage. Roughly 11% of the island complex is wetlands. Shallow marine waters contain eelgrass beds.

Amagat Island USFWS

Wildlife and Fish:

The Aleutian Islands are important breeding grounds for birds and marine mammals. Large, globally important colonies of seabirds are found throughout the chain; these rugged cliffs provide habitat for Red-faced Cormorants, Leach's and Fork-tailed Storm Petrels, Red-legged and Black-legged Kittiwakes, Common and Thick-billed Murres, and Least and Crested Auklets. The Aleutian Canada Goose breeds only in the Aleutians and on islands nearby off the Alaska Peninsula. The archipelago provides wintering habitat for Steller's Eiders and Emperor Geese and nesting grounds for Peale's Peregrine Falcon and Bald Eagles. The majority of the western population of endangered Steller sea lions give birth at rookeries on the chain, and northern sea otters live in the more protected waters among the islands. Fin, humpback, killer, and minke whales feed in the nearshore and offshore waters in the summer. Passes between the islands, especially Unimak Pass, focus migrating marine and avian species into biologically important and sensitive areas.

Crested Auklet
A. Sowls, USFWS

The natural fragmentation of the islands contributes to a higher level of endemism than in most of Alaska. Endemic bird subspecies include Evermann's Rock Ptarmigan, Yunaska Rock Ptarmigan, and Aleutian Song Sparrow.

Up to 14 species of terrestrial mammals occur naturally on many of the islands. Large predators like brown bear and gray wolf can be found in the eastern islands, but both diversity and size of native mammal species decrease westward until only two smallish animal species—the collared lemming and red fox—can be found on Umnak Island.

The Aleutian Islands unit of the Alaska Maritime National Wildlife Refuge is thought to have more salmon spawning streams than any other refuge in the country, providing a rich food resource for birds and terrestrial and marine mammals.

Recent research suggests that the Aleutian chain may have the highest diversity and abundance of deep-sea coral in the world. Coral gardens provide habitat for dozens of species of sea life, including rockfish, perch, flatfish, mackerel, crab, shrimp, cod, pollock, sea stars, snails, and octopus.

Intentional and accidental introductions of cattle, reindeer, foxes, rabbits, and rats to various islands have altered the habitat and seabird colonies of the islands through overgrazing and predation. Declines in

population levels of seabirds, some fish and shellfish, and marine mammals are likely a result of trophic changes in the Bering Sea ecosystem due to commercial harvest of fish and whales over the last 40 years, as well as climate change.

People:
The Native people of the islands are Aleut. Their subsistence foods come from the diverse habitats of the islands, including the marine mammals, caribou, salmon, chitons, fish, mussels, urchins, octopus, birds, eggs, and plants. The largest communities are Adak Station and Unalaska.

Land Use:
Commercial fishing and subsistence are the major uses of natural resources in this ecoregion. The archipelago also defines a major shipping route. Active and shuttered military installations exist on the islands. Pollutants are locally acute, and radioactivity from nuclear testing persists on Amchitka Island.

Land Management:
The federal government is the largest landholder (80.4%). The USFWS manages most of the ecoregion as the Alaska Maritime National Wildlife Refuge. Private owners are the other major landholders.

Table 24. Aleutian Islands land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	<1.0%
Federal	DOD	<1.0%
Federal	USFWS	80.3%
Local	Local	<1.0%
Private		19.6%
State	DNR	<1.0%

Alaska Peninsula
Area: 15,745,664 acres (6,372,183 hectares)
Landscape:
The Alaska Peninsula and Unimak Island, the northernmost island of the Aleutian Archipelago, compose this ecoregion, which separates the Gulf of Alaska from the Bering Sea. The dominant feature of the ecoregion is the Aleutian Range, the peninsula's volcanic spine, which reaches elevations of 8,580 feet (2,600 meters) above sea level. Extensive glaciation has carved U-shaped valleys into the mountains. Because glaciers remain in the high peaks, many lakes and rivers contain suspended glacial flour. The lowlands contain numerous lakes, estuaries, and large river basins, which terminate in broad estuarine areas on the Bering Sea. On the south side, deeply cut fjords characterize the landscape. Volcanic activity and major ocean storms from the Gulf of Alaska have also shaped the topography and soils. The Alaska Peninsula is largely free of permafrost.

Alaska Peninsula volcano K. Bollinger, USFWS

Much of the shoreline along the Bering Sea is characterized by mixed sand and gravel beaches and exposed tidal mudflats. The protected bays and lagoons often have eelgrass beds, which form the food base for many fish and waterfowl. Izembek Lagoon contains one of the largest eelgrass beds in the world.

The rugged Gulf coast has intertidal and subtidal algal forests, characterized by kelp attached to rocky substrates.

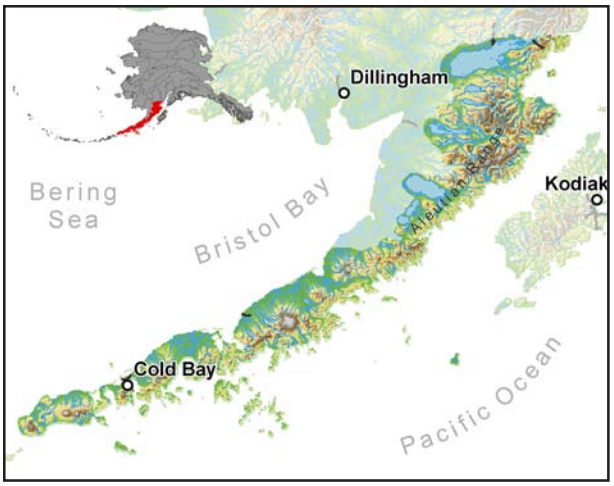


Figure 26. Alaska Peninsula ecoregion

The maritime climate affects the south slope of the Aleutian Range, with average annual precipitation ranging from 24 to 65 inches (61 to 165 centimeters), and average annual temperature ranging from 34 to 39 °F (1 to 4° C). Sea ice does not form along this coast, except in a few protected bays and inlets. On the north side, the transitional climate creates a slightly cooler, yet drier, climate.

Due to topography, past glaciation, and climate, tundra vegetation characterizes this ecoregion below the barren and ice-covered peaks. The alpine tundra is a semiarid habitat that supports low shrubs, lichens, mosses, and grasses. Moist tussock tundra of mosses, lichens, and tufted hair grass occurs in mountain valleys and along plateaus. Wet tundra is confined to low-lying coastal areas around Bristol Bay. Ponds, lakes, and wetlands cover most of these areas. High brush communities of alder and willow dominate floodplains. Black spruce occurs primarily in interior lowlands, on north-facing slopes, and on poorly drained flats. Mixed forests of black or white spruce, balsam poplar, black cottonwood, paper birch and quaking aspen can also be found.

