

Central Alaska Network

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

Glaciers Resource Brief

July 2013, no. 52

Kahiltna Glacier, S.R. Capps 1916



Kahiltna Glacier, R.D. Karpilo 2004



Status & Trends

Monitoring glaciers in the Central Alaska Network

An inventory of the status and trends of glaciers in all Alaska national park units was recently completed in an NPS-sponsored partnership with glaciologists at the UAF Geophysical Institute and Alaska Pacific University (2013). This study marks the first comprehensive status and trends inventory of glaciers in Alaska's national parks and provides detailed information on the current conditions of and recent changes to the glaciers in the Central Alaska Network.

Wrangell-St. Elias is the most heavily glaciated park unit, with 38,198 km² of ice (including some ice in Canada) in recent satellite imagery. Between 1948-1973 and 2006-2011, glacier coverage decreased by 5%. Ice loss was heavily influenced by a few large glaciers in Icy Bay and the Bering Glacier. Surface elevation analysis shows two large interior land-terminating glaciers

in Wrangell-St. Elias losing volume at a rate of about 0.5 m/yr after 2000. Coastal and tidewater glaciers were more variable over time, including some gain in mass by Guyot and Yahtse Glaciers between 2009 and 2012.

In Denali National Park, ice cover diminished by 8% between 1952 and 2010 to become 15.5% glaciated (3817 km²). The vast majority of glaciers in Denali have shrunk considerably in that time. Only two of Denali's surge glaciers—Muldrow and Peters—have gained area since 1952. The lower parts of both glaciers have thinned dramatically since that time.

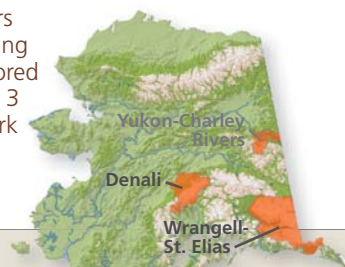
In addition to the comprehensive inventory, ongoing monitoring at Denali shows a negative net balance at both index sites within the park, which adds to the overall negative trend in the cumulative balance measurements started in 1991.

Objectives

What do we want to know about glaciers in CAKN?

- Monitor long-term changes in the location and extent of glaciers in Denali and Wrangell-St. Elias using aerial photography, satellite imagery, landscape profiling and field surveys
- Monitor mass balance of selected glaciers in Denali and Wrangell-St. Elias

Glaciers are being monitored in 2 of 3 network parks



Importance

Why are glaciers important in the Central Alaska Network?

Glaciers and glacier systems are dominant and dynamic physical features in two of the three parks (Denali, Wrangell-St. Elias) in the Central Alaska Network and are a driver of landform and ecosystem change. Glaciers are inextricably tied to climate and the hydrological cycle. Because glacier systems are driven primarily by climate fluctuations, they provide

a reliable record of long-term climate change that has already occurred. Upper elevation climate is nearly impossible to measure directly and can be well represented by glacier dynamics. Glaciers provide significant hydrologic base flow to major rivers in Central Alaska Network park units.



Management Applications

How can monitoring glaciers help protect parks in CAKN?

- Provide information on hydrologic and ecologic changes resulting from glacier ice loss or change
- Prepare for and adapt to changes to visitor experience as a result of glacier ice loss or change



Long-term Monitoring

How are we monitoring glaciers in CAKN?

In Denali, mass balance has been measured twice annually on Traleika and Kahiltna glaciers since 1991. Terminus mapping is completed for the park using aerial and/or satellite imagery every decade. In addition, repeated measurements are taken on several focus glaciers throughout the park to measure changes in surface elevation.

NPS does not conduct routine glacier measurements in Wrangell-St. Elias. Instead, extensive work by partner agencies and outside researchers is used to track the status and trends of the park's glaciers. In 2013, mass balance and surface elevation data was analyzed for a ~60 year period. Future plans include adding mass balance index sites within the park and preserve.

Ongoing monitoring in both park units is periodically supplemented by partner studies and focused research, including the recent comprehensive inventory of glaciers.



Geologists collect mass balance measurements in the Central Alaska Network.



CENTRAL ALASKA NETWORK

USING SCIENCE TO PROTECT OUR PARKS

THE CENTRAL ALASKA NETWORK (CAKN) IS ONE OF 32 NATIONAL PARK SERVICE INVENTORY AND MONITORING NETWORKS. EACH NETWORK EXISTS AS PART OF A NATIONAL EFFORT TO BETTER UNDERSTAND AND MANAGE PARK LANDS USING SCIENCE-BASED INFORMATION.

In order to focus this effort, 270 national park units with significant natural resources were grouped into 32 regional networks.

The Central Alaska Network is made up of 3 parks: Denali National Park and Preserve, Wrangell-St. Elias National Park and Preserve, and Yukon-Charley Rivers National

Preserve. Together, these 3 parks contain over 21.7 million acres and makeup 25% of all the land in the National Park Service. They represent a great diversity of climate and landform, from temperate coastal rainforests to glaciated mountain ranges. What they share in common are their largely wild and unaltered landscapes.

In order to track the condition of our parks, Central Alaska Network scientists have chosen 34 key indicators, or "vital signs," to represent the overall health of the network. Each vital sign falls into one of 4 categories: animal life, physical environment, human use, or plant life. Underlying these 4 vital sign categories is a focus on habitat change.

CAKN VITAL SIGNS:

Animal Life

Arctic Ground Squirrel
Bald Eagles
Brown Bear
Caribou
Dall's Sheep
Freshwater Fish
Golden Eagles
Moose
Passerines
Peregrine Falcons
Ptarmigan
Small Mammals
Snowshoe Hare
Wolves

Physical Environment

Air Quality
Climate
Fire
Glaciers
Land Cover
Permafrost
Shallow Lakes
Snow Pack
Soundscape
Streams & Rivers
Volcanoes & Tectonics

Human Use

Human Populations
Human Presence/Use
Natural Resource Consumption
Trails

Plant Life

Exotic Species
Insect Damage
Plant Phenology
Subarctic Steppe
Vegetation Structure/Composition

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