

Data Logger Tracks Dissolved Oxygen Levels in Endangered Mussel Habitat

Market: Environmental Research

Organization: CCR Environmental

Challenge: Environmental firm looks to prove that new reservoir will not harm endangered mussel species.

Northern Georgia will soon have a new freshwater reservoir: Lake McIntosh. The proposed 650-acre lake will sit on the border of Fayette County and neighboring Coweta County, eventually providing more than 10 million gallons of drinking water per day. But first, the Fayette County Water System must assure the United States Fish and Wildlife Service that endangered mussels living in the targeted creek will be safe.

That's where Chris Crow and his team at CCR Environmental come in. The Atlanta-based group of biologists carries out natural resource studies, endangered species surveys, impact assessments, and many other regulation-driven studies for clients.

For this project, they are conducting physical and biological analyses of Line Creek, downstream of the proposed reservoir. Along with their usual kit of data-gathering tools and techniques, including some underwater temperature data loggers, they are using an Onset **HOBO U26 Dissolved Oxygen data logger**.



The amount of dissolved oxygen in a body of water is an indicator of its health; high dissolved oxygen correlates with high biological productivity, and low dissolved oxygen means lower biological productivity. Because all animals, including mussels, require oxygen for respiration, dissolved oxygen is an important indicator of the relative health of an aquatic animal's environment.

Under the Endangered Species Act, the USFWS requires consultation for any project that may affect federally-protected species or their critical habitat. The Lake McIntosh project was determined to potentially impact several federally-protected mussel species, including the oval pigtoe (*Pleurobema pyriforme*), shinyrayed pocketbook (*Hamiota subangulata*) and Gulf moccasinshell (*Medionidus penicillatus*).

Previously, Crow and his team measured dissolved oxygen in the field with hand-held probes. "Our option was to do it manually," Crow explained, "meaning that once a week we had to go out to the site before dawn with a meter." It is general practice to measure dissolved oxygen just before dawn, when levels are at their lowest.

The HOBO Dissolved Oxygen logger is self-contained, and can be deployed and left to take measurements in a body of water, either fresh or saltwater, for weeks at a time. It records dissolved oxygen levels as often as the user chooses, and the data is time-stamped and downloadable to a laptop computer or data shuttle; the accompanying software allows for configuration and launch, and

data viewing and analysis. The logger provides 0.2 mg/L accuracy, maintains calibration for six months, and features an easy-to-replace sensor cap.

The logger is easy to position, as well. “It’s important that the logger be placed in the deep part of the stream in a well-mixed area,” Crow explains, “with the sensor down low enough so it’s not going to expose the probe if the water level drops.” He deployed the device in sandy-bottomed Line Creek with the help of a six-foot metal fence post. The logger was attached to the post with zip ties, and fit vertically into the U-shaped groove in the post.

“The project started in early May 2012. We did the dissolved oxygen measurements manually the first few times we went to the site, and then we got the Onset logger. We deployed it, checked it while onsite a week later to make sure it was working, then downloaded data again at around four- to five-week intervals.” The team also confirmed the logger’s measurements with a calibrated hand-held dissolved oxygen probe.

Crow likes the ease with which he can get data from the logger. Now when he and his team visit the site, they bring the optic base station, plug it into a laptop’s USB port, “Download the data, reset, and off you go!” he said.

As expected, the lowest dissolved oxygen levels were seen in midsummer. That’s when the creek’s flow is lowest, and the temperature is highest (cold water holds more dissolved gases than does warm water – think of cold vs. warm soda). “We can see the highs and lows, and can see the diurnal [day/night] cycle now, too,” to confirm that just before dawn is, indeed, the time of lowest dissolved oxygen. “It’s reassuring to confirm it’s there,” he said.

The data will provide the dissolved oxygen information required for the Fish and Wildlife Service, and will help determine how reduced stream flow will affect dissolved oxygen – and by extension – the organisms in the stream. The data will serve, too, as baseline data for habitat comparison post-construction of the Lake McIntosh dam. The USFWS requires long-term monitoring of dissolved oxygen associated with flow releases from the dam, and that monitoring will be performed for the Fayette County Water System by CCR.

Other dissolved oxygen loggers Crow and his group considered were priced at several thousands of dollars, or were part of a much larger hydro lab, which was unnecessary. The Onset logger, with **graphing and analysis software**, is priced at less than \$1500.

Will they rely on this dissolved oxygen data logger for future projects? Now that Crow is confident of the device’s performance, the answer is yes.

“It comes down to cost. It’s more cost-effective if you can put out a data logger and save money and time traveling to the site less often.”