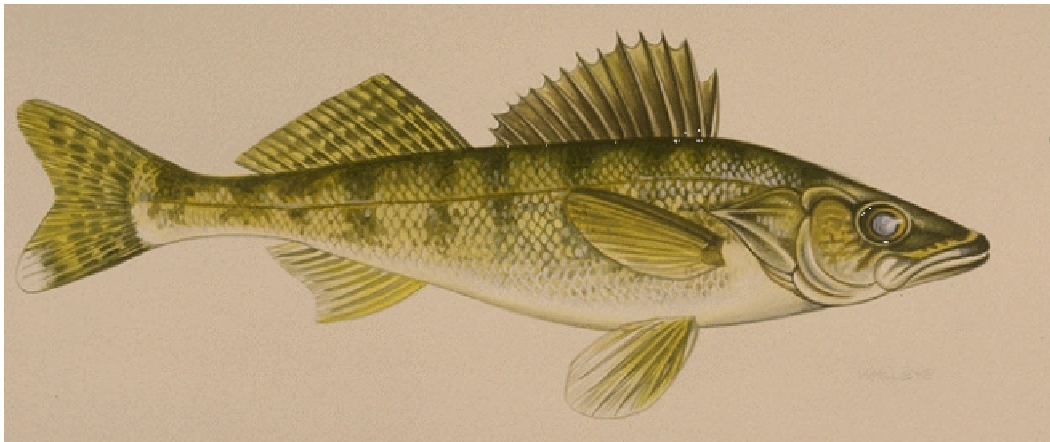


Chapter 8

The Aquatic Communities Progress Report

Insert at beginning of LaMP 2000 Chapter 8.



Walleye Pike
Image provided by Great Lakes Fishery Commission

Lake Superior Lakewide Management Plan
2004

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Chapter 8

The Aquatic Communities Progress Report

8.0 INTRODUCTION

The Aquatic Communities Committee (ACC) is comprised of fish biologists and aquatic scientists for federal, provincial and state agencies and tribal authorities within the Lake Superior Basin. This committee has a link to the Great Lakes Fishery Commission and its programs through the Lake Superior Technical Committee (LSTC). Many of the ACC members are also members of the LSTC. This unique relationship has meant that through the commitment of both committees to protect, restore and rehabilitate fish populations, habitats and fisheries, common objectives and strategies are shared. The committees have been able to work cooperatively together when seeking support from individual agencies and outside funding sources to help accomplish the requirements of the ACC work plan. This unique relationship has also allowed the committees to respond to some of the challenges and suggested next steps found in the Ecosystem Chapter of the LaMP 2002 Progress report.

The summary of accomplishments described below includes achievements of the 2002-2004 work plan's four priority projects and other lakewide projects. Several of these required data collection from the entire lake or large portions of it. These kinds of projects are expensive and logistically challenging to execute. It was only by forming agency and non-governmental organization partnerships that sufficient resources, expertise, and funding were pooled to do the work. The Canada-Ontario Agreement respecting the Great Lakes Basin Ecosystem (COA) was instrumental in funding the Ontario portion of many of these projects in 2003.

8.1 LaMP ACCOMPLISHMENTS 2002 TO 2004

1. Completed the first of a multiyear hydro acoustic survey that will provide an accurate biomass estimate of pelagic prey fish in Lake Superior as well as provide information that will allow development of a long-term prey fish monitoring survey. (*See details on acoustic surveys below*)
2. Began a multiyear lakewide program to identify and quantify critical habitat for key fish species to develop and understand the linkages between habitat supply and fish community production. (*See details on acoustic surveys below*)
3. Implemented efforts to restore or rehabilitate critical habitat for brook trout and other fish in 14 tributaries around the lake.
4. Broadened the breadth of knowledge and action towards lakewide brook trout rehabilitation through symposia, workshops and multidisciplinary projects,

