

# LAKE SUPERIOR

LAKEWIDE ACTION AND MANAGEMENT PLAN



2021 ANNUAL REPORT

A summer thunderstorm rolls over Lake Superior's Apostle Islands National Lakeshore, Wisconsin. Source: Getty Images

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## What is the Lake Superior LAMP?

Under the [Great Lakes Water Quality Agreement \(GLWQA\)](#), the governments of Canada and the United States committed to restore and maintain the physical, biological and chemical integrity of the waters of the Great Lakes.

The [Lake Superior Lakewide Action and Management Plan \(LAMP\)](#) is an ecosystem based strategy for protecting and restoring Lake Superior water quality. The LAMP is developed and implemented by 36 governments and agencies around the lake, together known as the Lake Superior Partnership.

The Partnership is led by the U.S. Environmental Protection Agency (U.S. EPA) and Environment and Climate Change Canada (ECCC) to facilitate information sharing, set priorities, and assist in coordinating environmental protection and restoration activities.

## OVERVIEW

Over the past year, the Lake Superior Partnership agencies conducted science and monitoring as part of the 2021 Cooperative Science and Monitoring Initiative (CSMI), and implemented other actions outlined in the draft 2020-2024 LAMP.

The Lake Superior Partnership agencies will also be participating in the [2022 Great Lakes Public Forum](#) in September in Niagara Falls, Ontario. The Forum is held every three years to engage the public on the state of the Great Lakes, progress achieved under the GLWQA over the past three years, and priorities that will guide the science and actions for the next three years.

Lake Superior continues to be in good condition. The lake is a safe, high-quality source of drinking water, with many healthy coastal wetlands and other habitats. While the lake is doing well, protective and restorative actions are necessary to prevent and address threats to ecosystem health.



Sunshine paddle in Rock Harbor, Michigan. Source: Getty Images

In the following sections of this annual report, the Lake Superior Partnership provides updates on our activities reducing chemical contamination, managing nutrients and algae, preventing and controlling invasive species, and restoring and protecting habitat and species.

## REDUCING CHEMICAL CONTAMINATION

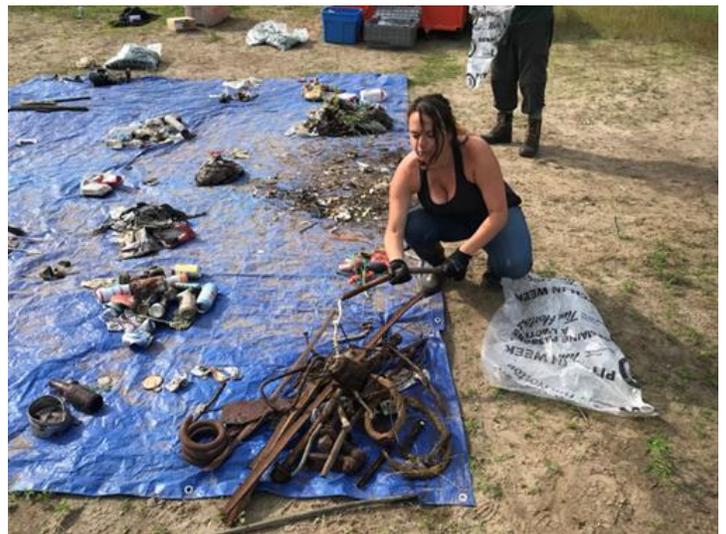
Lake Superior concentrations of toxic chemicals are much lower compared to the 1970s; fish consumption advisories, however, continue to be in effect. Chemicals such as mercury, PCBs, dioxin, toxaphene and PFAS can accumulate in fish tissues and may harm human health if consumption advisories are not followed. Efforts to reduce impacts of chemicals and other pollution in Lake Superior are continuing through innovative approaches for identifying sources and through outreach and engagement with businesses, including the projects described below.

### Identifying Mercury Sources in the St. Louis River Estuary

The Mercury Research Laboratory at the U.S. Geological Survey designed a study to examine sources of mercury in fish in the St. Louis River Area of Concern. Using an innovative method for source mercury identification, researchers were able to differentiate between century-old industrial contamination and contemporary sources. Results indicate that mercury contamination from past industrial usage is still present in sediments and the lower food web of the St. Louis River. Understanding the relative contributions of legacy versus contemporary mercury sources will help to inform restoration strategies. To learn more about this study, please see the corresponding [article](#).

