



The National Impact Assessment Process

A national assessment on the potential consequences of climate variability and change over time spans of 20–30 and 100 years began in 1997. The assessment is focused on both vulnerabilities and opportunities for the U.S., but recognizes that many of the issues of interest within the Nation have international aspects as well. A National Synthesis Report will draw on the results of 20 regional assessments that have investigated potential consequences of climate variability and change in different parts of the country. Alaska is one of these regions. The conclusions drawn from this national assessment are part of the U.S. contributions to the Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report.

Goals of the Regional Impact Assessment

Regional assessments of impacts due to global climate change have become a high priority on the international research agenda. The International Geosphere-Biosphere Programme provides a good rationale for this regional emphasis (IGBP, 1991): “First, the research needed to

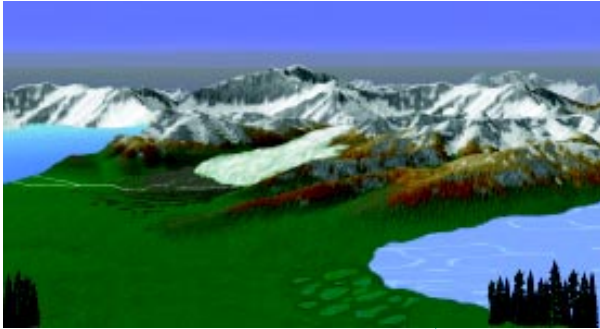
I. Introduction



develop a global perspective demands that regional differences in characteristics such as biogeography and climate be taken into consideration. Second, the goal of a practical predictive capability for global environmental change makes it necessary that this capacity be developed for distinct subcontinental regions. Global change predictions will be of greatest value to decision makers on a regional basis, and if scientists from throughout the region are involved from the start in the processes through which they are generated.”

The Alaska regional impact assessment has been guided by the questions posed by the national assessment, as follows:

- What are the current environmental stresses and issues that will form a backdrop for potential additional impacts of climate change?
- How might climate variability and change exacerbate or ameliorate existing problems?
- What are the priority research and information needs that can better prepare policy makers to reach wise decisions related to climate variability and change?



Computer-generated composite of Alaskan landscape features

- What coping options exist that can build resilience to current environmental stresses, and also possibly lessen the impacts of climate change?

