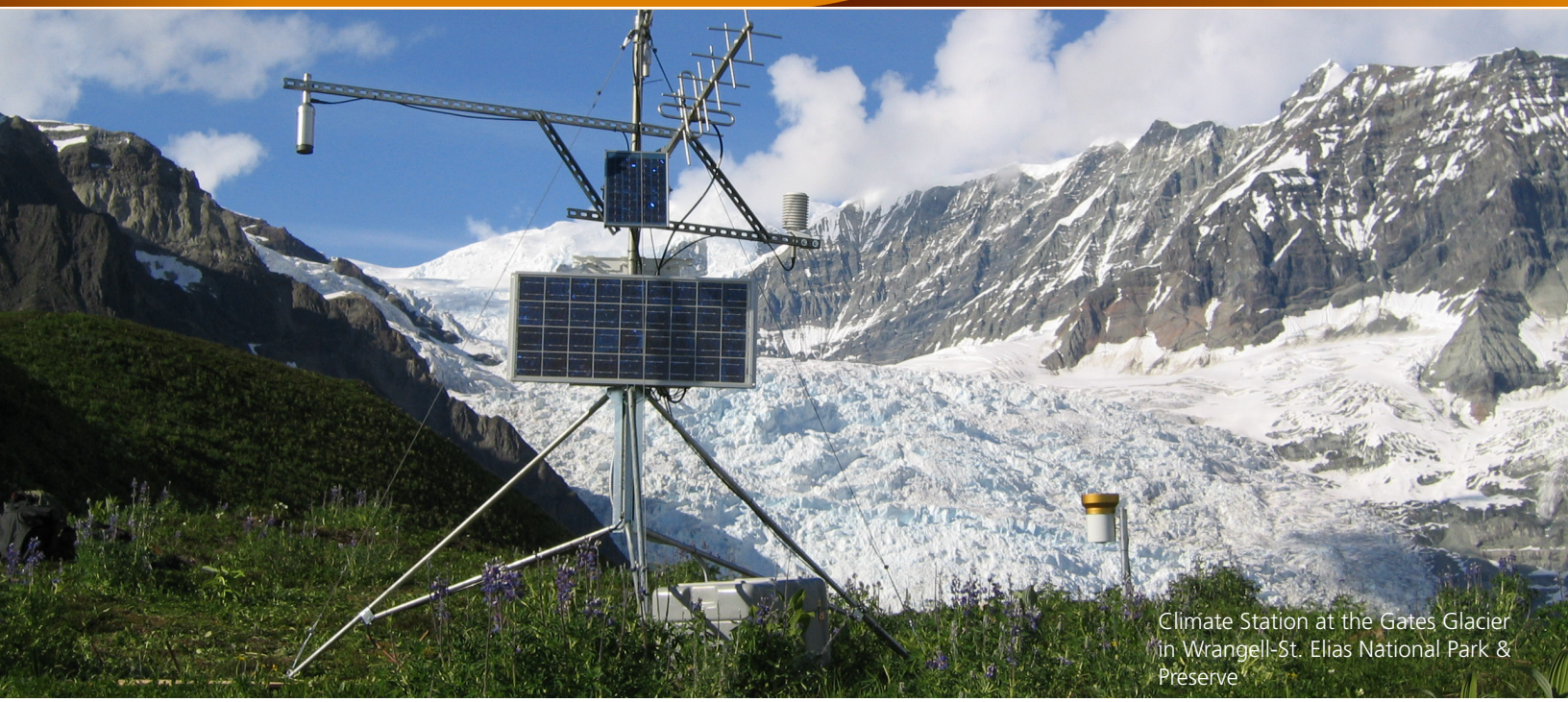
Central Alaska Network

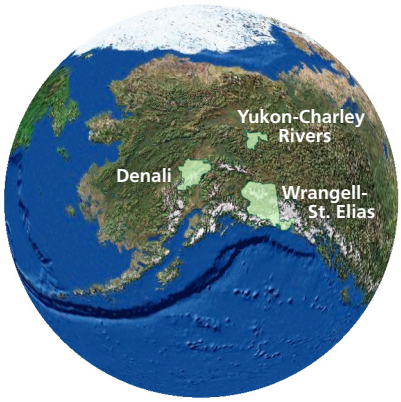
Denali NP & Pres. Wrangell-St. Elias NP & Pres. Yukon-Charley Rivers N. Pres.

