RESOURCE BRIEF 5

RECORD TEMPS RECORDED AT NETWORK WEATHER STATIONS OVER PAST 7 YEARS

CLIMATE MONITORING IN THE CENTRAL ALASKA NETWORK

THE CLIMATE HAS A TREMENDOUS INFLUENCE ON THE LANDSCAPE AND THOSE LIVING ON IT. SCIENTISTS WITH THE CENTRAL ALASKA NETWORK (CAKN) RECOGNIZE THAT MONITORING THE CLIMATE IS CRITICAL TO UNDERSTANDING THE CONDITION OF PARK ECOSYSTEMS.

In the past four years, CAKN has added 16 new climate stations across Denali, Wrangell-St. Elias, and Yukon-Charley Rivers. Many of these climate stations were strategically placed at high elevations and in remote areas to supplement existing stations located at low elevations close to populated areas. Though only a few seasons have passed since these new climate stations were installed, network scientists are already discovering interesting information about CAKN's environment.

In 2006 scientists compared data from the new sites with the older, long-term sites. In most cases it was found that areas of higher elevation had warmer average monthly winter temperatures than lower elevations, due to strong inversions. In addition, it was found that climate extremes were occurring more frequently. 2004 was the warmest summer on record, with observations dating back to 1926 at some locations. Most of the warmest winter, spring, and fall periods at these sites have also occurred within the past 7 years. At the other end of the spectrum, November of 2006 and March of 2007 were the coldest months on record at most locations. There were also record high precipitation and flooding events in August and October of 2006.

Two large scale climate patterns may be affecting conditions in the Central Alaska Network: rapid sea ice loss in the Arctic Ocean and the warm phase of the Pacific Decadal Oscillation.

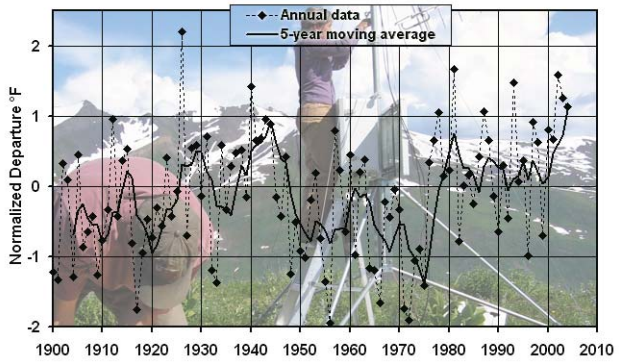
The decline of sea ice extent in the Arctic Ocean is likely to have serious effects on central Alaska's air temperatures in the future because it may accelerate warming trends and change climate patterns. Meanwhile, the influence of the Pacific Ocean on subarctic ecosystems is already recognized. Warm sea surface temperatures off the southern coast of Alaska have been increasing overland temperatures for 30 years in what is referred to as the warm phase of the Pacific Decadal Oscillation. These are only two examples of large scale climate patterns that impact CAKN ecosystems, there are many more.

The Central Alaska Network is tracking changes and using climate data to answer questions and support findings in other components of the monitoring effort. Will shallow lakes in Denali's Minchumina basin continue to dry up? Will spruce trees move ever farther upland? These and other complicated questions are explained and driven by climate.

What do we want to understand about climate?

1. Record long-term trends in temperature and precipitation with fully instrumented climate stations strategically placed in CAKN parks, and maintain the integrity of existing National Weather Service (NWS) Cooperative sites with long-term records in and near network parks.
2. Record long-term trends in secondary climate drivers such as wind speed, solar radiation, and relative humidity to provide more information on the localized climate.
3. Distribute data in convenient formats to evaluate the influence of local and global climate cycles on resources within the ecosystem.

Normalized Annual Air Temperature
Average of 9 Long-term CAKN Stations



Why is Climate Important?

Climate determines the temperature and precipitation patterns for ecosystems worldwide and has a powerful influence on landscape and ecology.

Changes in the physical environment, caused by climate change or normal physical processes (such as wildfire), can have significant impacts on the entire natural community. In order to fully understand an ecosystem, these changes must be properly monitored and documented.

The Central Alaska Network encompasses several climate regions, from the maritime climate in southern Wrangell–St. Elias, to the continental climate in Yukon–Charley Rivers and northern Denali. Between these areas, a transitional climate exists in the major mountain ranges.

CAKN's strategically placed climate stations provide data on climate patterns and extreme events, such as floods, droughts, and severe temperatures. In addition, the climate stations provide real-time weather data which is of immediate use to park management and operations. Climate data from the Central Alaska Network will also contribute significantly to Alaska climate knowledge by filling in some of the gaps that exist in the multi-agency climate station network, and by contributing accurate measurements of winter precipitation.

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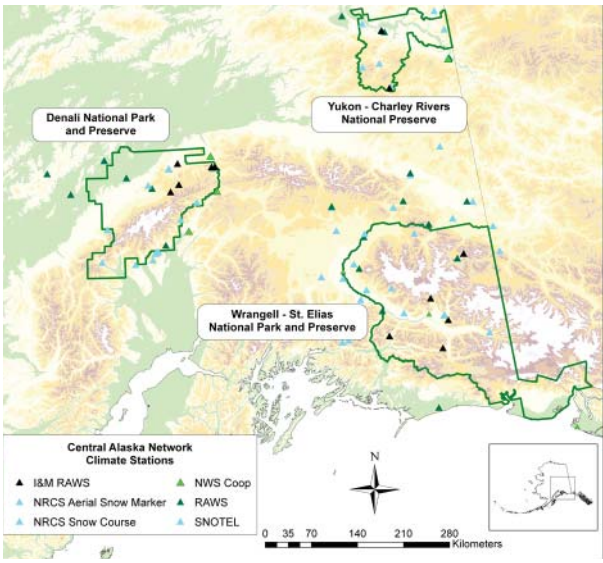
How Are We Monitoring The Climate?

To monitor climate in remote areas, the Central Alaska Network uses research grade weather monitoring instruments that are powered by solar panels and batteries. These stations record air temperature, relative humidity, wind speed, wind direction, solar radiation, snow depth, soil temperatures, and summer rain. These stations are automated and send hourly updates on current weather conditions to the web via satellite.

Each year CAKN scientists visit the stations to calibrate sensors, download data and do repairs or upgrades when necessary. Data products available on the web include daily and monthly summaries, time series graphs, wind rose graphs, and details about the station.

The CAKN climate monitoring program also cooperates with the Natural Resource Conservation Service, the Western Regional Climate Center, and the National Weather Service to operate stations in and around network parks. These partnerships, along with university cooperators, enable us to cover 21 million acres and to integrate this specialized knowledge of Alaska climate systems.



PARKS BEING MONITORED:

DENA: Denali National Park & Preserve

WRST: Wrangell-St. Elias National Park & Preserve

YUCH: Yukon-Charley Rivers National Preserve

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 37 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:

Animals

- Arctic Ground Squirrel
- Bald Eagles
- Brown Bears
- Caribou
- Freshwater Fish
- Golden Eagles
- Macroinvertebrates
- Moose
- Passerines
- Peregrine Falcon
- Ptarmigan
- Sheep
- Small Mammals
- Snowshoe Hare
- Wolves

Environment

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

Humans

- Human Population
- Human Presence
- Natural Resource Consumption
- Trails

Plants

- Exotic Species
- Forage Quantity/Quality
- Insect Damage
- Plant Phenology
- Subarctic Steppe
- Vegetation Structure/Composition

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