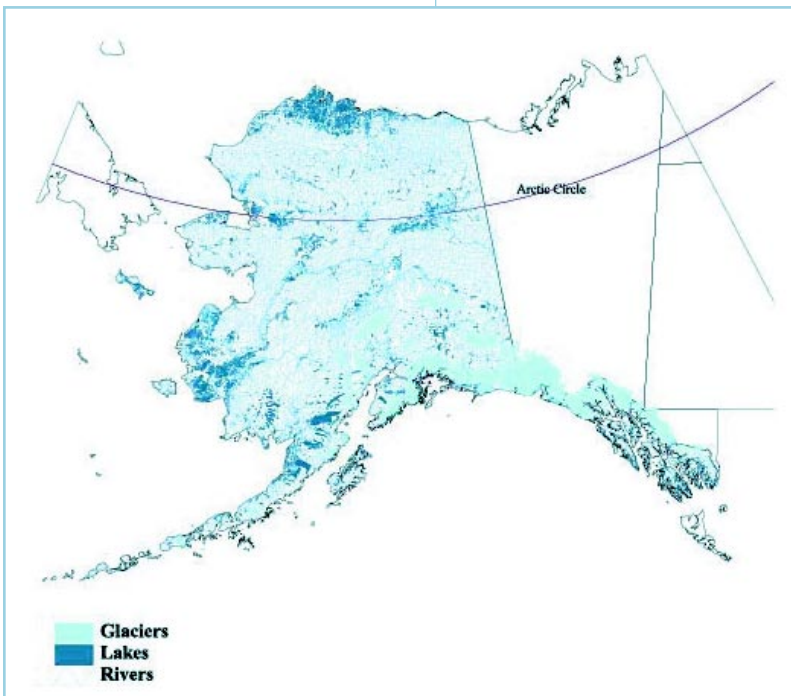
Description of the Region

The Alaska region, which includes the Bering Sea, is the largest of all the regions considered under a National Assessment Synthesis conducted for the entire United States. It spans about 60 degrees of longitude and 20 degrees of latitude. Alaska is sharply divided by mountain ranges into coastal and interior regions. With a longer coastline than all other 49 states combined, there are pronounced differences between the coastal regions themselves and the interior. Alaska's climate ranges from a mild and wet maritime climate in the south to the extreme cold polar desert climate in the north. The state contains the fourth largest glaciated area in the world and Alaska has more than 40 percent of the nation's surface-water resources (Lamke, 1986) (Fig. 2). Approximately 170 million acres of Alaska's 367 million acres are covered by wetlands; this is more than the total wetland area in the other 49 states (Dahl, 1990). Other natural resources include large numbers of wildlife, the nation's largest fishery in the Bering Sea, substantial petroleum resources, gold and other minerals, and the nation's largest areas set aside in parks, reserves and wildlife refuges. Alaska has a large Native population, which still practices traditional subsistence activities.

Fig. 2. Rivers, lakes and glaciers of Alaska (Domaratz, Michael A., Cheryl A. Hallam, Warren E. Schmidt, and Hugh W. Calkins. U.S. Geological Survey Circular 895, Digital Line Graphs from 1:2,000,000-Scale Maps, USGS Digital Cartographic Data Standards, 1982.)

Alaska's Economy

Along the arctic coast Alaska's oil fields produce 20 percent of domestic petroleum needs. In southeast Alaska and along the Bering Sea coast, fisheries predominate in economic activities and the Alaskan fisheries are the largest in the nation. The fisheries resources of the Bering Sea are also exploited by many other nations. Timber harvesting occurs mostly in coastal areas in southeast Alaska. Mining for gold and other metals exists throughout the state. Some agriculture and forestry takes place in the interior. While vast expanses of boreal forest cover the interior, relatively little of it produces enough wood volume to support a commercial forest industry. Tourism is an important economic activity and the tourism industry covers all areas of the state. Diverse forms of subsistence livelihood practiced primarily in Native communities throughout the state depend on fish, marine mammals, and wildlife—including partly commercial reindeer herding—and play a social and cultural role vastly greater than their contribution to monetary incomes.



The percent of total income contributed by various sectors in Alaska in 1995 is shown in

Table 1. These percentages have not changed much since 1995 (Goldsmith, 1997; percentages rounded off).

Alaska's Ecosystems

Alaskan ecosystem types (Fig. 3) correspond to climatic regimes that range from maritime wet and cool climates in the south to a cold continental climate in the interior and an extreme arctic cold and arid climate along the arctic coast. This has produced rainforest in the southeast and south-central coastal regions, shifting to boreal forest in the south-central region and through the interior, and arctic tundra in the Alaskan Peninsula and Aleutians, the west coast and Seward Peninsula, and north of the Brooks Range. A small quantity of land (about 30,000 acres or 12,000 hectares) is in agricultural production in the Tanana and Matanuska valleys and on the Kenai Peninsula. Larger areas are used for pasture (185,000 acres or 75,000 hectares) and reindeer grazing (about 12 million acres or 5 million hectares, mostly on the Seward Peninsula). Large tracts of land, about 60% of the surface area of the state, are set aside in national parks, wilderness areas and nature preserves. The marine ecosystems of the Bering Sea and Gulf of Alaska are among the most productive in the world and are highly susceptible to climate change.

Alaska's Climate

Alaska has very large climatic differences among its various regions because it spans 20 degrees of latitude and about 60 degrees of longitude. The range of climatic conditions rivals that of the 48 contiguous states as a whole. In the southern coastal margin, including the panhandle and Aleutians, an extreme maritime climate predominates, with heavy precipitation—up to 100 in (250 cm) per year—that leads to the formation of large glaciers. The interior has the most continental climate with yearly precipitation values of 8–16 in (20–40 cm) and normal January temperatures around -13°F (-25°C) in January and 59°F (15°C) in July. The region north of the Brooks Range is semi-arid with precipitation of less than 8 in (20 cm) per year and a mean July temperature of about 39°F (4°C). Winters are long with snow on the ground for about nine months. Because of the low annual mean temperatures throughout most of the state there are widespread areas of permafrost (Fig. 4), perpetually frozen ground, and extensive sea ice along Alaska's western and northern coasts.

Historical Climate Trends

Alaska, like other regions, has seen major climatic changes in the past that have led to great changes of the environment (Fig. 5). In

Table 1. Percent of total income from various sectors in Alaska for 1995

Oil (taxes, production):	35%
Federal civilian:	28%
Federal military:	10%
Seafood:	7%
Permanent fund:	6%
Tourism:	5%
Misc. Income:	<5%
Timber:	2%
Mining:	2%
Agriculture:	0.1%