Wildlife and Fish:

The diverse habitats of the Alaska Peninsula support a rich wildlife assemblage. Five species of Pacific salmon, steelhead, rainbow smelt, Arctic grayling, and Dolly Varden are present in the ecoregion; Dolly Varden, steelhead and salmon spawn in many of the region's streams. Healthy populations of many top-level predators live here, including brown bear, wolf, wolverine, and lynx. Several caribou herds range across the region. Moose inhabit the uplands and riparian corridors. Smaller mammals include hoary marmots and tundra hares.

Coastal wetlands, lagoons, and bays provide staging areas for large seasonal aggregations of waterfowl and shorebirds. Izembek and Moffet Lagoons host concentrations of more than 500,000 shorebirds each spring, including Marbled Godwits and Rock Sandpipers, and the majority of the eastern Pacific population of Black Brant each fall. Aleutian Terns, Arctic Warblers, Red-faced Cormorants, and Kittlitz's Murrelets breed here. The ecoregion provides prime wintering habitat for several bird species—Emperor Goose, King Eider, Steller's Eider, and McKay's Bunting.


Red-faced Cormorant
USFWS

Rookeries and haulouts for Steller sea lions are distributed primarily along the Gulf coast, while harbor seals haul out on beaches along both coastlines. Sea otters have recolonized the lower half of the peninsula, but the population has decreased dramatically in recent years. Fin, humpack, and minke whales feed in the nearshore and offshore waters in the summer. Pacific herring and halibut occur in the marine portions of the ecoregion, as do several shellfish species, such as scallops, crab, shrimp and many species of groundfish.

Several species are endemic to the islands, including tundra voles, the Amak Island Song Sparrow, the Semidi Islands Winter Wren, McKay's Bunting, and the Beringian Marbled Godwit. The globally rare Bristle-thighed Curlew also inhabits this ecoregion.

Many species that live here and in the Bering Sea have seen dramatic decreases in populations, including Steller sea lions and sea otters.

People:

Human communities occur primarily along the coast; the largest are King Cove and Sand Point. The Aleut people traditionally lived at the west end of the ecoregion and Alutiiqs to the east.

Land Use:

This ecoregion is almost entirely intact, with minimal development around several small communities. The major components of the region's economy are commercial fishing, transportation services, government jobs, Native corporations, subsistence, and tourism. Oil and gas development has been proposed for the area, and this development and its attendant infrastructure may become a reality with current trends in energy policy.

Land Management:

The federal government owns 73% of the ecoregion. The NPS manages its holdings as Katmai National Park and Preserve and Aniakchak National Monument. Boundaries of four national wildlife refuges intersect the ecoregion; Alaska Peninsula National Wildlife Refuge is the largest. A small portion of state-managed lands have been designated game refuges, critical habitat areas, state parks, and state recreation rivers. The ecoregion falls in the jurisdictions of the Kodiak Island, Lake and Peninsula, and Aleutians East boroughs.

Table 25. Alaska Peninsula land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	5.7%
Federal	NPS	29.0%
Federal	DOD	<1.0%
Federal	USFWS	38.0%
Local	Local	<1.0%
Private		11.9%
State	DNR	15.2%

Coastal Mountains Transition

Wrangell Mountains

Area: 3,537,164 acres (1,431,471 hectares)

Landscape:

The steep Wrangell Mountains, at the northwest edge of the St. Elias Mountains, are covered with ice fields and glaciers. The terrain includes shield and composite volcanoes, with elevations ranging from 2,000 to 12,800 feet (600 to 3,900 meters) or more. This exceedingly rugged terrain results from the ongoing collision of the Pacific and North American tectonic plates. Sediment-laden rivers originate in the glaciers, and small lakes remain in some high valleys where glaciers have receded. The Wrangell Mountains are highly dynamic due to active volcanism, avalanches, landslides, glaciers, and stream erosion.

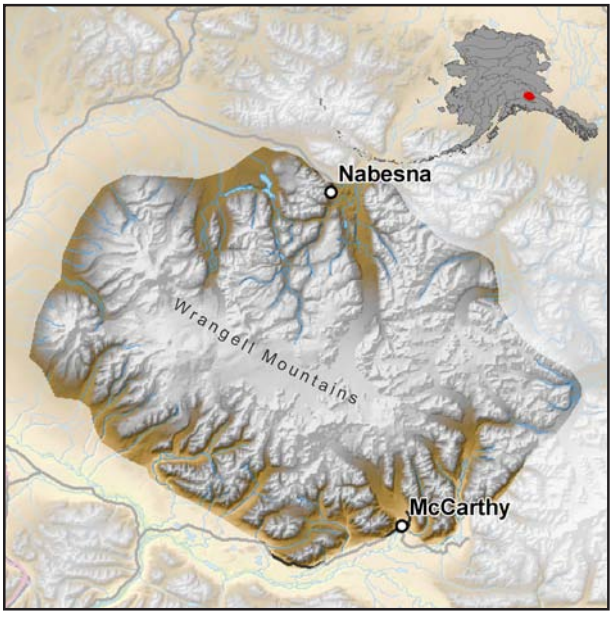


Figure 27. Wrangell Mountains ecoregion

The climate is continental, but the size of the mountains and nearness to the coast alter the moisture characteristics. The extreme height of the Wrangell Mountains allows interception of moisture-laden air from the North Pacific Ocean. The abundant maritime snows feed the extensive ice fields and glaciers. The climate becomes dry continental at lower elevations where the Wrangell Mountains abut the cold-air basin of the Copper River.

Chitistone Canyon T. Paul, ADF&G

Much of this ecoregion is dominated by rocky slopes, ice fields, and glaciers, and soils are thin and stony; thus much of the ecoregion is devoid of vegetation. Dwarf scrub communities made up of mountain avens, ericaceous shrubs, and/or willows occur on well-drained windy sites. Tall scrub communities occur on floodplains and along drainages and include species such as willow and alder with an understory of mosses, herbs and graminoid species. Broadleaf forests of quaking aspen and paper birch and needleleaf forests dominated by white spruce are found at lower elevations.