### Reducing Plastic Pollution in Thunder Bay, Ontario

Thunder Bay's nearshore waters have some of the highest abundances of microplastics in Lake Superior, according to a recent published study by Kara Cox and others. In response, an increasing number of people and businesses are helping to reduce the amount of plastic waste reaching Lake Superior. EcoSuperior Environmental Programs with support from Ontario Ministry of the Environment, Conservation and Parks and Environment and Climate Change Canada are helping with clean-up events, helping move businesses away from using single-use plastics, and delivering presentations to schools and the community. In addition, 26 Thunder Bay restaurants have joined "[The Last Straw - Thunder Bay](#)" campaign to reduce single-use plastic waste in their operations. A growing number of individuals are cleaning up shorelines using supplied clean-up kits and recording the type of plastics being found such as cigarette butts, take-out containers, and fishing lines. Since 2016, 2 million cigarette butts alone have been recycled. Together, we are making a difference. [Visit the website](#) to learn how you can help.



*EcoSuperior volunteer sorts waste collected during a shoreline community cleanup. Source: EcoSuperior Environmental Program*

## MANAGING NUTRIENTS AND ALGAE

Lake Superior beaches and nearshore areas continue to provide good opportunities for swimming and recreational use. However, an increased frequency of algal blooms in some areas is an emerging concern. This increase in algal blooms is thought to be the result of warmer lake temperatures and changing precipitation patterns, including increased frequency of intense storms. Current management actions include conducting research to better understand historical and current nutrient conditions in Lake Superior and to identify conditions and locations for potential algal blooms such as the recent project described below.

### Investigating Algal Blooms in Shoreline Areas of U.S. National Parks

The U.S. National Park Service and U.S. Geological Survey are partnering to supply equipment for low-cost toxin sampling and analysis of up to 32 freshwater algal marine toxins and 25 marine algal toxins at selected U.S. National Parks. Results will provide the data essential to establish management action thresholds for algal blooms. Parks selected for inclusion in the project experience nuisance algal blooms or have implemented a Harmful Algal Bloom Sampling Program (i.e., Apostle Islands National Lakeshore

and Isle Royale National Park). The project includes engagement of citizen scientists through such programs as [BloomWatch](#), [CyanoScope](#), [CyanoMonitoring](#), and the [Phytoplankton Monitoring Network](#).



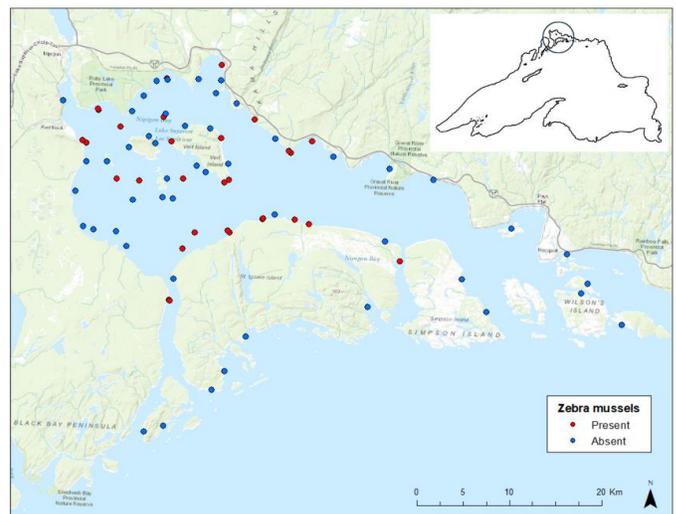
Algal bloom in Lake Superior. Source: National Park Service

## CONTROLLING INVASIVE SPECIES

Lake Superior's ecosystem continues to be dominated by native species with fewer new aquatic non-native species finding their way to Lake Superior compared to decades past. Invasive species that have established in the area, however, have altered Lake Superior's ecosystem at all trophic levels and have reduced the ecosystem's resilience. Creative measures are being used to combat invasive species such as Zebra Mussels and Rusty Crayfish as described below.

### Stopping the Spread of Invasive Zebra Mussels in Nipigon Bay, Ontario

Invasive Zebra Mussels can decrease habitat quality and habitat availability for native species. Lake Superior's water quality characteristics (e.g., low calcium concentrations) pose a challenge to Zebra Mussel spawning and survival in the lake, but they are present and spreading in a number of embayments. Anglers and boaters are helping stop the spread of Zebra Mussels established in Nipigon Bay, Ontario, by cleaning, draining and rinsing their boats, live wells, and bilge pumps to mitigate the spread of these invaders. Monitoring in 2020 and 2021 by Parks Canada and the Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry found Zebra Mussels at 23 of the 70 sites that were sampled.



