



Regional Highlights from Global Climate Change Impacts in the United States

www.globalchange.gov/usimpacts

Alaska

Over the past 50 years, Alaska has warmed at more than twice the rate of the rest of the United States' average. Its annual average temperature has increased 3.4°F, while winters have warmed by 6.3°F. The higher temperatures are already causing earlier spring snowmelt, reduced sea ice, widespread glacier retreat, and permafrost warming. The observed changes are consistent with climate model projections of greater warming over Alaska, especially in winter, as compared to the rest of the country. Climate models also project increases in precipitation over Alaska. Simultaneous increases in evaporation due to higher air temperatures, however, are expected to lead to drier conditions overall, with reduced soil moisture. Average annual temperatures are projected to rise between 5 and 13°F by late this century, with lower emissions scenarios yielding increases at the lower end of this range and higher emissions yielding increases near the higher end of the range.

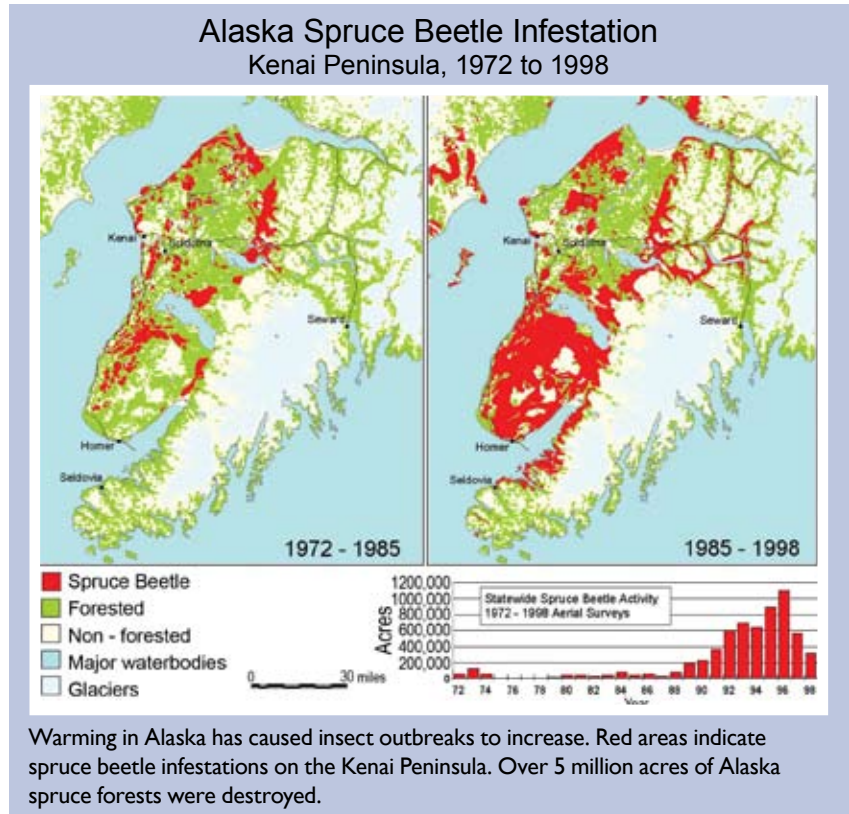
Key Issues

Longer summers and higher temperatures are causing drier conditions, even in the absence of strong trends in precipitation.

Between 1970 and 2000, the snow-free season increased by about 10 days across Alaska, primarily due to earlier snowmelt in the spring. A longer growing season has potential benefits, such as a longer season for summer tourism and agriculture. However, the white spruce forests in Alaska's interior are experiencing declining growth due to drought stress and continued warming could lead to widespread death of trees. The decreased soil moisture also suggests that agriculture might not benefit from the longer growing season.

Insect outbreaks and wildfires are increasing with warming.

During the 1990s, south-central Alaska experienced the largest outbreak of spruce beetles in the world as rising temperatures allowed the beetle to survive the winter and to complete its life cycle in half the usual time. Drought-stressed trees were unable to fight off the infestation. Fires are also increasing. By the end of this century, the area burned in Alaska is projected to triple under a moderate greenhouse gas emissions scenario and to quadruple under a higher emissions scenario.