Wildlife and Fish:

This ecoregion may be best known for the prime habitat it provides for Dall sheep. Mountain goats, brown bears, caribou, wolverines, and gray wolves also occur here. Trumpeter Swan, Widgeon, and Lesser and Greater Scaup nest in river valleys. Smith's Longspurs probably breed here. Arctic grayling can be found in clear waters.

People:

Upper Tanana and Ahtna Athabascans are the traditional inhabitants of the Wrangell Mountains. McCarthy and Nabesna are the largest communities.

Land Use:

This ecoregion is almost entirely intact. Historically, mining has been the major industry. Major transportation routes to the west and north of the ecoregion promote recreation and tourism. Subsistence harvest occurs throughout the ecoregion.

Land Management:

The ecoregion is contained almost entirely within the boundaries of Wrangell-St. Elias National Park and Preserve, which is managed by the NPS.

Table 26. Wrangell Mountains land status

Owner	Agency	Percent of Ecoregion
Federal	NPS	96.0%
Federal	USFWS	4.0%

Kluane Range

Area: 5,170,434 acres (2,092,446 hectares)
Alaska 24%, Canada 76%

Kluane Range T. Paul, ADF&G

Landscape:
The Kluane Range ecoregion lies primarily in Canada. Tall mountains to the south force much of the moisture from the Pacific Ocean to drop along the coast, so the Kluane Range has a dry continental climate. Lower elevations receive 7 to 11 inches (19 to 28.5 centimeters) of precipitation a year, with possibly greater amounts at higher elevations in the northern part of the ecoregion. The mean annual temperature ranges from 27 to 23 °F (–3 to –5 °C), with cold winter temperatures of –22 °F (–30 °C) being common.

Few glaciers exist in this ecoregion, except for those extending down from the St. Elias Mountains. Permafrost is discontinuous, but ground freezing results in solifluction lobes, ice wedges, and patterned ground, especially on north-facing uplands. Due to the steepness of the slopes, the dominant disturbance processes in the mountains are scree movement, rock falls, landslides, and soil creep. On the steep mountainsides, streams are swift. In the valleys, streams meander and soil drainage is poor in valley bottoms.

Black spruce stands and sedge tussock fields dominate vegetation in the poorly drained areas. White spruce occurs on better-drained sites at lower elevations. Much of the ecoregion is above tree line, with alpine tundra and barrens of lichens, prostrate willows, and ericaceous shrubs. Shrub birch and willow are prevalent in the subalpine.

Wildlife and Fish:
Ungulates typically found in alpine areas—Dall sheep and mountain goats—are abundant in this ecoregion, with moose and caribou occurring in the valleys and subalpine areas. Predators include brown bears, wolves, and wolverines.

People:
The Alaska portion of this ecoregion has few people due to its ruggedness and location within Wrangell-St. Elias National Park. Traditionally, Athabascan people lived in the northern part of the ecoregion and Tlingit in the south.

Land Use:
The Alaska Highway runs through this ecoregion, bringing supplies and tourists from Canada to Alaska. In Alaska, this ecoregion remains intact due to its ruggedness. Historically, mining has been a major industry here, with open pit, underground, and placer operations. Coal deposits also exist but have not been developed.

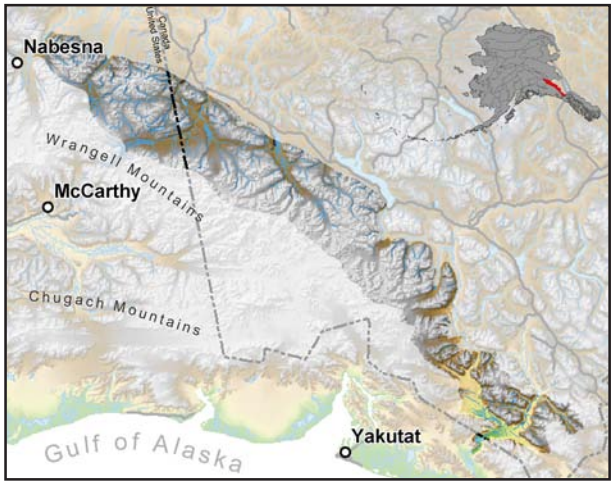


Figure 28. Kluane Range ecoregion

Land Management:
More than three-quarters of this ecoregion falls in Canada. Canada has included parts of it in Kluane National Park and Tatshenshini-Alsek Provincial Park. The Alaska portion is almost entirely part of Wrangell-St. Elias National Park and Preserve.

Table 27. Kluane Range land status

Owner	Agency	Percent of Ecoregion
Federal	NPS	99.8%
Federal	USFWS	<1.0%

Coastal Rain Forests

Kodiak Island

Area: 3,145,004 acres (1,272,766 hectares)

Landscape:

This ecoregion comprises Kodiak Island, the Trinity Islands to the south, and Afognak Island and the smaller islands to the north. These islands are a geologic extension of the Chugach Mountains on the mainland to the north. In the past, an ice sheet across Shelikof Strait connected these islands to the mainland, engulfing all but the highest points and some seaward coastlines. The retreating ice carved deep fjords into the northwest sides of Kodiak and Afognak. Smooth rounded ridges separate fjords, and high, sharp peaks to 4,470 feet (1,362 meters) punctuate the spine of Kodiak. Cirque glaciers and lakes sit in the highest valleys. Glacially fed streams run swift and for short distances.

Fireweed on Kodiak hillside L. Van Daele, ADF&G

The last Pleistocene glaciation, combined with volcanic activity in the more recent past, has dramatically impacted the vegetation of these islands. Trees did not survive the glaciation, so Sitka spruce and black cottonwood have only recently reestablished on the islands. Most of the island is covered with willow and alder thickets or wet and moist sedge meadows. Barrens or alpine tundra exist in the higher elevations.

The maritime climate exhibits little seasonal temperature variation, with an average annual temperature of 38 to 41 °F (3 to 5 °C). Clouds and fog are common, and precipitation is heavy, ranging from 50 to 70 inches (127 to 178 centimeters) annually. Storm events are the primary source of natural disturbance, though earthquakes and volcanic eruptions have played a major role on Kodiak.

Sea otter riding an ocean swell D. Menke, USFWS

Wildlife and Fish:

These islands have highly productive marine and freshwater ecosystems that support a diverse group of species. Offshore waters contain halibut, cod, sea otters, Steller sea lions, and whales. Tugidak Island supports one of the largest harbor seal haulouts in the state. Puffins, auklets, Black-legged Kittiwakes, and other seabirds nest in cliff colonies

along the rocky shorelines. Aleutian Terns and Harlequin Ducks live at the saltwater bays. A high concentration of Black Oystercatchers nests along the shoreline.

