

SENTINEL LAKES PROGRAM now providing answers

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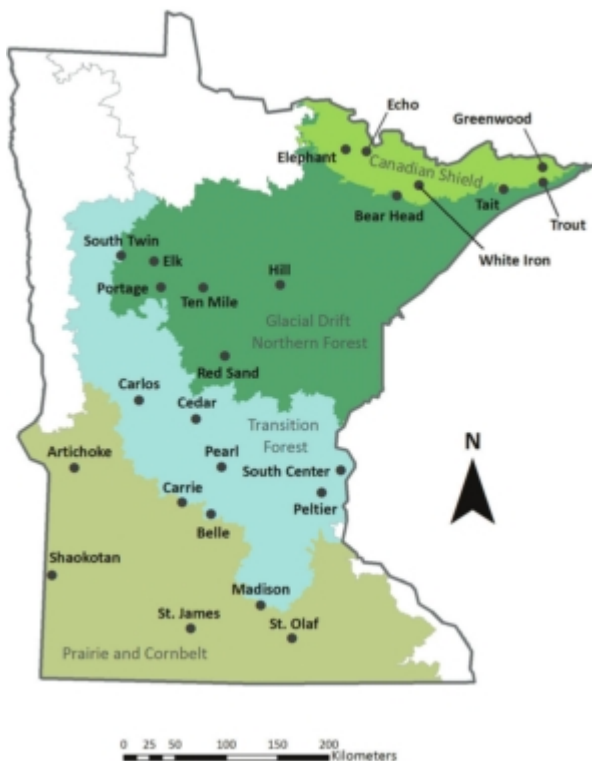
More than a decade of information collection from lakes provides new understanding

Assistant Editor

St. Paul — Minnesota's Sentinel Lakes program, first funded via an Environment and Natural Resources Trust Fund grant, has been around for 14 years now. It's a long-term monitoring program to "detect and understand the physical, chemical, and biological changes occurring in Minnesota lakes," according to DNR's program web page.

It's also a long-term investment that's been handed off in a cooperative arrangement between the Minnesota DNR and the Minnesota Pollution Control Agency to give agency researchers a long-term set of data to better understand historic and current lake conditions while considering factors such as nutrients, climate, land use, and by ecological region.

"I'm glad we've made the investment," said Lee Engel, the MPCA's supervisor of water quality monitoring and the agency's contact for the program. "With all the questions that keep coming up, you can never go back in time and re-create the data."



The 25 lakes in the state's Sentinel Lakes program were selected to be representative of all of the lake types in the state.

Map courtesy of Minnesota DNR

The data collection on 25 lakes includes continuous water-temperature monitoring; continuous water-level monitoring; weather stations that record air temperature, relative humidity, wind direction, wind speed, gust speed, and dew point; trophic level measurements, including macroinvertebrates, plants, phytoplankton, water chemistry, and zooplankton; and fish sampling.

"It gives us a complete picture of what's going on in those lakes," said Casey Schoenebeck, the DNR's Sentinel Lakes coordinator. "If something is changing, how do you best understand the mechanisms behind that? One of the best ways is to continuously monitor these different trophic levels. It can still be very difficult to disentangle some of the different impacts, but sometimes it is obvious."

The program, which began in 2008, has received several rounds of ENRTF funding from the Legislative-Citizen Commission on Minnesota Resources. That was before the two agencies, with the DNR as the lead, took over in a collaborative effort using in-kind support that included data collection and analysis from experts in both agencies, Schoenebeck said. In the DNR, that expertise comes from across various sections of the department, including folks from Fisheries and Ecological and Water Services.

The lakes to be monitored, Schoenebeck said, were strategically selected.

"They were selected across the major ecological regions, including the prairie, transition (north-central hardwood forests), the northern lakes and forest region, and the Canadian Shield. "We wanted lakes that were both deep and shallow, and from three different categories of nutrients –from not many to productive."

Initially there were 24 lakes, but Greenwood Lake in Cook County was added so that a lake with a naturally-reproducing lake trout population could be represented.

"They are not all the best fisheries, although some are incredible fisheries," Schoenebeck said. "But these 25 lakes give you a representation of the state. ... It would be impossible to collect all of this data on all of Minnesota's lakes. This allows us to detect what is going on with these 25 lakes, and we can apply what we learn to other lakes."

There are three state employees dedicated to the program, including Schoenebeck.

"It is a collaborative effort," he said. "I'm based in Fisheries (but) the vast majority of the work completed for this program is done through in-kind support. These two large agencies are voluntarily allocating resources to this effort."

Engel noted that program activities like data collection has been baked into existing workloads.

"I think what happened is we have been able to get a lot of support from higher management at PCA – that this is important to collect to help us look at climate change in lakes," he said. "We have integrated this into our annual workload with the staff that we have. It's a significant amount of work, but (Sentinel Lakes activities are) just a fraction of what we do."

Engel noted that there are a few gaps in some of the data. Last year's pandemic and social-distancing guidelines wouldn't allow for water-quality monitoring to take place, but other types of data were collected. And in 2012, when there was a state shutdown, some data collection that year wasn't done.

The program is beginning to pay dividends, Engel said.

"We are now getting to that point of 10-plus years of data on most of these lakes," he said. "We are starting to get into trend analysis. You need seven or eight years of data before you can even start to do that."

For Lake Carlos, in the north-central hardwoods region, a zebra mussel infestation discovered a decade ago has allowed scientists to analyze the effects that invasive species is having.

"The changes can be dramatic," Schoenebeck said, speaking generally about changes that can be seen due to the introduction of invasive species. "We have noticed those and detected those changes at the trophic level. Sometimes the changes are not as obvious at the fishery level. Fish take a little bit longer to react to things, whereas water quality and phytoplankton can be more impacted. At Lake Carlos, it was infested after the program started. We can see and understand how that impacts these different trophic levels, and how it impacts water quality."

Added Engel: "We are seeing evidence of the lake changing." There's been an increase in water clarity and a change in algal levels.

More data and time should reveal the larger ecological effects, Engel said.

"We can work with the data and learn how the biology is changing," he said. Engel noted other scenarios where that will be possible due to AIS introductions in Greenwood and Trout lakes, where spiny waterfleas have been found, or at 10 Mile Lake near Hackensack, which was recently found to have a zebra mussel infestation.

At Lake Shaokotan in Lincoln County, a change in land-use practices led to changes for the better.

"The lake shifted from an algal, turbid state," Schoenebeck said. "(Land-use changes) reduced phosphorous and the lake flipped to a clear, vegetative state. You have plants now where there were very few aquatic plants."

A few of the state's cisco lakes are in the program, and the intensive monitoring is answering questions about how climate change will effect those fish over the long haul.

By making this investment in data collection, fisheries and ecological scientists will be able to ask and answer questions about how these lakes are changing over time.

"We want to understand the changes occurring on all of these different levels so we can effectively manage the resources, including the fishery," Schoenebeck said. "It works because there is a common goal among all of the partners."

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