Climate Change Resource Brief



Climate Station at the Gates Glacier in Wrangell-St. Elias National Park & Preserve

Climate Change and Central Alaska



The Central Alaska Network (CAKN) spans 443 miles from north to south, 448 miles from east to west and includes a variety of ecosystems from coastal rainforest to very dry interior boreal forest. Due to the large distances and landforms the network includes, the climate is variable across the network. Correspondingly, any future change in climate may be very different over the span of the network. For interior Alaska portions of the network, scientists predict that more precipitation will be offset by warmer temperatures and it generally will be drier. In contrast, scientists believe climate change will mean a wetter and warmer climate in the coastal areas of Wrangell-St. Elias. Regardless of exactly how the climate changes over the next decades, the monitoring program of the CAKN has been developed with the ability to measure the resulting change in its ecosystems and detect change in climatic drivers. The CAKN is structured to measure change across multiple spatial scales, multiple time scales and from low to high in the food chains of network ecosystems. Below we describe some key vital signs we are monitoring with respect to climate change.

Climate

Climate is one of the key drivers for Alaska's ecosystems and since 1940, Alaska's climate has warmed an average 4°F. Through robust monitoring we can put this change in the context of ongoing cycles and better understand the scale of climate change in central Alaska. Prior to 2004, measurements made on the climate of interior Alaska were based on data from a few weather stations and then projecting that data for several hundred miles. Additionally, most historic climate stations are located in low-lying areas and do not accurately measure winter precipitation, which results in a lopsided climate picture. The CAKN has added 16 climate stations positioned strategically throughout the network to provide a more balanced picture of the networks' climate. With just five years of data collected at higher elevation sites, climatologists have made significant revisions to the climate maps of Alaska which provide more accurate climatic summary and serve as an improved baseline from which to assess change.

Clouds over the landscape in Denali National Park & Preserve.

Vegetation

We are monitoring several facets of climate change with respect to vegetation. At the coarsest scale we are monitoring changes in vegetation structure and composition on 2.5km plots across each park. To inform us about changes in the growing season each year and across years, we are monitoring the timing of aspen leaf-out at sites in each CAKN park. Finally, we have also acquired historic photographs of various locations in the parks and conducted repeat photography at those locations. These photo-pairs allow assessment of decadal scale trends in plant communities.

Animals

It is expected that animals will respond to climate change in part, by altering their ranges as the habitat they require changes. For example, scientists expect to see a general shift to the north for many species as the southern portions of their ranges cannot sustain necessary habitat. The CAKN has strategically chosen to monitor animal species that occur across elevation ranges and across the north-south gradient of the network. We have also sought to monitor species in different ecological positions in the food chain so that we are monitoring those high in the food chain (e.g. predatory species like eagles, wolves) and low in the food chain (e.g. prey species like passerine birds, moose). Our monitoring will inform parks of how animal distributions and population sizes change as climate changes.

Aquatic Resources

Shallow Lakes – Water plays a large role in defining the nature of the various ecosystems in the Central Alaska Network. We are focusing our monitoring on two primary water resources shallow lake systems and streams. Shallow lakes are a prominent feature of the network landscape and provide important habitat and ecosystem functions. The physical properties of shallow lakes make them good potential indicators of climate change because while they may be more likely to dry up if temperatures warm, we may also see more lakes formed as permafrost melts. The shallow lake program collects water chemistry, physical (e.g. lake depth) and biological data (e.g. aquatic insects, plants) from lakes as well as remotely sensed data. Taken together, these data have the power to inform us on the changing status of this important resource as the climate changes.

Streams – Like shallow lakes, stream systems provide important habitat for plants and animals in our network as well as performing important ecosystem functions. The biggest changes we anticipate from climate change which will affect streams are increases in glacial melt, permafrost melt, timing and amount of precipitation and air temperature. We expect to observe corresponding changes in water chemistry, stream channel form and flow as well as the biological components (e.g. aquatic insects, fish, plants) of our stream systems. Measuring the change in our stream systems at several spatial scales is a key aspect of the program.

Summary

Climate change models and the like help park managers anticipate what to expect in coming decades, however it is most likely that none of the models or scenarios are entirely correct. Therefore it is crucial that we monitor our resources in a manner that allows us to detect ecosystem changes due to climate change and other agents of change. In so doing we can provide the most complete information to park managers who, in turn, must make optimal decisions for the management of National Park resources.

A small sampling of the species that inhabit Central Alaska Network parks.

Vegetation on a small pond in Yukon-Charley Rivers National Preserve.

Esker Stream in Disenchantment Bay, Wrangell-St. Elias National Park & Preserve.

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