



Arctic Network

Bering Land Bridge N Pres. • Cape Krusenstern NM
Gates of the Arctic NP & Pres. • Kobuk Valley NP • Noatak N Pres.

Large Lake Communities & Ecosystems Resource Brief

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Long-term Monitoring:

How are we monitoring lake ecosystems and communities in the Arctic Network?

Over the next several decades using a watershed perspective, Arctic Network (ARCN) will monitor long-term trends in chemical, physical, and biological characteristics of large lake ecosystems and their associated fish populations within Gates of the Arctic National Park and Preserve.



- Seasonal and decadal scale changes in lake levels and water temperatures, which affect fish habitat, will be monitored with sensors.
- We will analyze the chemical attributes (e.g. chlorophyll-a, anions, pH, dissolved oxygen, turbidity, and salinity) of lakes because they determine lake productivity, species composition, and sensitivity to acidification and contaminants.
- Other indicators of lake ecosystem health, such as the structure and diversity of phytoplankton and zooplankton communities, will be analyzed from water and mesh net sample collections.
- In order to document change in shoreline habitat, we will use aerial and panoramic photography to estimate the extent of shoreline erosion and slumping. Riparian habitat will also be assessed along designated transects.

Management Applications

How can monitoring lake ecosystems and communities help Arctic Network parks?

The NPS Organic Act and Alaska National Interest Lands Conservation Act (ANILCA) mandate that the value and status of lakes in ARCN be protected for future generations because lakes are important to wildlife, subsistence users, and the scenic quality of the park. Our primary monitoring efforts will inform park managers about the current status and trends in the condition of particularly important lakes and their surrounding catchments. Our secondary monitoring efforts will focus on integration of lake monitoring efforts with other ARCN vital signs that may affect the catchments of the aquatic systems. These other vital signs include streams, snow and ice, climate and weather, permafrost dynamics, fire extent and severity, and wet and dry deposition of contaminants.

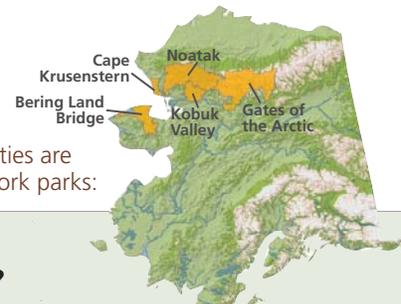


Preliminary Objectives

What do we want to know about lake ecosystems and communities in the Arctic Network?

- Are depths, surface areas, and abundance of lakes changing?
- Are hydrologic and chemical inputs and outputs to and from lakes changing?
- Are lake temperatures and productivity changing?
- Are lake invertebrate communities changing?
- Are growth rates, contaminant concentrations, and overall health of fish changing?

Large lake ecosystems and communities are being monitored in all 5 Arctic Network parks:



Importance

Why are large lake ecosystems and their communities important?

More than 300,000 acres of ARCN are covered by freshwater lake ecosystems. Large lakes in ARCN provide important habitat for aquatic primary producers, zooplankton, macroinvertebrates, and secondary consumers such as fish and waterfowl. As integrators of large-scale processes, i.e. catchments, lake ecosystems are susceptible to local, regional, and global stressors. In ARCN these stressors may include visitor use, air contaminant deposition, increased air temperatures, melting

permafrost and glaciers, and alterations in the water cycle and terrestrial biogeochemistry.

Large lakes in ARCN are associated with volcanic explosions, geologic rifts, or the presence of moraine dams. These large deep lakes support diverse fish populations, are important to subsistence users, and are renowned for their sport fishing. The largest lakes in ARCN, Walker and Imuruk Lakes, are National Natural Landmarks.