- including population genetics, habitat modeling and assessment, management plan development, population surveys, stocking and protective regulations.
5. Began development of a walleye rehabilitation strategy for Black Bay in western Superior.
 6. Established multi-focused, lake-wide sturgeon rehabilitation effort with links to a larger Great Lakes effort through the Great Lakes Fishery Commission (GLFC) publication of a rehabilitation plan for Lake Superior. In addition, funding of Great Lakes workshops, describing the current status of spawning populations in historic sturgeon tributaries, developing a genetic profile for each population and habitat restoration have also helped in the rehabilitation effort.
 7. Agencies through the GLFC have developed a list of important research questions related to the Lake Superior aquatic community that seek to improve the understanding of lake trout population sustainability, food web dynamics, native species restoration, lower trophic levels, and the effect of introduced species.
 8. Established an inventory of tributary waters crossing along the north shore of Superior to identify existing risks to fish and fish habitat and those crossings in need of remediation. Crossings are prioritized for remedial action based on the level of risk.
 9. Begun the process of developing environmental objectives that will support Lake Superior's Fish Community Objectives.
 10. Submitted the next State of Lake Superior Report for review and publication by the GLFC (published every 5 years).
 11. The International Association for Great Lakes Research held a State of Lake Superior Conference in 2003 at Michigan under the Chairmanship of Dr. Marty Auer, a member of the ACC. This conference focused on lower trophic level studies and knowledge synthesis for the lake.
 12. Invasive species accomplishments – agencies continued fish surveillance surveys to document range expansion of ruffe and detect other Aquatic Nuisance Species (ANS) from Thunder Bay, Ontario to Sault Ste. Marie, Michigan. In 2003, round goby and white perch were discovered and confirmed in Thunder Bay Harbour, Ontario. Fish community surveys were continued in the St. Louis River and four other south shore rivers to monitor fish community structure in tributaries colonized by ruffe and other ANS. Educational materials (pocket guides, signage at boat landings, brochures, videos, etc.) continue to be produced by Sea Grant, Federation of Ontario Anglers and Hunters and others. These materials are distributed throughout the Lake Superior basin to prevent the introduction and control the spread of ANS.

13. Partnered with Ontario Power Generation for studies on how to restore sturgeon access to historic spawning sites below Kakabeka Falls on the Kaministiquois River, Thunder Bay.
14. Discontinued stocking of sturgeon in the St. Louis River upon return of adults to historic spawning sites.
15. Continued development of a management plan for brook trout in Wisconsin waters of Lake Superior.
16. Culvert and roadside erosion control video has been developed in Wisconsin. A total of 11 workshops were held throughout the state, 2 in the Lake Superior Basin. A total of 497 government and roadside crew workers participated in workshops, including about 100 in the Lake Superior Basin.
17. A symposium, "Living on the Edge: Protecting Lake Superior's Rivers and Streams", was held to address natural resource considerations in community planning. More than 300 government officials, natural resource personnel, and watershed group members attended.
18. Existing and potential areas of increased non-point pollution in the White, Marengo, and Potato river watersheds, Wisconsin, were documented. Suitable locations to focus stream bank buffer restoration locate retention ponds and create field filter strips were identified and recommended to local governments.
19. A GIS database with multiple Basin-level layers was developed for resource managers to assist decision making related to timber cutting cycles, tree planting programs, master planning, brook trout habitat, CRP and buffers, to best reduce erosion and sedimentation in Lake Superior tributaries.
20. Sea lamprey management and control activities continued in Lake Superior. Progress has been made on alternative control methods such as the use of pheromones to attract spawning-phase sea lamprey.

Selected Accomplishment Details

Using Remote Sensing Techniques to Answer Important Questions about the Aquatic Environment

Fisheries managers around Lake Superior have determined that in order to more effectively manage the Lake Superior fish community, they need to understand the relationship between habitat supply and fish production. Fishery biologists need answers to such questions as the following: Does the amount of spawning habitat limit the number of walleye or lake trout produced annually? Could there be greater numbers of young fish if nursery areas were larger? How many more fish might be produced if connectivity between habitats was improved or critical habitats rehabilitated?

