Resource Brief
Alaska

National Park Service
U.S. Department of the Interior

Inventory and Monitoring Program
Alaska Region

Weather and Climate Change

Background

Accurate data on climate, or the long-term statistical expression of short-term weather, is at the foundation of all monitoring efforts and scientific research conducted within Alaska's national parks. Average Arctic temperatures have been increasing at almost twice the rate of the rest of the world, and effects are evident in the decrease in extent and thickness of Arctic sea ice, permafrost thawing, coastal erosion, shrinking glaciers and altered distribution of species (IPCC 2007). This further raises the importance of high quality weather and climate data in understanding and responding to the current and potential effects of climate change. *The Alaska Region has been identified as the high latitude representative in the National Park Service's Climate Change Response Strategy and is currently implementing enhancements to several monitoring efforts within the Inventory and Monitoring Program.*

In Alaska, weather and climate data has historically been recorded in easily accessible, low elevation areas. The 54 million acres of national parks in Alaska include areas with diverse landforms and localized weather patterns. A large percentage of the parklands are also located in remote, roadless areas. The Inventory and Monitoring Program is currently collecting data at remote area weather stations (RAWS) located throughout national parks in Alaska and plans to install additional stations in representative areas throughout the parks.

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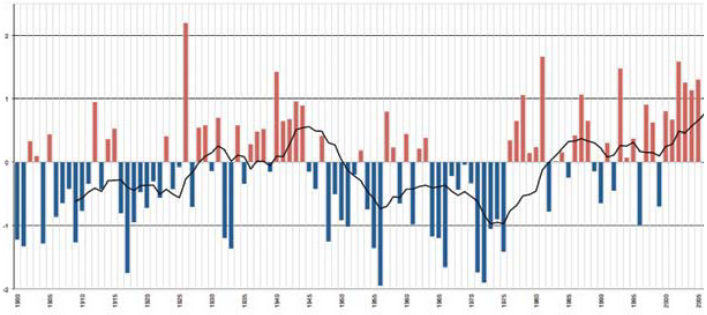


Mean annual temperature departure for Central Alaska; blue bars are negative and red bars are positive departures. The phase shift in the PDO is apparent as it shifts from a cool to warm phase in 1976.

photo: Nichole Andler/BELA/NPS

The National Park Service is monitoring weather in many remote, roadless areas never before monitored, including Bering Land Bridge National Preserve.

Monitoring

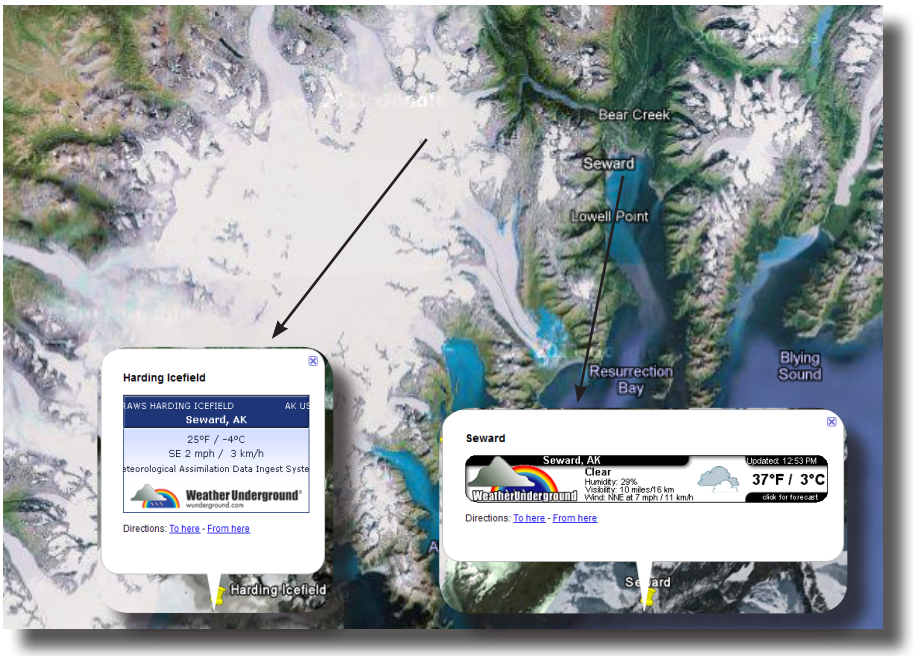
The NPS Inventory & Monitoring program has installed 28 new climate stations over the past eight years, with at least 12 more planned for installation, to understand the climate patterns and trends within Alaska's national parks. Prior to the recent installations, the observational record for the state was almost exclusively from low elevations, near populated areas and along the coasts and river systems, and therefore was not representative of the vast upland areas that characterize parks within Alaska. The NPS lands in Alaska encompass most of the mountainous areas of the state and provide a great opportunity to fill in data gaps in the climate record.

