

Studying the Channels that Connect the Great Lakes

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Ecological monitoring is an essential part of managing ecosystems in the 21st century: it helps track changes due to human impacts, assesses pollution and efforts to clean it up, and offers insight into the intricate relationships between living things, both in the monitored area and in general. Scientific monitoring techniques can easily be applied to different regions of the world, but sometimes it's important to take a step back and make sure that the approach that makes sense for one study is still producing desired results in a different environment.

Scientists at the Environmental Protection Agency (EPA)'s Office of Research and Development do just that: working on the basic science of developing and testing new sampling methods and making sure techniques used in one environment work just as well in another setting.

The researchers assessed two Great Lakes connecting channels, the Huron Erie Corridor (HEC, better known as the St. Clair River, Lake St. Clair and the Detroit River) and

the St. Mary's River. From the assessment, they'll develop final recommendations for other EPA offices whose goal is to integrate data from samples taken in these connecting channels with information from samples taken in the Great Lakes nearshore areas in the most seamless way possible. Those findings, will eventually become part of the National Coastal Condition Assessment (NCCA), a nationwide aquatic resource survey that assesses the health of coastal lands across the country once every five years. But before that integration takes place, it's important to make sure that data is compatible between ocean coasts, the freshwater Great Lakes and the industrialized shipping channels that connect them.

When designing the study, the researchers decided to treat the connecting channel essentially like shallow water sites in the open lake, in order to match other NCCA sampling in the Great Lakes nearshore zone, and randomly selected sites so they would end up a representative view of the HEC's condition.

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This is an ideal approach to look at the connecting channel system as a whole, but is not ideal for evaluating localized hotspots like runoff from industrial sites. These sites tend to cluster along the shore and are unlikely to be hit with this randomized approach unless a very large number of sites are sampled, which would increase the cost of the survey. However, those sites are monitored by other initiatives like the Area of Concern program. The researchers are still evaluating how to balance those concerns as they develop the final recommendations for future surveys.

At each site in the study design, researchers took measurements of standard physical measurements like water temperature and dissolved oxygen content, as well as water chemistry, sediment chemistry, and benthic macroinvertebrate samples. They also collected underwater video, a novel way of determining what kinds of habitats are present on the lake bottom and which is becoming more common in survey programs like CSMI.

The researchers found that, as one might expect, water quality in the channels that connect Lake Erie and Lake Huron was somewhere between the water quality in each of the lakes. However, when categories like good, fair and poor are used to describe water quality, first those categories must be defined to make sure everyone is talking about the same things.

For NCCA, all of the Great Lakes have thresholds defined for good, fair and poor water quality. If water quality in the HEC is compared to, for example, thresholds for western Lake Erie, the quality appears better than if compared to the water quality thresholds for Lake Huron.

For example, in western Lake Erie, phosphorus content below 15 micrograms per liter is considered good, while anything above 32 micrograms per liter is rated as poor. However, in Lake Huron, good is defined as

less than five micrograms per liter, and anything above 10 micrograms is considered poor. So when conditions in the Huron-Erie Corridor are evaluated using the thresholds from Lake Huron, conditions in the HEC look mostly fair, while limits from western Lake Erie lead to the HEC being rated as good overall.

However, the thresholds for the Great Lakes were developed for the Great Lakes and may not be appropriate for defining good, fair, and poor water quality in the connecting channels. These channels are of similar depths as the nearshore regions of the lakes, but experience different water movements and industrial inputs from the lake shore areas. An ongoing goal of the study is identifying water quality thresholds that appropriately describe conditions for the connecting channels themselves (Figure 1).

Overall, the approach the scientists develop will offer a good way to get a general sense of the health of the ecosystem and how it is changing. This will complement more focused investigations related to restoration and remediation efforts that are the focus of many management agencies. Once data analysis is complete, they'll issue recommendations on how to integrate sampling in connecting channels into the overall Great Lakes assessment, and expect to have the procedures approved in time to hand them off to the research crews working the 2020 NCCA and other monitoring efforts like CSMI.

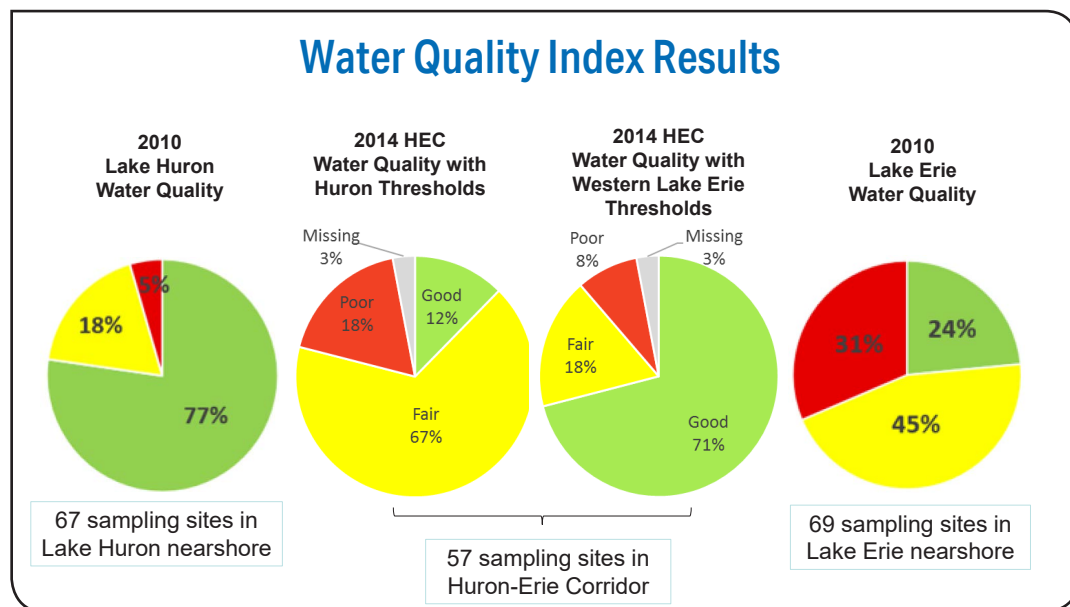


Figure 1