Most of the fish biomass in the lake is produced or resides in water less than 50 m deep. This translates into a potential need to map and describe thousands of sq. km of lake and tributary bottom. With recent technological advances, Canadian and American fisheries managers are able to hire experts in acoustic technology to map critical spawning and nursery areas.

The National Water Research Institute of Environment Canada and the U.S. Geological Survey-Lake Superior Biological Station and others have applied their expertise in acoustic mapping surveys to map the distribution of substrates in specific areas of Lake Superior. Mapped areas include lake trout spawning areas along the Minnesota shoreline, nursery and shallow open water areas of Michipicoten Bay, Ontario, and southern



NWRI survey vessel
 Photograph by Susan Greenwood,
 Ontario Ministry of Natural Resources

Keweenaw Bay, Michigan, and sea lamprey nursery habitat in Batchawana Bay, Ontario. Other projects in progress or planned include Gull Island Shoal, Wisconsin, Buffalo Reef and Huron Bay, Michigan, Black Bay and Thunder Bay, Ontario.

By bouncing sound waves off the lake bottom and recording the strength of the return signal, scientists can determine the composition of the substrate. As sound waves are sent and received, location and water depth are simultaneously recorded which allows scientists to create a geo-referenced map of the substrate.

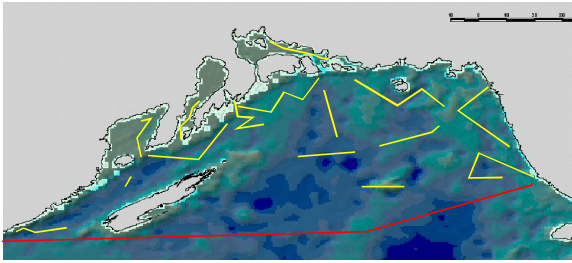
The final products of this acoustic mapping procedure are baseline descriptions of current habitat conditions that will support decision-making processes that seek to rehabilitate and sustain near shore fisheries. We now know what substrates (sand, clay, gravel, cobble) are present, in what surficial quantity, at what depth and exactly where they are relative to other substrates or bottom features.

Acoustic technology is also supporting the first ever comprehensive open water prey fish monitoring program for Lake Superior. As partners, the Ontario Ministry of Natural Resources, U.S. Geological Survey Lake Superior Biological Station, Great Lakes Environmental Research Laboratory of the National Oceanographic and Atmospheric Administration, the University of Minnesota-Duluth and member agencies of the GLFC, have developed a lake-wide acoustic assessment program to quantify the abundance of pelagic prey fishes (rainbow smelt, chubs and lake herring) in Lake Superior.



NWRI data collection on site
 Photograph by Susan Greenwood, OMNR

Realized Transect Locations-Year 1



R/V Kiyi Year One Transects
Figure by R. Hrabik Univ. of Wisconsin

This project will allow fishery biologists to develop a realistic estimate of the quantity and composition of the prey base in the offshore waters of Lake Superior and address a key piece of the fish community puzzle that has thus far been unavailable to fishery managers. The information gathered will provide valuable insight into the important relationship and balance of predator/prey fish in Lake Superior. Fishery managers will have additional data from which to effectively and adaptively manage Lake Superior fisheries in a stable and sustainable manner.

In 2003 the USGS vessel R/V Kiyi completed work in two of four open water quadrants. Pelagic prey fish abundance and biomass information was collected during night acoustic surveys and mid water trawls conducted in late summer. The methodology, bouncing sound waves off schools of fish swimming at depths of up to 300 m, collected data that through sophisticated modeling and statistical applications provides estimates of fish biomass and density by species.

The program is scheduled to continue into 2006 and will provide the first comprehensive review of just how big the prey fish biomass is, what depths are frequented by what species, and what areas of the lake are the most productive.

Native Species Rehabilitation

In 2003, rehabilitation plans for brook trout, lake sturgeon, and walleye in Lake Superior were completed by multi-agency committees and published by the Great Lakes Fishery Commission. This represents significant progress toward efforts to rehabilitate native fish species in Lake Superior. Plans are available on the web at <http://www.GLFC.org>.