The Inventory and Monitoring Networks within Alaska share common goals and objectives to meet this challenge: identify long and short term trends by monitoring and recording weather conditions at representative locations in the parks, a commitment to making these data available to everyone and utilizing these data for larger-scale climate monitoring and modeling efforts.

The focus for the Central and Southwest Alaska Networks over

photo: Pam Sousanes/NPS

A researcher with the National Park Service conducts routine maintenance on a remote area weather station located in Yukon-Charley Rivers National Preserve.



Real-time weather data for stations located within the Southwest Alaska Network are available online through Google Earth. The example above shows data taken at approximately 1 p.m. on March 9, 2011. Local weather at Seward (37 ° F), which is located at an elevation of 83 ft, differed significantly from weather at Harding Ice Field (25 °F), which is located at 4296 ft. The two remote weather stations are located approximately 12 miles from each other.

the next few years is to maintain the integrity of the new stations, promote the use of data for ecological and climatic analysis, improve data query tools and integrate the NPS climate products with other climate change research and monitoring efforts. The NPS recently partnered with the PRISM (Parameter-elevation Regressions on Independent Slopes Model) Climate Group at Oregon State University to update the gridded monthly and annual precipitation and temperature data sets for Alaska for the 1971 - 2000 climate period. These maps help estimate variations in temperature and precipitation around existing climate stations and will be used to update the projected climate change scenarios for the national park units in the state.

The Arctic and Southeast Alaska Networks are currently focused on developing a detailed climate monitoring plan using the foundation established by the Central and Southwest Alaska Networks. This will result in installations of new stations in areas where data is critical, including the vast upland areas of the Arctic parks and the coastal areas in Southeast Alaska.

Putting it All Together

The climate monitoring program now has products available for use in understanding climate and ecosystem change, such as publicly accessible data and data analysis tools, climate summary maps and reports summarizing annual climate factors and long-term trends (Davey et al. 2006, Keen 2008). Climate data can be used in the analysis of other vital signs to better understand the effects of climate change, including the four vital signs monitoring efforts being enhanced as part of the National Park Service's Climate Change Response Strategy in Alaska: glaciers, permafrost, seasonal processes and alpine vegetation.

Climate Monitoring in Alaska

Climate is considered the most important broad-scale factor influencing ecosystems. Because global climate models indicate that climate change and variability will be greatest at high latitudes, climate monitoring will be critical to understanding the changing conditions of park ecosystems. Potential effects in national parks include a reduced snowpack, earlier ice break-up on lakes, warmer winters and wetter summers. These changes may affect the distribution, abundance, growth and productivity of plants and animals. The NPS has invested substantial time and effort to develop an effective and robust climate monitoring program that will answer critical questions about how the trends in temperature and precipitation are changing in Alaska national parks. These data will make a critical difference in our understanding of climate trends in Alaska over the next 50 years.

Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007 Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.) Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Davey, C.A., K.T. Redmond, and D.B. Simeral. 2006. Weather and Climate Inventory, National Park Service, Arctic Network. Natural Resources Technical Report NPS/ARCN/NRTR -2006/005.

Keen, R.A. 2008. Climate Data Analysis of Existing Weather Stations in and around the Central Alaska Network (CAKN). Technical Report written for the National Park Service Central Alaska Network. Denali Park, AK.

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