Presence of Zebra Mussels in Nipigon Bay, Ontario. Source: NDMNRF

Zebra Mussels are most abundant in the northwest area of Nipigon Bay but are found as far east as Moffat Strait next to Simpson Island. Click [here](#) for more information on how to spot them and what you can do to help prevent the spread.

### [Addressing Impacts of the Invasive Rusty Crayfish in Pike Lake, Minnesota](#)

Pike Lake is one of many lakes in the Superior National Forest in Minnesota. The lake is infested with an invasive crayfish species called Rusty Crayfish, which is known to be very aggressive and out-competes the indigenous species of crayfish. The Rusty Crayfish are also known to destroy spawning areas of native fish, such as Yellow Perch, and natural grasses and other plants found in the lake. The Minnesota Department of Natural Resources conducted a survey to identify suitable areas for creating large wood structures along the shoreline which would benefit the declining Yellow Perch population in the lake by offering an alternative structure on which to lay their eggs. These structures offer other benefits to the lake's aquatic resources, including shade, resting cover, perches for birds and reptiles, and habitat for macroinvertebrate reproduction. The U.S. Forest Service built approximately eight structures in March 2021 and anticipates building more over the next five years. Cameras were installed at three structures to observe how the structures rest along the shoreline as ice melts from the lake. For more information on how to spot Rusty Crayfish and what you can do, click [here](#).



*Hauling wood structures to the shoreline for fish habitat.  
Source: U.S. Forest Service*

## PROTECTING AND RESTORING HABITAT AND NATIVE SPECIES

Many intact, high-quality habitats, including abundant coastal wetlands, are found in the Lake Superior ecosystem. Hard infrastructure in the watershed, such as dams and parking lots, alter habitats and can negatively affect water quality, native species populations and resiliency to climate change impacts. Current management actions such as the projects described below include efforts to assess and restore habitat degradation.

### [Protecting Shoreline in Thunder Bay, Ontario](#)

The [Superior Stewards Shoreline Protection Program](#) is a new shoreline assessment and educational program which provides private landowners with up to 100 plants to enhance shoreline and riparian zones, rehabilitate shoreline habitat, offer erosion protection, and improve water quality.



*Superior Stewards Shoreline Protection Program project.  
Source: Lakehead Region Conservation Authority*

The Shoreline Protection Program is focused on lands within the Thunder Bay Area of Concern to address fish and wildlife related beneficial use impairments. The program is managed by the Lakehead Region Conservation Authority with funding from the Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry. Over 1,000 native plants have been

installed so far, with plans to double the program's reach in 2022. Find more information about how to become a Superior Steward on the website.

### Restoring Fish Passage in Two Mile Creek, Michigan

Two Mile Creek is a tributary to the wild and scenic Cisco Branch of the Ontonagon River, which flows to Lake Superior. Located in the Ottawa National Forest in Michigan's Upper Peninsula, Two Mile Creek is a high quality/cold water stream that supports native Brook Trout and other important fish species. The Creek was identified as a priority for restoration actions in a forest-wide watershed condition classification effort. The Two Mile Creek Fish Passage Habitat Restoration Project, funded by the U.S. Forest Service and U.S. Fish and Wildlife Service under the Great Lakes Restoration Initiative, replaced an undersized and perched culvert that had created a barrier to adult and juvenile Brook Trout with a new bottomless culvert providing unrestricted access to 22 miles of high quality habitat. Construction of the new crossing included placement of bedding material (stone) within the culvert to restore natural channel function and used a seed mix of rye, fescue and clover to provide natural cover along the roadside slopes to reduce sediment impacts to the stream. In addition, the new appropriately-sized culvert increased the capacity of the site to withstand more frequent and intense storms and large climate change flooding. Project partners included the Superior Watershed Partnership, U.S. Forest Service Ottawa National Forest, U.S. Fish and Wildlife Service Ashland Fish and Wildlife Conservation Office, the Partners for Watershed Restoration collaborative, and the Ontonagon County Road Commission.



*Two Mile Creek culvert replacement – before (top) and after (bottom) restoration. Source: U.S. Forest Service*

# OUTREACH AND ENGAGEMENT

## GLWQA Engagement Opportunities

The Lake Superior Partnership held two *Let's Talk Lake Superior* public webinars in 2021 to discuss topics such as the draft LAMP and actions being taken to protect habitat and species. You can keep up to date on future public webinars and other GLWQA engagement opportunities in the [Engagement](#) section of [Binational.net](#). Information on many of our partner organizations' upcoming outreach and engagement opportunities can also be found at the Great Lakes Commission's "[Great Lakes Calendar](#)".

## CONTACT INFORMATION

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Sunset over Nipigon Bay near Dublin Creek, Ontario. Source: Getty Images