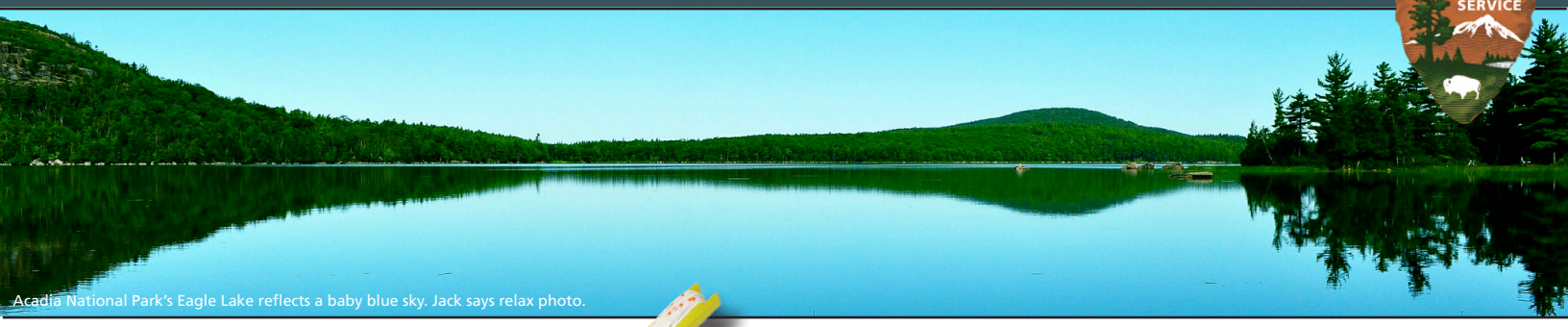


Acadia National Park's Eagle Lake reflects a baby blue sky. Jack says relax photo.

Water Quality & Quantity Monitoring

Secchi Disk

Northeast Temperate Network

Program Brief

Right: Water quality technicians take readings using a specialized YSI Sonde in one of Acadia NP's many lakes. NPS photo.

Below: Streams and brooks run through many NETN parks. Here, readings are being taken at Saint-Gaidens NHS's Blow-Me-Down brook. NPS photo.

There are a total of 27 ponds and lakes larger than 1 acre and about 50 miles of perennial rivers and streams that fall at least partially within Northeast Temperate Network (NETN) parks - the majority of both in NETN's largest unit - Acadia National Park. No matter where they may be, freshwater resources are subjected to natural and human generated impacts and alterations, which have imposed stress on these resources for many years.

Why monitor water quality?

Current and historic threats to aquatic ecosystems in NPS units throughout the northeastern U.S. have led to specific physical, biological, or chemical stressors to the freshwater ecosystems.

The documentation of baseline water quality and water-quantity conditions is essential to the long-term health of freshwater resources. Documenting the changes in baseline conditions will assist park managers in identifying and managing stressors in park freshwater ecosystems as they occur.

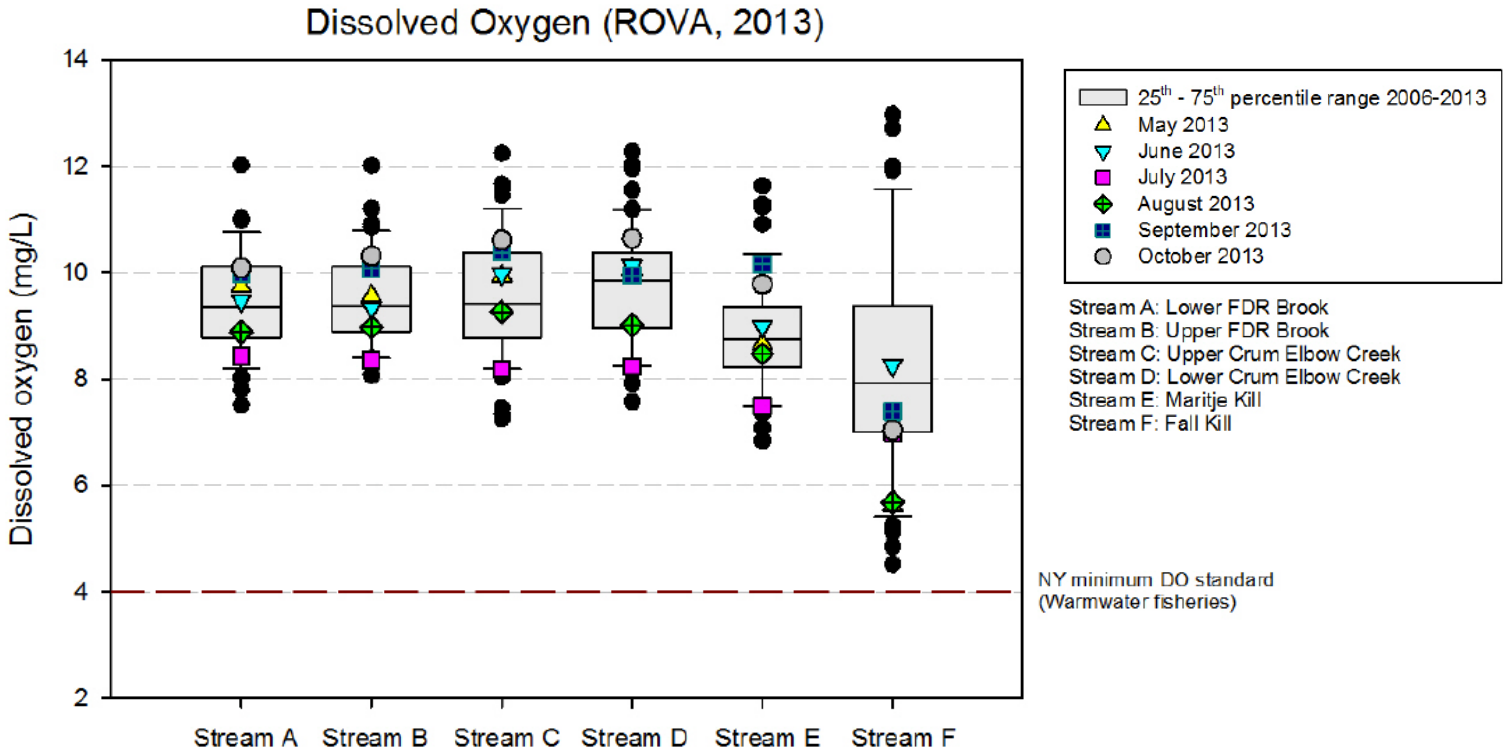
The vital signs for NETN freshwater bodies are water chemistry (pH, DO, conductivity, temperature), nutrient enrichment (nitrogen and phosphorous), water quantity (flow for streams, stage [water-level]for ponds and streams), and the detection of invasive plant species. Detailed descriptions of all monitoring methods can be found in the Freshwater Monitoring protocol from the Network's website.

The overall goal of the program is to monitor the status and trends of NETN lakes, ponds, and streams in order to assess changes in ecological integrity and the impacts of key stressors, and to guide management decisions affecting these resources. Another objective is to ensure the early detection of aquatic invasive plants in the lakes, ponds and streams of NETN parks and alert park and state environmental managers of any new incidences of invasive species to allow for a rapid response.

How is the monitoring done?

Hydrologic techs and Network interns travel to park waterbodies monthly during the season to take readings.

Lakes & Ponds: Sampling is performed monthly from May through October by the NETN water quality team which usually includes a hydrologic technician, an SCA intern, and some shared Acadia staff for monitoring in that park. Physical and water chemistry parameters are measured each month and periodically collected water samples are sent for analysis to the University of Maine. All monitoring data are incorporated into a series of comprehensive databases that feed into an EPA data system.



Sample of a graph displaying Dissolved oxygen (DO) levels for Roosevelt-Vanderbilt streams in 2013. DO is a critical indicator of water quality because aquatic life generally needs it at concentrations at or above 5 mg/L to thrive. Low oxygen can directly kill or stress organisms such that they will not be able to successfully reproduce or grow.

Non-native invasive species are the stressor of greatest concern across all systems in NETN parks, including freshwater aquatic, wetlands, marine, and terrestrial systems. Water quality staff perform visual searches for aquatic invasives when visiting park sites.

Streams & Brooks*:* In all parks except Acadia, every perennial stream with reasonable access to a site where stream flow can be accurately measured is monitored monthly from May through October for freshwater quality vital signs. In Acadia, every watershed that allows reasonable access to a site where stream flow can be accurately measured is monitored monthly from May through October as a partial record site under an augmented serially alternating design.

Over the course of a monitoring season, these brief snapshots work well enough to give parks some idea of what direction the health of their water resources may be headed, but leave large gaps in the knowledge of what's happening to park ponds and streams between NETN's monthly visits. The limited monitoring schedule also potentially misses out on the impacts of intermittent weather-related or human events (nearby construction projects, agricultural runoff after a large rainstorm, etc.).

These knowledge will be somewhat mitigated during the next several monitoring seasons, as continuous water monitoring equipment is installed in Network parks. This will complement the standard monthly data gathered by water quality techs with conductivity, dissolved oxygen, water level, and temperature data gathered automatically at half-hour (streams) and hourly (ponds and lakes) intervals.

How is the information delivered to parks?

NETN is in the process of transitioning the way it delivers and shares water quality monitoring data with its parks. Currently, most data is shared with parks in Annual Data Summary reports (the figure above is from a said report) that display results using graphs and charts, along with a brief interpretation of the data. Soon, using a web interface, parks will be able to see water quality data on a much more timely basis by viewing frequently updated data that is uploaded to each park's webpage after the NETN water crew visits a site. Stay tuned to NETN's webiste for updates.

More information:

For protocols, annual reports, and briefs:

NETN website

Water Quality Monitoring:

http://go.nps.gov/waterQuality

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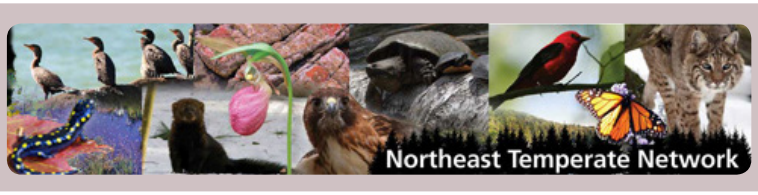
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