The streams and rivers here are short, but they draw abundant runs of five species of Pacific salmon. The returning salmon transport important nutrients to the freshwater and terrestrial portions of the islands and feed the largest brown bears on earth—the Kodiak brown bears. Arctic char, Dolly Varden, steelhead, and rainbow trout can also be found in the fresh waters of the islands. The other native land mammals include red fox, river otter, short-tailed weasel, little brown bat, and tundra vole. Sitka black-tailed deer, Roosevelt elk, beaver, snowshoe hare, and mountain goat were all introduced.

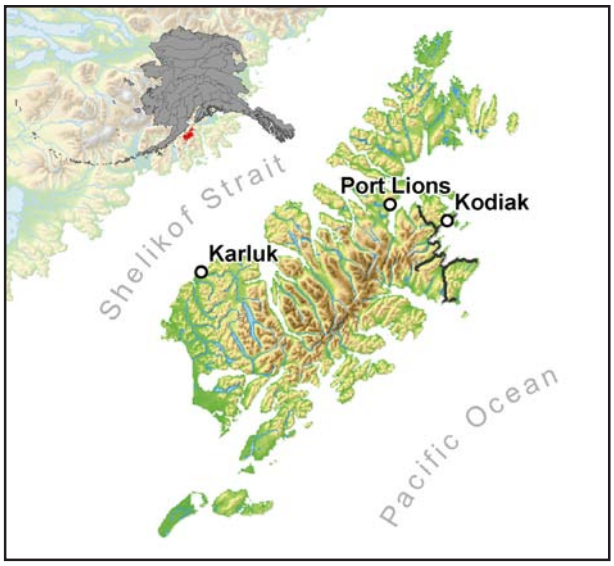


Figure 29. Kodiak Island ecoregion

People:
Human settlements largely occur along the shoreline in small villages. Kodiak is the largest city in the ecoregion. Koniag people were the original inhabitants.

Land Use:
The major economic activities related to natural resources are commercial fishing, recreation, and tourism.

Land Management:
This ecoregion has a high level of private ownership relative to the rest of the state (32%). Most of the federal government's land is managed by the USFWS as Kodiak or Alaska Maritime National Wildlife Refuges. Shuyak Island State Park and Tugidak Island Critical Habitat Area make up less than 1% of the State of Alaska's holdings. The Kodiak Island Borough has jurisdiction over this ecoregion.

Table 28. Kodiak Island land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	<1.0%
Federal	USFWS	54.4%
Local	Local	1.2%
Private		32.1%
State	DNR	11.9%

Gulf of Alaska Coast
Area: 4,346,191 acres (1,758,879 hectares)
Landscape:
The Gulf of Alaska Coast ecoregion sweeps around the north Gulf coast, including lands from the Barren Islands off the south tip of the Kenai Peninsula, around the Gulf side of the peninsula, through Prince William Sound, and along the coast to the Yakutat Forelands. The rugged, ice-covered Chugach and St. Elias Mountains form the backdrop for these lowlands. Fjords and archipelagos characterize the western coastlines, while broad coastal plains, river deltas, barrier islands, and sand tidal flats define the shoreline east of Prince William Sound. The continental ice sheet and recurring glaciers carved deep fjords that

filled with seawater when the glaciers retreated, leaving broad U-shaped valleys, and well above current sea level, hanging glaciers. In the eastern part of the ecoregion, unconsolidated glacial, alluvial, and marine deposits have been lifted by tectonics and isostatic rebound after glacial retreat to produce a relatively flat plain. Most larger streams in this ecoregion originate in glaciers; in the eastern portion, silt-laden streams are low gradient and braided, terminating in broad deltas and wetlands. The prime example of this is the Copper River Delta, which at 700,000 acres, constitutes the largest contiguous wetland on the Pacific Coast of North America. Small lakes occur high in glacially carved valleys. Glacial outburst floods, land subsidence, isostatic rebound, and localized high wind events continue to dominate and influence landscape patterns.

Orca in winter, Prince William Sound USFWS

The marine environments of this ecoregion vary, from exposed coastlines to sandy barrier islands to deep fjords. In Prince William Sound, depths reach 800 meters and icebergs float at the base of tidewater glaciers. Tides are strong, and a large amount of fresh water flows into the ocean from this section of coast.

The cool, maritime climate brings extended periods of clouds and fog with abundant precipitation. The average annual precipitation ranges from 30 to 160 inches (76–206 centimeters). Mean annual snowfall varies from 80 to 600 centimeters. The average annual temperature also has a large range: 30 to 42 °F (–1 to 6 °C). Permafrost is absent from this ecoregion.

Abundant precipitation and braided streams keep organic soils on the flat plains saturated. Wetlands in these locations support black spruce muskeg, tall scrub communities, low scrub bogs, wet graminoid herbaceous communities, and wet forb herbaceous communities. Where soils are better drained along the shoreline and on mountain slopes, a lush temperate rain forest predominated by western hemlock and Sitka spruce grows. Cottonwood and alder stands occur along river valleys throughout the ecoregion, with birch occurring in valleys only in the Kenai Peninsula.

Figure 30. Gulf of Alaska Coast ecoregion

Wildlife and Fish:

Migratory birds find important stopover, nesting and feeding areas in this ecoregion. One of the most important shorebird stopover sites in North America is the Copper River Delta. Along with nearby Controller Bay (Bering River Delta), the area supports the largest spring concentration of shorebirds in the Western Hemisphere (Bishop et al. 2000). Thirty-six species of migrating shorebirds have been counted in the Copper River Delta alone, with the two most abundant species being Dunlins and Western Sandpipers. Waterfowl, passerine, and shorebird species of importance include an extremely dense population of Trumpeter Swans; the entire breeding population of Dusky Canada Geese; a sizable population of Aleutian Terns, Red-throated Loons, Harlequin Ducks, and Black Oystercatchers; a large concentration of Surfbirds each spring; and high nesting concentrations of Bald Eagles and Marbled Murrelets. Yellow-billed Loons and many species of sea ducks winter along the coast in Prince William Sound. Parasitic Jaegers are known to breed in the area, and Long-tailed Jaegers migrate through seasonally. Sensitive landbirds in the ecoregion include Olive-sided Flycatchers and Blackpoll Warblers.