Warming in Alaska has caused insect outbreaks to increase. Red areas indicate spruce beetle infestations on the Kenai Peninsula. Over 5 million acres of Alaska spruce forests were destroyed.

Lakes are declining in area.

Across the southern two-thirds of Alaska, the area of closed-basin lakes (lakes without stream inputs or outputs) has decreased over the past 50 years. This is likely due to the greater evaporation and thawing of permafrost that result from warming. These wetlands provide breeding habitat for millions of waterfowl and shorebirds and are important hunting and fishing grounds for Native People. A continued decline in the area of surface water would present challenges for ecosystems, natural resources, and the people who depend upon them.

Coastal storms increase risks to villages and fishing fleets.

Alaska has more coastline than the other 49 states combined. These coastlines are increasingly threatened by a combination of losing their protective sea ice buffer, increasing storm activity, and thawing coastal permafrost. The ground beneath some communities is literally crumbling into the sea. The rate of erosion along Alaska's northeastern coastline has doubled over the past 50 years.

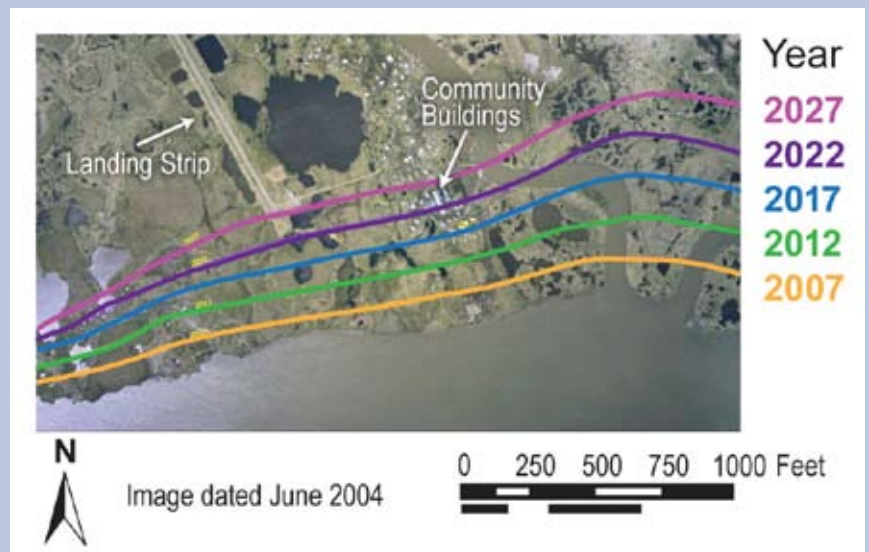
Displacement of marine species will affect key fisheries.

Climate change is altering marine ecosystems in ways that affect commercial fisheries. The world's largest single fishery is the Bering Sea pollock fishery, which has undergone major declines in recent years. Air and sea temperatures have increased, and sea ice has declined in this region.

Thawing permafrost damages roads, runways, water and sewer systems, and other infrastructure.

As permafrost thaws, the land can sink and collapse, damaging forests, homes, and infrastructure. Economists estimate that thawing permafrost will add billions of dollars in repair costs to public infrastructure (costs to private property have not yet been estimated).

Projected Coastal Erosion, 2007 to 2027
Newtok, western Alaska



Many of Alaska's coastlines are eroding rapidly; the disappearance of coastal land is forcing communities to relocate. The 2007 line on the image indicates where Newtok, Alaska's shoreline had eroded to by 2007. The other lines are projected assuming a conservative erosion rate of 36 to 83 feet per year; however, Newtok residents reported a July 2003 erosion rate of 110 feet per year.

The full report, including references for the material above, can be found online at:
www.globalchange.gov/usimpacts

It is published by Cambridge University Press, with hard copies available at: www.cambridge.org
ISBN 978-0-521-14407-0