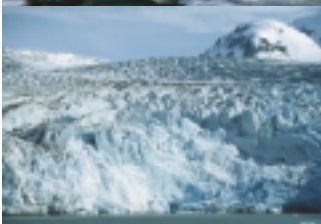


A Diversity of Ecosystems

by Richard Whiteford



The U.S. Fish and Wildlife Service (FWS) has initiated an ecosystem approach to protecting species and habitats. In Alaska, the ecosystem approach is essential to allow enough room for some species to migrate beyond their presently established ranges to compensate for climate and other environmental changes. Unbroken corridors are needed to prevent disruption of the food supply and provide the elbow-room needed for migration.

For its purposes, the FWS has identified 10 ecosystems in Alaska:

1) The **arctic ecosystem** begins at Point Barrow, the northernmost point of land in the United States, and extends south for around 250 miles (400 kilometers) to the Brooks Range. It reaches from the Arctic Ocean on its western border to Canada's Yukon Territory to the east. The flat lowlands of the North Slope are shrouded in thick permafrost and do not drain well, which causes the formation of many thaw lakes in summer. Foothills separating the flat lowlands from the Brooks Range are covered with tussock sedges and low shrubs. At higher elevations, the vegetation includes such trees as white spruce (*Picea glauca*) and balsam poplar (*Populus balsamifera*), with an understory of willows (*Salix alaxensis*, *S. planifolia*, and *S. lanata*). The arctic ecosystem supports polar bears (*Ursus maritimus*), arctic foxes (*Alopex lagopus*), musk oxen (*Ovibos moschatus*), waterfowl, and small mammals.

2) The **interior ecosystem** roughly spans from the Brooks Range south to the crescent-shaped Alaska Mountain Range and west from the Kaiyuh Mountains to the Canadian border. The interior's rolling forested lowlands and uplands are dominated mostly by white spruce on the south slopes and black spruce (*Picea mariana*) in the low

flood plains and higher uplands. Such mammals as gray wolves (*Canis lupus*), wolverines (*Gulo gulo*), and moose (*Alces alces*) are found here.

One division of the interior ecosystem, the **interior highlands**, has many rugged mountains topped with majestic, snow-capped peaks. Dwarf scrub communities of mountain-avens (herbs in the rose family), such as *Dryas octopetala*, *D. integrifolia*, and *D. drummondii*, dominate this inhospitable environment. Dall sheep (*Ovis dalli*), moose, caribou (*Rangifer tarandus*), and ground squirrels are found in this region.

In the **interior bottomlands**, meandering streams feed numerous oxbow and thaw lakes. Needle leaf, broadleaf, and mixed forests are the norm. It is prime habitat for many mammals, including moose, caribou, beavers (*Castor canadensis*), and muskrats (*Ondatra zibethicus*). It is also a haven for ducks, geese, salmon, and other fish. The bulk of Alaska's human population resides in this region.

3) The **south-central ecosystem** extends southward from Cook Inlet and the Chugach Mountains. This area is covered with rugged mountains, ice fields, and glaciers. Moose, mountain goats (*Oreamnos americanus*), and small mammals live in the mountains, while salmon and freshwater fishes inhabit the streams.

4) The **southeast ecosystem** reaches down the Alaskan panhandle to Queen Charlotte Island. A cluster of about 1,100 islands, the tops of a submerged mountain range, is known as the Alexander Archipelago. This region includes the Tongass National Forest, the largest national forest in the United States. It consists of deep narrow bays, a ragged coastline, high sea cliffs, and a wet, somewhat milder climate. Western

hemlock (*Tsuga heterophylla*) and Sitka spruce (*Picea sitchensis*) blanket the shore line and cliffs, providing habitat for moose, mountain goats, and black-tailed deer (*Odocoileus hemionus*), while the coastline and rivers teem with waterfowl and salmon.

5) The **Yukon-Kuskokwim Delta ecosystem**, a flat wetland region pocked with peat mounds and sand dunes, is dominated by the dwarf scrub crowberry (*Empetrum nigrum*). It stretches from the Norton Sound south to the Killbuck Mountains. In the north, the Yukon River flows into the Yukon Delta along the Bering Sea, and in the south, the Kuskokwim River drains the Killbuck Mountains. The Yukon-Kuskokwim Delta ecosystem is important habitat for more than 1.75 million geese and swans, 2 million ducks, and more than 100 million shore and water birds. The land supports moose, caribou, grizzly bears (*Ursus arctos*), black bears (*Ursus americanus*), and gray wolves.