Black Oystercatcher ADF&G

This ecoregion also hosts a diverse assemblage of marine species. Steller sea lions and harbor seals haul out on its rocky shores and icebergs, and sea otters forage along its shoreline. Cetaceans include Dall's and harbor porpoises and orca, fin, humpback, and minke whales; also, an isolated pod of beluga whales has recently been documented in Disenchantment Bay. Forage species, particularly herring, capelin, and sand lance, are abundant and form the food base for most marine fishes and seabirds. Marine invertebrates and fish, such as the many species of rockfish, inhabit many different niches in the Gulf. Important nutrients from the marine environment are transported to the terrestrial and freshwater ecosystems by returning salmon and by other marine life, such as forage fish, which can be carried inland by nesting seabirds.

The many streams and rivers support mainly Dolly Varden, coastal cutthroat trout, and all five species of Pacific salmon. Two species of lamprey occur on the Yakutat Foreland. Large runs of steelhead are found in the Copper River and in the Situk River near Yakutat. Small runs of steelhead are documented in the Doame, Akwe, Italio, Yahtze, Tsiu, and Kiklukh Rivers; Steelhead Creek (Lituya Bay); Humpback Creek; Manby Stream; and the Anhau Lagoon/Lost river system. Some number of steelhead probably inhabit just about every coastal stream along the Gulf in this ecoregion (Robert Johnson, ADF&G, personal communication). Alaska blackfish are known to occur in the Tsiu River, far south of their normal range. Sticklebacks are found in the brackish water margins between the glacial lakes and ponds at the headwaters of many streams.

Terrestrial mammals include snowshoe hares, black and brown bears, moose, mountain goats, and Sitka black-tailed deer. Moose were introduced to the Copper River Delta during the 1950s, and deer were introduced to Yakutat Bay islands from Sitka about 1950; both species have flourished. Furbearers include wolves, wolverines, coyotes, foxes, lynx, martens, mink, beavers, weasels, and red squirrels. The Montague Island vole is a large subspecies of tundra vole occurring only on Montague Island. Hoary marmots occur in a patchy distribution from sea level to alpine; sightings of Alaska marmot have also been reported, but visual identifications have not been confirmed with sampling (Robert Johnson and Phil Mooney, ADF&G, personal communication).

Two amphibians are found here: Wood Frog and Western Toad. As for reptiles, several Olive Ridley Seaturtle carcasses have washed ashore in this ecoregion over the years.

People:
Tlingit people have traditionally inhabited the eastern portion of the ecoregion, while Eyak, Chugach, and Koniag people settled in different parts of the west. Mainland dwellers subsisted on salmon, eulachon, mountain goats and, in very limited locales prior to introduction, moose. Island dwellers used more marine resources, including marine mammals, shellfish, salmon, herring, halibut, seaweed, and berries. Seward and Cordova are the largest towns.

Land Use:
Timber harvest, commercial fishing, and recreation are the primary economic activities related to natural resources in the area. Mining of metallic and nonmetallic elements and energy-related commodities also occurs. This area received substantial oil exploration activities, both onshore and offshore, in the 1950s through mid 1970s.

Land Management:
This ecoregion has a relatively high level of private ownership (19.7%). The federal government owns 63%. Due to the extensive east-west reach of this ecoregion, Wrangell-St. Elias, Glacier Bay, and Kenai Fjords National Parks and Preserves, as well as Tongass and Chugach National Forests, all intersect its boundaries. Most of the federal land here is managed as Chugach National Forest. The State of Alaska has designated several critical habitat areas, marine parks, refuges, and recreation areas here.

Table 29. Gulf of Alaska Coast land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	2.1%
Federal	NPS	8.1%
Federal	USFWS	<1.0%
Federal	USFS	52.9%
Local	Local	<1.0%
Private		19.8%
State	DNR	16.4%

Chugach-St. Elias Mountains
Area: 23,013,682 acres (9,313,510 hectares)
Alaska 85.2%, Canada 14.8%

Landscape:
The Chugach and St. Elias Mountains form a crescent behind the Gulf of Alaska coastline, reaching from the southern tip of the Kenai Peninsula around to the Fairweather Range in the Alaska Panhandle. These rugged mountains contain the largest collection of ice fields and glaciers outside of the polar regions.

Scott Glacier USFWS

Elevation ranges from 330 feet to more than 14,750 feet (100 to 4,500 meters) and greater, with huge ice fields, snowfields, and glaciers surrounding steep angular peaks. Small isolated peaks called nunataks jut from the middle of broad glaciers. Some glaciers still run all the way to tidewater, but where others have receded, broad U-shaped valleys with long lakes and deep fjords were left. The deeper soils in these valleys, formed from unconsolidated morainal and fluvial deposits, insulate isolated pockets of permafrost. During the summer, meltwater from the snow and ice flows along the base of the glaciers and eventually forms swift, short streams in valleys or inundates coastal flats. Only two rivers, the Alsek and Copper, breach these mountain ranges.

Ice and snow cover much of this ecoregion, and many peaks are covered with active scree, making snow and rock avalanches common disturbances. Where thin and rocky soils exist at some high elevations, alpine tundra of sedges, grasses, and low shrubs occur. Alder shrublands grow on slopes at lower elevations. Mixed forests of mountain hemlock and Sitka spruce occur in valleys.

The climate is transitional between maritime and continental, so temperatures tend to be cold and precipitation high. Elevation, latitude and geographic position determine local conditions. On the whole, the average annual precipitation ranges widely, from 12 to 160 inches (20 to 406 centimeters), increasing with elevation and from south to north. Similarly, the average annual temperature varies greatly throughout the ecoregion, from 24 to 40 °F (–4 to 4 °C).

Wildlife and Fish:

Due to the height of these ranges and the expansiveness of the ice fields, diversity of species in this ecoregion is low. The alpine tundra supports mountain goats, Dall sheep, hoary marmots, pikas, and ptarmigan. Moose, brown bears, and black bears forage on vegetated slopes and in valley bottoms. Dolly Varden, rainbow trout, Pacific salmon and steelhead are present in many rivers and streams. These river corridors also provide passage for migratory waterfowl and passerines.

People:

This ecoregion encompasses historic regions of several Native peoples, including Tanaina and Ahtna Athabascan, Alutiiq, Eyak, and Tlingit. Valdez is the largest town.

Land Use:

This ecoregion is almost entirely intact, with minimal development around several small communities, mine sites, and a few roads. Historically, mining has been the major industry. The Alaska portion of the ecoregion contains major transportation routes, has an active recreation and tourism industry, and is near the majority of the state's population. Timber harvest occurs in the Chugach Mountains. Subsistence harvest occurs throughout the ecoregion.

