



Central Alaska Network

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

Streams & Rivers Resource Brief

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Dall's sheep trails near upper Little Jack Creek, Wrangell-St. Elias National Park & Preserve.

Status & Trends

Monitoring water quality in streams and rivers

Compared to National Parks in the lower 48, water quality in the Central Alaska Network (CAKN) is generally very good.



However, both past and present human actions have had negative impacts on stream and river ecosystems in these

parks. The legacy of mineral extraction, in particular gold mining, has had the most obvious effects. Some historically mined streams, for example, exhibit substantial water quality impairment due to excess heavy metal concentrations, elevated sediment loads and habitat alteration. Other current and past activities, such as ATV use, logging, road construction, and infrastructure development can have deleterious effects on water quality as well.



Water quality is not just about safe

drinking water. The Clean Water Act outlines a much more comprehensive vision, one that encompasses physical and biological as well as chemical aspects of water quality. To evaluate how park streams are responding to human



activities, we are developing analytical tools for assessing the biological integrity of stream ecosystems. These tools, which are used by water quality agencies all around the world, use the status or health of aquatic macroinvertebrate communities as indicators of the status or health of the stream ecosystem as a whole. These tools will allow park managers to accurately assess the effects of management actions on water quality in park streams, as well as to evaluate the progress of restoration projects.



Objectives

What do we want to know about streams & rivers in CAKN?

- Determine long-term trends in chemical and biological measures of water quality.
- Determine long-term trends in the composition and spatial distribution of aquatic communities, including macroinvertebrates and diatoms.
- Monitor changes in the distribution of anadromous and resident fish species in network parks.
- Determine long-term trends in annual and seasonal flow patterns in selected streams and rivers.
- Develop tools for park managers to assess biological water quality in selected streams and rivers.

Streams and rivers are being monitored in all 3 network parks



Importance

Why are streams and rivers important in the Central Alaska Network?

Streams and rivers are vital components of network ecosystems. They provide habitat for fish, including all 5 species of salmon. Fish in turn are important food sources not only for park wildlife, but also for people. For example, the world-famous Copper River sockeye salmon spawn in Wrangell-St. Elias NP & Pres. All 3 parks support subsistence and recreational fisheries as well. The aquatic insects that live in streams are an important food source for both fish and birds.

Streams and rivers are constantly reshaping the landscape, creating a diverse array of landforms and habitats that are important for both terrestrial and aquatic species. These changes can be either gradual, like the slow growth of a river delta, or dramatic, like the destruction of riparian forests during a large flood. The end result of these processes is a dynamic mosaic of habitats that increases the diversity of terrestrial vegetation and wildlife.



Management Applications

How can monitoring protect streams and rivers in CAKN?

- Assess water quality in park streams and rivers
- Improve management of subsistence and recreational fisheries
- Provide early detection of aquatic invasive species
- Improve modeling and prediction of high flows in park streams and rivers



Long-term Monitoring

How are we monitoring streams and rivers in CAKN?

To monitor ecological change in streams and rivers, the Central Alaska Network uses a wide variety of information. This includes biological, chemical and physical measurements collected during field visits, and also data derived from satellite and airborne instrumentation. Data are collected each year from a small number of easily-accessed sentinel streams in each network park, as well as from a large number of remote streams that are visited only once every 10 years or so.

At each stream, network scientists collect data on the species composition and abundance of aquatic insects, and diatom and fish communities. Because these organisms are in the streams year-round, their responses to the stream environment serve as biological indicators of ecological change that scientists may not

be able to detect when collecting other types of data. Detailed chemical and physical information about each stream is collected as well.

By combining these various types of information, network scientists will be able to detect changes in how stream ecosystems are behaving, not just at the small percentage of streams that are being studied, but across all 21 million acres of the vast and remote 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 35 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
Freshwater Fish
Golden Eagles
Moose
Passerines
Peregrine Falcons
Ptarmigan
Sheep
Small Mammals
Snowshoe Hare
Wolves

Physical Environment

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

Human Use

Consumptive Use of Natural Resources
Human Populations
Human Presence/Use
Trails

Plant Life

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

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