

Assessing the Consequences of Climate Change for Alaska and the Bering Sea Region

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Cover photos

Upper left: Fishing vessel in Prince William Sound; **Upper right:** Forest near Prince William Sound; **Lower left:** Trans Alaska pipeline north of Atigun Pass (all by D. Coccia, Geophysical Institute, University of Alaska Fairbanks); **Lower right:** Fish rack at fish camp (NPS archive photo, Western Arctic Park Cluster); **Center:** Nesting murre (National Fish & Wildlife Service)

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Preface

The objectives of this interdisciplinary workshop were to assess the nature and magnitude of changes in the Alaska/Bering Sea region as a consequence of climate change; predict/assess the consequences of these changes on the physical, biological and socio-economic systems in the region; determine the cumulative impacts of these changes on the region, including assessment of past impacts; and begin to investigate possible policy options to mitigate these cumulative impacts.

The assessment covered climate-related consequences on the following sectors:

Fisheries

Effects on fisheries due to climate change have been observed in Alaska where a major international fishery exists in the Bering Sea. These effects, which resulted in increases in catches in some areas and decreases in others, need to be assessed. This assessment needs to also consider fisheries policies, market prices, changes in technology for fish harvesting and utilization, changes in fisheries management and changes in societal needs and preferences.

Forestry

The effects of climate change observed on the Alaska boreal forests include unprecedented insect outbreaks, increased fire frequency and intensity, and the effects of permafrost thawing in changing the landscape. The northward migration of the forests and a lengthened growing season are factors that will become more important to both forestry and agriculture as the climate continues to become warmer.

Infrastructure

Permafrost thawing is occurring throughout Alaska and is already adversely affecting roads, houses, airfields and other infrastructure, as well as slowly changing the boreal forest to bogs and grasslands. As the climate continues to warm, more permafrost will thaw and snow and ice will melt. The resulting impacts will become more serious and will require further monitoring, modeling, and assessment to determine the rates of change, the spatial extent of thawing and melting, and its effects.

Subsistence

Changes in the high-latitude environment, including a reduced sea ice cover, changes in ocean temperatures and snow cover on land, and thawing of permafrost and coastal erosion have influenced the subsistence hunting and fishing practices of Alaska's Native population. The abundance and distribution of fish, marine and land mammals and reduced or altered access to these food resources are all critical factors in assessing future consequences for Alaska Natives.

Wildlife

Seabird populations in Alaska are larger and more diverse than in any similar region in the Northern Hemisphere. They are good indicators of healthy marine ecosystems and can be useful in measuring change in the marine environment. Recent marked shifts in climate have affected entire ecosystems and the continuing study of seabirds is expected to provide vital clues on the health of these ecosystems.

This workshop was part of the U.S. Global Change Research Program's National Assessment of the Potential Consequences of Climate Variability and Change. The Alaska regional assessment was

originally begun under the auspices of the International Arctic Science Committee in 1995. This was the fourth annual workshop on this topic held in Alaska. Future workshops are planned to update our assessment of climate change impacts as more information and data become available. The reports published to date are:

- 1996. Preparing for an Uncertain Future: Impacts of Short- and Long-Term Climate Change in Alaska. P. Anderson and G. Weller, eds. Center for Global Change and Arctic System Research, University of Alaska Fairbanks, Fairbanks, Alaska, 43 pages.
- 1997. The Impacts of Global Climate Change in the Bering Sea Region. An Assessment Conducted by the International Arctic Science Committee under its Bering Sea Impacts Study (BESIS). Results of a Workshop at Girdwood, Alaska, September 1996. Center for Global Change and Arctic System Research, University of Alaska Fairbanks, Fairbanks, Alaska, 40 pages.
- 1998. Implications of Global Change in Alaska and the Bering Sea Region. Proceedings of a Workshop at the University of Alaska Fairbanks on 3–6 June 1997. G. Weller and P.A. Anderson, eds. Center for Global Change and Arctic System Research, University of Alaska Fairbanks, Fairbanks, Alaska, 152 pages plus appendices.
- 1999. Assessing the Consequences of Climate Change for Alaska and the Bering Sea Region. Proceedings of a Workshop at the University of Alaska Fairbanks, 29–30 October 1998. G. Weller and P.A. Anderson, eds. Center for Global Change and Arctic System Research, University of Alaska Fairbanks, Fairbanks, Alaska, 94 pages (this volume).

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