Land Management:

Almost 15% of this ecoregion is in Canada. Canada has included parts of this ecoregion in Kluane National Park and Tatshenshini-Alsek Provincial Park. The federal government manages 79% of the Alaska portion; management is shared primarily by the BLM, NPS, and USFS. Due to the extensive east-west reach of this ecoregion, Wrangell-St. Elias, Glacier Bay, and Kenai Fjords National Parks and

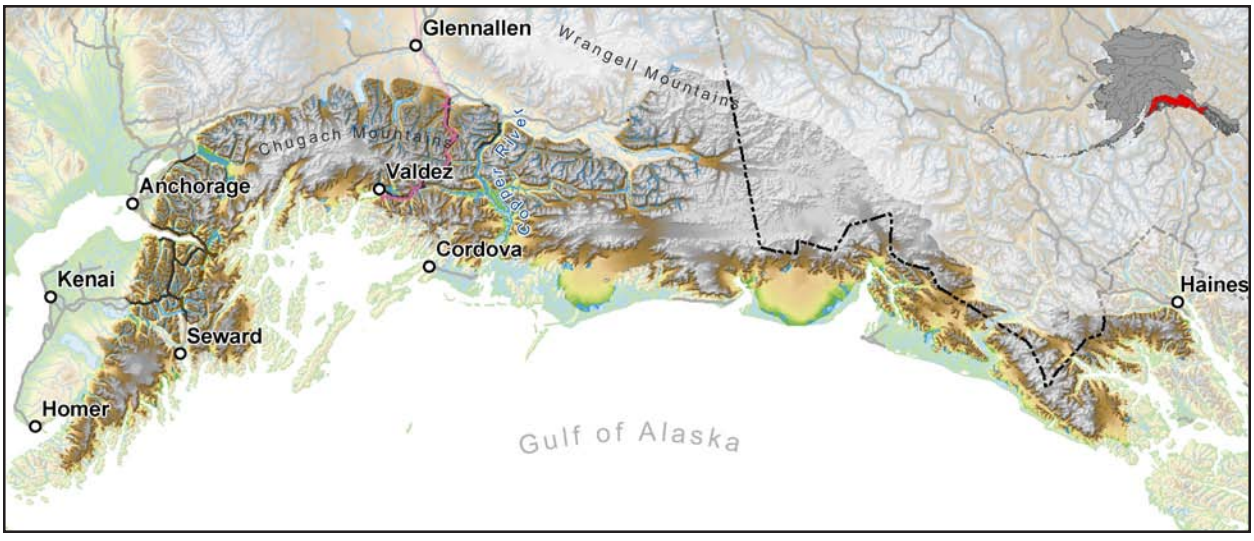


Figure 31. Chugach-St. Elias Mountains ecoregion

Preserves, as well as Tongass and Chugach National Forests, all intersect its boundaries. The State of Alaska has designated several state parks and marine parks here. The ecoregion falls in the jurisdictions of the Kenai Peninsula Borough, Matanuska-Susitna Borough, the City and Borough of Yakutat, and the Municipality of Anchorage.

Table 30. Chugach St. Elias Mountains land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	9.1%
Federal	NPS	43.6%
Federal	DOD	<1.0%
Federal	USFWS	4.1%
Federal	USFS	22.1%
Local	Local	<1.0%
Private		2.8%
State	DNR	18.1%

Northern Coast Mountains

Area: 10,448,214 acres (4,228,334 hectares)
Alaska 48.4%, Canada 51.6%

Landscape:

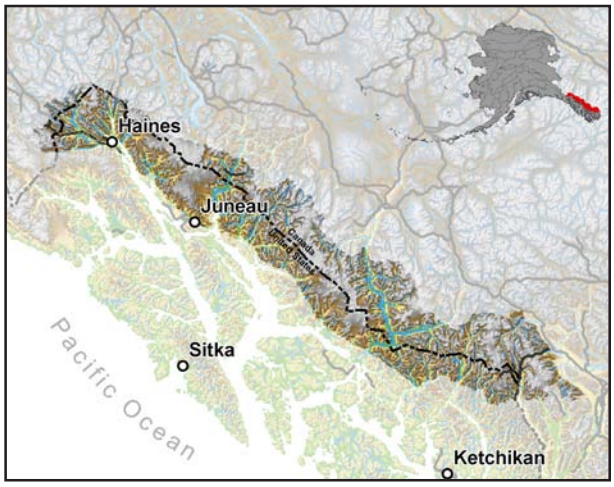


Figure 32. Northern Coast Mountains ecoregion

The Northern Coast Mountains ecoregion encompasses the rugged coastal mountain range that straddles the border between Alaska and British Columbia. During the Pleistocence, massive ice sheets covered these mountains. Today heavy winter snows still feed ice fields and glaciers in this ecoregion, but steep, rugged peaks, called nunataks, are exposed, and the retreating glaciers have left deep V-shaped and U-shaped valleys. Elevation in this ecoregion ranges from sea level to 9,840 feet (3,000 meters). During the summer, melting ice feeds swift streams and rivers to the coast. Two interior rivers pass through these mountains—the Taku and Stikine. This is also the southernmost extent of tidewater glaciers on the North American continent.

The transitional climate from maritime to continental results in large amounts of precipitation and surprisingly warm temperatures, given the extent of ice in the ecoregion. The average annual temperature ranges from 39 to 43 °F (4 to 6 °C), though frost is possible at any time of year. Precipitation varies from an average of 40 to 100 inches (102–254 centimeters). Avalanches occur often due to steep slopes and heavy snowfall.

Much of the land not under glaciers is barren rock or alpine tundra of sedges, grasses, and low shrubs. Dwarf and low scrub communities also occur, and Western hemlock, alpine fir, and Sitka spruce inhabit river valleys.

Wildlife and Fish:

This ecoregion provides habitat for a limited number of species. Mountain goats, hoary marmots, and ptarmigan live in the alpine areas. Moose, brown and black bears, coyote, lynx, wolverine, otters, beaver,

and gray wolves inhabit the ecoregion, as do birds, including Vancouver Canada Geese, Trumpeter Swans, and Golden Eagles. The streams, headwater lakes, and rivers support large runs of five Pacific salmon species, which transport important, marine-derived nutrients back to the freshwater and terrestrial ecosystems and draw brown bears and other scavengers. Other resident and anadromous fish species in these watersheds include Dolly Varden, and bull, cutthroat, rainbow, and steelhead trout. Other anadromous fish include lampreys and eulachon. Large spawning concentrations of eulachon can occur during spring near the mouths of rivers, attracting large concentrations of Bald Eagles, gulls, and Steller sea lions.