6) The **Northwest ecosystem** consists largely of the Seward Peninsula. A narrow strip of coastal lowlands gives way to the rolling hills of the uplands, which are interspersed with isolated, rugged mountains. Very cold year-round, this area is thinly inhabited by humans. It supports such mammals as caribou, seals, rabbits, squirrels, muskrats, and beavers. Along the coast, ice fishing and seal hunting are means of subsistence for the native people.

7-10) Four marine ecosystems arc around Alaska. To the north is the **Beaufort/Chukchi Sea**, to the southwest are the **Bering Sea/Aleutian Islands** and the **Bristol Bay/Kodiak ecosystems**, and to the south is the **North Pacific/Gulf of Alaska ecosystem**. The Beaufort and Chukchi Seas are a part of the Arctic Ocean and are frozen much of the year. Bristol Bay lies south of the Bering Sea and is flanked on the south by the Aleutian Islands. Many whales on the Endangered Species list inhabit these marine ecosystems, including the northern right

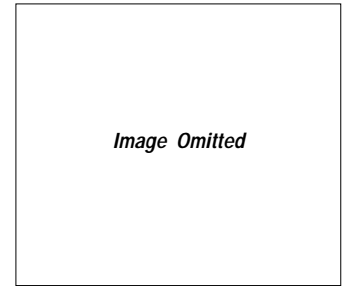
whale (*Balaena glacialis*), bowhead whale (*Balaena mysticetus*), and humpback whale (*Megaptera novaeangliae*), as well as one marine reptile, the leatherback sea turtle (*Dermochelys coriacea*). Walrus (*Odobenus rosmarus*) are also found.

The Bristol Bay-Kodiak ecosystem includes the Alaska Peninsula and the watersheds of the Kvichak and Nushagak Rivers. This 100-mile (161-km) long by 40-mile (65-km) wide island is dominated in the north by spruce forests, while the interior is dense with lush vegetation, and the southwest is covered with grassy hummocks. Summers are cool and wet, and winters here have a moderate maritime climate. Kodiak's native mammals are the Kodiak (or brown) bear, northern river otter (*Lontra canadensis*), short-tailed weasel (*Mustela erminea*), little brown bat (*Myotis lucifugus*), and tundra vole (*Microtus oeconomus*). Millions of seabirds such as cormorants, gulls, murre, and puffins inhabit the bays, inlets, and shores.

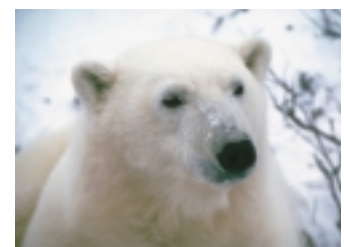
The rugged volcanic arc of the Aleutian Islands reaches 1,100 miles (1,800 km) westward from Alaska's mainland, well past the International Date Line. The islands separate the Bering Sea from the Pacific Ocean. Short-tailed albatrosses (*Phoebastria albatrus*) can be found here in the summer, feeding off the rich waters. Steller sea lions (*Eumetopias jubatus*), sea otters (*Enhydra lutris*), and northern fur seals (*Callorhinus ursinus*) live along the coast. Seabirds can be found by the millions.

Cooperative partnerships among the FWS and other public and private concerns are critical to protecting Alaska's rich terrestrial and marine diversity. With so many widely wandering species, the ecosystem approach is the best way to manage Alaska's wildlife.

Richard Whiteford is an environmental journalist and a member of the Society of Conservation Biology.



When it comes to saving natural diversity, many say Alaska is America's last chance to do things right the first time. Only about one percent of Alaska's natural areas have been significantly altered by human activity so far, yet less than 12 percent of its various ecosystems are in highly protected areas. Given the speed and magnitude of ecological changes in the lower 48 States over the past century, Americans cannot afford to be complacent about Alaska.



Opposite page, top to bottom: Denali National Park, Dall sheep, bald eagle, forest, humpback whale, coastal glacier, river otter
Corel Corp. photos

Above, top to bottom: The endangered Aleutian shield-fern (Polystichum aleuticum), an island in the Aleutian chain, polar bear
Photos by Virginia Moran, Karen Boylan/USFWS, and Corel Corp., respectively