



Central Alaska Network

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

Shallow Lakes Resource Brief

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Status & Trends

The art of monitoring wood frogs (*Rana sylvatica*) in CAKN

Wood frog monitoring in the Central Alaska Network (CAKN) began in 2011 with the deployment of sound recording devices used to determine the timing and duration of the wood frog breeding season. This project was developed in collaboration with the Terrestrial Wetland Global Change Research Network (TWGCRN) and the Alaska



Checking a sound recorder, WRST

Department of Fish and Game (ADFG), whose goal is to track changes in the timing and duration of the wood frog breeding season across North America. TWGCRN has developed an innovative technique using digital sound recorders to capture frog calls in lieu of ground surveys. Ground surveys often miss the calling period because site conditions are unknown. Using sound recorders allows us to deploy recorders well in advance of spring break up and continue collecting data well after breeding has finished. It also allows us to be at the site around the clock so we don't miss frogs that might begin calling early in the day or night.

In 2011, CAKN deployed two digital sound recorders in early spring, prior to breeding, in shallow wetland habitats in Denali National Park and Preserve (DENA) and Wrangell-St. Elias National Park and Preserve (WRST). The recorders collected sound data from late April through mid-September. These test recorders captured digital recordings of frogs and other birds and animals from both wetlands. Unfortunately, there were a few problems encountered during these early tests. Multiple microphones were damaged by wildlife and in the first year of deployment we experienced power supply issues. In 2012, we resolved the power supply issues but damage resulting from wildlife has continued. We are trying to develop measures to protect the recorders while retaining high quality recordings. Any type of infrastructure surrounding the microphones can interfere with the collection of good sound data so care must be taken to protect the instruments yet retain the collection of high quality data.

We have recently begun processing the sound data collected thus far and hope to have preliminary results available for dissemination in early 2013.

Objectives

What do we want to know about wood frogs in CAKN?

- Is this site occupied by wood frogs and how does that change through time?
- At what time and on what date do wood frogs start calling each spring?
- When do wood frogs stop calling?
- What is the timing of peak calling?
- What is the relative abundance of frogs?
- When do wood frogs call throughout the day?
- How does wood frog calling behavior change with temperature and water level?

Wood frogs are being monitored in all 3 network parks



Importance

Why are wood frogs important in the Central Alaska Network?

Frogs are a vital part of the aquatic food chain. They are food for a variety of animals including fish, cranes, and waterfowl and they eat copious quantities of insects. Frogs are also excellent indicators of environmental health. Frogs undergo complete metamorphosis that is dependent on environmental conditions. Minor changes in temperature or water level have direct effects on the timing and duration of the breeding season. These sensitivities make them excellent indicators of climate change. Frogs breathe through their skin, readily absorbing chemicals and gases from the environment, making them highly susceptible to chemicals dissolved in water.

Scientists around the world are concerned about the health of frogs for several reasons. Frog populations are declining worldwide. These declines have been linked to a variety of causes: habitat fragmentation and loss, chemical contamination, increased ultraviolet radiation. Despite the fact that much of Alaska is remote and relatively pristine, frog populations in Alaska are at risk. ADFG and the US Fish and Wildlife Service have both observed unusually high numbers of deformed wood frogs throughout Alaska, but the cause of the deformities is unknown. Environmental contaminants, genetic defects, infections and predation are all potential causes.



Management Applications

How can monitoring protect wood frogs in CAKN?

Monitoring the timing and duration of the wood frog breeding season will provide important information to biologists who manage wildlife. Wood frogs are an important food resource for a myriad of fish and wildlife. Changes in the wood frog breeding season will provide early warning of environmental changes that will likely have cascading effects on aquatic food webs.

Information on frog abundance and distribution will provide important baseline information for this species in interior Alaska. These data will also contribute to other regional programs monitoring this species across its range. Linking park information in this way to the statewide and national level will inform resource managers and lead to a greater understanding of environmental and climatic changes that are impacting wood frogs.

This work will also facilitate the development of wood frog monitoring in the Arctic Network Parks, the northern most extant of their range.

Finally, outreach and education materials prepared by the network will impart information regarding this highly sensitive species and increase public awareness about the ecological importance of wood frogs.

Long-term Monitoring

How are we monitoring wood frogs in CAKN?

The wood frog monitoring program involves using digital sound recorders to determine the presence of frogs at a wetland, timing and duration of the breeding season and relative abundance of the population. Each spring, in late April, we deploy the sound recorders in the upland habitat adjacent to a wetland. Sound is recorded for the first five minutes of every hour each day until the recorders are retrieved in mid-September.

Once the data are retrieved, we use Song Scope, a computer software program, to visualize the sound files. Rather than listening to hours of recordings, we can quickly identify the files that contain frog calls. These particular files can then be examined more closely, while files without frog activity can be ignored. This process saves a lot of time, making the data analysis much more efficient.

We track the temperature and level of the water in the lake next to each frog monitor, and we also record the air temperature at the monitor. This information can be used to determine if and how environmental conditions are impacting the timing of frog breeding. Over time, this information will help us determine if climate change is affecting the breeding biology of the wood frog population.



Digital sound recorder, DENA



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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