Taku Inlet in winter J. Hyde, ADF&G

People:

This ecoregion is on the eastern side of the region traditionally inhabited by the Tlingit people. Juneau is the largest community in this area and the capital of Alaska.

Land Use:

Major components of the economy are tourism and recreation, government, commercial fishing, and mining. Historically, mining has been a major industry here, with open pit, underground, and some placer operations. Today, mining exploration and production occur primarily in the Purcupine district northwest of Haines, at the Kensington gold mine north of Juneau and, in Canada, at the Tulsequah Chief mine area located adjacent to the Taku River. Limited timber harvest occurs in the Chilkat River valley. Major transportation routes to the Interior extend from Skagway and Haines, promoting recreation and tourism. Subsistence harvest occurs throughout the region. In the Canadian portion, this ecoregion is almost entirely intact, with limited development along the Haines and Skagway Highways and at small mine sites.

Land Management:

Over half (51.6%) of this ecoregion falls in Canada. British Columbia has included part of it in Atlin Provincial Park. On the Alaska side of the border, the federal government owns almost 90%. The USFS manages the majority of the Alaska portion as the Tongass National Forest. The State of Alaska owns 10%, mostly located at the northwest end of the ecoregion, and has designated a state forest and critical habitats, preserves, and parks in the ecoregion. The ecoregion falls in the jurisdictions of the Haines Borough and the City and Borough of Juneau.

Table 31. Northern Coast Mountains land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	5.7%
Federal	NPS	<1.0%
Federal	USFS	83.6%
Local	Local	<1.0%
Private		<1.0%
State	DNR	9.9%

Alexander Archipelago

Area: 13,634,178 acres (5,517,676 hectares)

Landscape:

The Alexander Archipelago is characterized by its temperate rain forests, long fjords, abundant islands, and maritime climate. Past glaciers carved deep, narrow valleys, which filled with seawater when the glaciers retreated. A few alpine glaciers still remain in broad U-shaped valleys at the heads of fjords, but most major glaciers have retreated to the adjacent ecoregions. Mainland rivers passing through this ecoregion typically start in glaciers farther inland. Elevations in this rugged ecoregion range from sea level to over 3,280 feet (1,000 meters), with rounded mountains and steep-sided angular mountains both present. Rolling moraine landforms dominate the hills and valley bottoms. Tectonic movement and the forces of rebound after glacier retreat have raised and lowered marine terraces, forming rich coastal lowlands and estuaries. The large rivers slow near the coast and end in broad deltas. Limestone underlies parts of the ecoregion, and karst topography of sinkholes, caves, underground streams, and fractured bedrock fosters high levels of endemism in plants.

Figure 33. Alexander Archipelago ecoregion

Various disturbance regimes affect the landscape—localized intense winter winds topple coastal trees, frequent landslides and avalanches denude steep mountain slopes, and flooding recurs in streams and rivers. With many narrow passages for tidewaters to transit, tidal range and currents can be extreme.

The cool maritime climate sees relatively little seasonal temperature variation, large amounts of precipitation, mostly in the form of rain, and extended periods of cloudiness and fog. Mean annual precipitation ranges from 30 to 220 inches (76 to 559 centimeters), and the mean annual temperature varies from 33 to 46 °F (1 to 8 °C). The northern part of the ecoregion experiences the drier and colder weather.

The temperate rain forest, consisting primarily of western hemlock and Sitka spruce, reaches from the coastline to the steeper, rockier mountain slopes. Salal and western red cedar are also found in the southern parts of the archipelago. Mixed conifer, black cottonwood, and lodgepole pine occur on drier sites. Where bedrock is not exposed, the forest gradually transitions to shrublands and alpine tundra of mosses and sedges. Water-tolerant plants such as sphagnum moss, sedges, bog kalmia and shore pine occur in peat lands. Poorly drained soils support open muskeg and forested wetlands.

Wildlife and Fish:

The natural fragmentation of the archipelago has influenced species distribution and promoted a level of endemism high for Alaska. Furbearers such as river otter, marten, mink, weasel, beaver and red squirrels are on the mainland and some of the islands. Brown bears roam the mainland and northern islands, including Admiralty, Baranof and Chichagof, and some adjacent smaller islands. Black bears occur on the mainland and most islands south of Frederick Sound. Gray wolves occur everywhere in the ecoregion except Admiralty, Baranof, and Chichagof Islands and a host of inconsequentially small islands. Wolves are most abundant on southern islands of the archipelago (i.e., south of Frederick Sound), where they occur as an endemic subspecies, the Alexander Archipelago wolf. As a result of Southeast Alaska's unique island biogeography and variable glaciation through time, populations of many other endemic birds, invertebrates, and mammals, including Gapper's red-backed vole, occur here.

This ecoregion is also rich—in comparison to the rest of the state—for the presence of amphibians, including Rough-skinned Newts, Northwestern Salamanders, Long-toed Salamanders, Wood Frogs,

Spotted Frogs, and Boreal Toads. When leatherback or green turtles follow the Japan or North Pacific currents north, there are also occasionally reptiles in this ecoregion. Additionally, there are five species of bats (little brown, long-legged, Keen's, silver-haired, and big brown), some of which also occur elsewhere along the Gulf of Alaska coast.

Chichagof Island T. Paul, ADF&G

The forests, estuaries, wetlands, and rivers provide rich habitat for birds and fish. Dolly Varden and cutthroat, rainbow, and steelhead trout occur here. Five species of Pacific salmon return to the streams each year, transporting important nutrients back to the freshwater and terrestrial ecosystems. Other anadromous fish include lampreys and eulachon. Spawning fish also provide rich food for bears, wolves, ravens, gulls, and the highest nest density of Bald Eagles in the world. Other birds include Vancouver Canada Geese, Trumpeter Swans, Red-tailed Hawks, Peregrine Falcons, Red-breasted Sapsuckers, Pacific-slope Flycatchers, Rufous Hummingbirds, Golden-crowned Kinglets, Varied Thrush, Red and White-winged Crossbills, Blue Grouse, ptarmigan, sandpipers, sea ducks, Black Oystercatchers, Common Murres, Tufted Puffins, Marbled Murrelets, Great Blue Herons, Western Screech-owls, and goshawks (Northern Goshawk and its subspecies, the Queen Charlotte Goshawk). Southeast Alaska encompasses the largest Marbled Murrelet population in the world; Marbled Murrelets are listed as threatened throughout their range south of Southeast Alaska.