Brook Trout Rehabilitation

With the publication of the Rehabilitation Plan for Brook Trout in Lake Superior and continuing and growing emphasis on brook



Nipigon Coaster Brook Trout
Photography by OMNR

trout rehabilitation, a workshop was held to coordinate and unify coaster brook trout rehabilitation efforts in Lake Superior. Fifty fisheries biologists, fishery managers and other scientists, came together to discuss long-term planning and to begin data consolidation for presentations at the 2004 National Meeting of the American Fisheries Society in Madison, Wisconsin. Participants recognized that some rehabilitation efforts will likely be achieved in 10-20 years while other efforts could take as long as 50-100 years.

Lake Sturgeon Rehabilitation

Progress was made in determining the current population status and abundance of lake sturgeon in historic spawning streams. Since 2002, status assessments have been initiated on eight Canadian tributaries to Lake Superior and one boundary river. They are the Goulais, Chippewa, Batchawana, Michipicoten, White, Little Black, Black, Pic and Pigeon rivers. Assessment netting on these rivers have resulted in the capture and collection of biological data from 70 fish. This effort brings the total number of Lake Superior tributaries in which assessment have been initiated to 15.

In addition to abundance and biological information, progress has been made in the effort to assess the genetic structure of spawning populations. This work seeks to delineate spawning stocks of lake sturgeon in Lake Superior and throughout the Great Lakes basin by their genetic characteristics. Preliminary work has shown that the genetic characteristics being analyzed are well suited to determination of genetic differences and similarities. The project is ongoing and a final report is anticipated in 2005.



Goulais River Sturgeon
Photography by OMNR

Conservation of the genetic integrity of the different spawning populations is an important management consideration. The delineation of management units based on genetic differences will help managers more efficiently target conservation strategies and better understand potential consequences of various management options. Data on levels of gene flow between spawning locations also provide insight into lake sturgeon ecology that is often difficult to detect through traditional population assessments.

8.2 CHALLENGES FOR 2004 TO 2006

Stresses and their impacts on aquatic ecosystems continue to be a challenge in the Lake Superior basin. The ACC has noted a number of challenges that, if successfully addressed, will make significant contributions to the LaMP goals related to the Lake Superior ecosystem and ultimately to human health.

- Establishing agency support for and maintenance of long-term biota and habitat monitoring programs.
- Ensuring the maintenance of healthy aquatic communities on rivers with, and those identified for, hydropower development.
- Completing around-the-lake mapping of near shore fish habitat.
- Preventing invasion and transport of non-native species within the Lake Superior basin.
- Funding continued monitoring efforts for invasive species and fish community changes and status.
- Protecting critical lake and tributary habitats.
- Expanding knowledge of aquatic systems and the human-induced perturbations that may have changed or limited their productivity.

8.3 NEXT STEPS FOR 2004 TO 2006

Future accomplishments will be dependent upon commitments by governments and other organization to support the science, resource management and legislative activities that will protect and restore the basin. During the next reporting cycle, the ACC will continue some projects begun since 2002 and initiate others once needed support has been found.

- Continue with the acoustic projects related to prey fish monitoring and critical shallow water habitat quantification.
- Continue to work with local communities and stakeholders to rehabilitate coaster brook trout, walleye and sturgeon populations.
- Establish environmental objectives for Lake Superior.
- Establish a lower trophic level monitoring program for Lake Superior.
- Report on the status of lake herring since the recovery of its top predator, lake trout.
- Identify inland aquatic systems in need of rehabilitation or protection to meet LaMP objectives. (e.g. stream road crossings with impaired habitat)
- Implement field trials to examine the feasibility of using sea lamprey pheromones as an additional tool for control and management of sea lamprey.

Members of Aquatic Communities Committee

Co-Chairs: Sue Greenwood, Ontario Ministry of Natural Resources
Henry Quinlan, U.S. Fish and Wildlife Service

Members: Mark Ebener, Chippewa-Ottawa Resource Authority
Don Schreiner, Minnesota Department of Natural Resources
Steve Schram, Wisconsin Department of Natural Resources
Owen Gorman, U.S. