

Continuous water-quality monitoring at Lake Mattamuskeet - A foundation for national wildlife refuge water quality partnerships: Project Update

FY 2013

PROJECT DESCRIPTION

The U.S. Fish and Wildlife Service has partnered with the U.S. Geological Survey to establish two automated water quality monitoring stations at Lake Mattamuskeet. Lake Mattamuskeet is divided by a causeway which effectively splits the lake into two distinct basins. The west side's submerged aquatic vegetation, bird use, and fisheries have declined. Also, the fishing public and fisheries agencies have been concerned with water level and salinity management.

Understanding and resolving these problems will be directly facilitated by the monitoring data from this project. Stations measure water level, pH, turbidity, dissolved oxygen, temperature, salinity, and conductivity. The stations provide data to inform management and assist cooperative assessments of the lake and its living resources.

OBJECTIVES AND ALTERNATIVES

Lake Mattamuskeet comprises 41,084 acres of the 50,180 acre Mattamuskeet NWR, so a primary project objective of the refuge is long-term monitoring of key limnological variables to inform lake management decisions. Other objectives include integration of national and regional goals, leveraging within-Service and external partnerships, building on proven approaches, generating high quality data, and facilitating resolution of refuge water quality concerns.

METHODS AND PROTOCOLS

Station operation follows established protocols (Wagner et al. 2006. Guidelines and standard procedures for continuous water-quality monitors - Station operation, record computation, and data reporting: U.S. Geological Survey Techniques and Methods 1-D3.).



Water quality monitoring station at Lake Mattamuskeet. USGS photo.

The monitors consist of 1) a metal housing with a data collection platform, 2) satellite transmitter, 3) cables with waterproof connectors, 4) water quality sensors, 5) batteries, 6) solar panels, and 7) staff gage. Field meters are used to standardize and adjust the station probes and document their precision and accuracy. Stations are serviced regularly to ensure data quality.

DATA MANAGEMENT

Lake conditions are available near real-time via the USGS's National Water Information System website. The stations make measurements every 15-minutes, and data are transmitted to the GOES satellite and uploaded to the website every hour. Data can be viewed by the public, refuge management, and cooperators at these sites:

Mattamuskeet West

http://waterdata.usgs.gov/nc/nwis/dv?referred_module=sw&site_no=0208458892

Mattamuskeet East

http://waterdata.usgs.gov/nc/nwis/dv?referred_module=sw&site_no=0208458893

Following quality control / quality assurance reviews, data is permanently archived in the USGS's National Water Information System Database and in an annual Water-Data Report.

ACCOMPLISHMENTS AND MANGEMENT IMPLICATIONS

Results of the first year monitoring (September 2012 through September 2013) are available in the 2013 Water-Data Report:

<http://wdr.water.usgs.gov/wy2013/pdfs/0208458892.2013.pdf>

<http://wdr.water.usgs.gov/wy2013/pdfs/0208458893.2013.pdf>

Monitoring is ongoing, and project funds include data collection through September 2014.

Long-term monitoring of key limnological variables is critically important to informing lake management decisions. The refuge has established a new multi-agency Lake Mattamuskeet Technical Working Group with the purpose of developing a 5-year comprehensive lake management plan. Data from the two stations are already being utilized by this group.

An important partnership with the Ambient Lakes Monitoring Program of the NC Division of Water Resources (NC DWR) emerged from this project. At no additional costs to the USFWS, grab samples are collected by USGS and analyzed by the NC DWR Water Sciences Chemistry Laboratory every month in the summer (April to September) and every-other-month in the winter (October to March). Samples are analyzed for total suspended residue, nutrients (total phosphorus and a nitrogen series), and chlorophyll *a*, and light attenuation of the water column is measured. The NC DWR benefits through obtaining data they can use in their Ambient Lakes Monitoring Program and the NC Trophic State Index. The USFWS benefits by getting data on additional water quality parameters to improve understanding of lake health. All data from this partnership are housed in the NC Lakes Database maintained by NC DWR and available to the public via STORET.

One of the rationale's for the USFWS's initial investment in continuous water quality monitors was to assist in targeting periods for more intensive data collection. The lake's remote location, large size, and shallow depth make sampling logistically challenging. Last year, station data were used to target lake-wide synoptic sampling during the diurnal peak and trough of algal production. Having the temporally-robust continuous data available was an effective trigger for enhanced spatially-expansive sampling.

We initiated a water quality data inventory, gathering historic data for the lake. We plan to begin retrospective analyses of water quality.

FY12 and 13 funds received from the I&M program have been matched over 100%. Project funds will be requested for a third year.

PARTNERS

USFWS - Refuges, Ecological Services, Fisheries, Migratory Birds

USGS – North Carolina Water Science Center

NC DWR - Water Sciences Section, Intensive Survey Branch, Ambient Lakes Monitoring

SOURCES OF SUPPORT

Initial funding came from the USFWS Natural Resource Program Center through an Inventory and Monitoring Water Quality Pilot Project (FY12). Funds were matched by Mattamuskeet NWR, Southeast Regional Office (Wildlife Resources), South Atlantic Migratory Bird Coordination Office, South Atlantic Fish and Wildlife Conservation Office, and Raleigh Ecological Services. The FY12 funds covered monitoring through October 2013. FY13 funds were provided by USFWS Region 4 I&M Program and matched by Mattamuskeet NWR. They cover operations through October 2014.

MORE INFORMATION

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