Wood Frog USFWS

Sitka black-tailed deer are the most wide-ranging large mammal in the ecoregion. Mountain goats occur naturally on the mainland mountains and steep fjord coasts; due to introductions, they are also now found on Baranof and Revillagigedo Islands. Moose are primarily found in the mainland river valleys. Small mammals include northern water shrews, deer mice, and long-tailed voles. Humpback, gray, orca, and minke whales; Dall's and harbor porpoises; harbor seals; Steller sea lions; and sea otters inhabit the marine waters. The Forrester Island complex supports the largest Steller sea lion rookery in Alaska. Northern (pinto) abalone is abundant in the outside coastal waters.

People:

Human settlements occur almost entirely along the coastline in this ecoregion. The Tlingit and Haida Natives traditionally subsisted on salmon, moose, eulachon, mountain goat, herring, halibut, seaweed, deer, waterfowl, grouse, seals, clams, cockles, chitons, and edible plants, and many still maintain subsistence lifestyles today. The largest towns are Sitka and Ketchikan.

Land Use:

The major components of the economy are timber harvest and processing, tourism and recreation, commercial fishing, and mining. Greens Creek Mine, one of the nation's largest producers of silver, is located in this ecoregion.

Land Management:

The federal government manages 91% of this ecoregion, with management largely by the USFS. Tongass National Forest includes Misty Fjords National Monument. The NPS manages Glacier Bay National Park and Preserve. Some of the state-managed lands have been designated game refuges, critical habitat areas, state parks, marine parks, and recreation rivers, but altogether these small units make up less than 2% of

the ecoregion. The ecoregion falls in the jurisdictions of the Haines Borough, Ketchikan Gateway Borough, the City and Borough of Sitka, and the City and Borough of Juneau.

Table 32. Alexander Archipelago land status

Owner	Agency	Percent of Ecoregion
Federal	BLM	<1.0%
Federal	NPS	6.1%
Federal	USFWS	85.0%
Local	Local	<1.0%
Private		5.7%
State	DNR	3.2%

Literature Cited

Abell, R. A., D. M. Olson, E. Dinerstein, P. T. Hurley, et al. 2000. Freshwater ecoregions of North America, a conservation assessment. Island Press. Washington. 319 p.

Aderman, A., M. Hinkes, and J. Woolington. 2000. Population identity and movements of moose in the Togiak, Kulukak, and Goodnews River drainages, southwest Alaska. Progress Report 00-01. USFWS and ADF&G. Dillingham, AK. 26 p.

Alaska Department of Environmental Conservation. 1976. Coastal ecosystems of Alaska: a preliminary review of the distribution and abundance of primary producers and consumers in the marine environment / DEC, prepared by Water Programs, Environmental Analysis Section, through a reimbursable services agreement for the Alaska Coastal Management Program. Juneau, AK. 180 p.

ADF&G. 1994. ADF&G's wildlife notebook series. Juneau, AK. 1 vol.

ADF&G. 1999. Yakataga State Game Refuge Management Plan. ADF&G. Douglas, AK. 86 p.

Alaska Sea Duck Working Group. 1999. Population status and trends of sea ducks in Alaska. USFWS. Anchorage, AK. 136 p.

Alaska Shorebird Working Group. 2000. U.S. shorebird conservation plan, a conservation plan for Alaska shorebirds, version 1.0. USFWS, USGS. Anchorage, AK. 1 vol.

Banks, D., R. Hagenstein, J. Pearce, A. Springer and M. Williams, editors. 1999. Ecoregion-based conservation in the Bering Sea: identifying important areas for biodiversity conservation. The Nature Conservancy and World Wildlife Fund. Anchorage, AK.

Bishop, M. A., P. Meyers, and P. F. McNeley. 2000. A method to estimate shorebird numbers on the Copper River Delta, Alaska. Journal of Field Ornithology. 71(4): 627–637.

Boreal Partners in Flight Working Group. 1999. Landbird conservation plan for Alaska biogeographic regions, version 1.0. USFWS. Anchorage, AK. 1 vol.

Dragoo, D. E., G. V. Byrd, and D. B. Irons. 2001. Breeding status, population trends and diets of seabirds in Alaska, 2000. USFWS. Homer, AK. 77 p.

Gallant, A. L., E. F. Binnian, J. M. Omernik, and M. B. Shasby. 1995. Ecoregions of Alaska. USGS Professional Paper 1567. Available from U.S. Government Printing Office, Washington. 73 p.

Literature Cited (continued)

Gibson, D. D. and B. Kessel. 1989. Geographic variation in the Marbled Godwit and description of an Alaskan subspecies. Condor 91:436–443.

Kruger, L. E. and C. B. Tyler. 1995. Management needs assessment for the Copper River Delta, Alaska. Gen. Tech. Report. PNW-GTR-356. USFS, Pacific Northwest Research Station. Portland, OR. 45 p.

Mac, M. J., P. A. Opler, C. E. Puckett Haecker, and P. D. Doran. 1998. Status and trends of the nation's biological resources. U.S. Department of the Interior, USGS. Reston, VA. 2 vols, 964 pp.

McNab, H. and P. E. Avers. 1994. Ecological subregions of the United States: Section Descriptions. USFS. Washington. Prepared in cooperation with the Regional Compilers and the ECOMAP Team of the Forest Service. WO-WSA-5.

Nowacki, G., P. Spencer, M. Fleming, T. Brock, and T. Jorgenson. 2001. Ecoregions of Alaska: 2001. USGS Open-File Report 02-297 (map).

Oswald, E. T. and J. P. Senyk. 1977. Ecoregions of Yukon Territory. Fisheries and Environment Canada, Canadian Forestry Service. Victoria, British Columbia. 115 p.

Ott, R. 1998. Alaska's Copper River Delta. Artists for Nature Foundation. The University of Washington Press. 160 p.

Ricketts, T. H., E. Dinerstein, D. M. Olson, C. J. Loucks, et al. 1999. Terrestrial ecoregions of North America, a conservation assessment. Island Press, Washington. 485 p.

Selkregg, L. 1976. Alaska regional profiles: southwest region. Arctic Environmental Information and Data Center, Anchorage, AK. 313 p.

Wynne, K. 1997. Guide to marine mammals of Alaska. Alaska Sea Grant College Program, University of Alaska Fairbanks. 76 p.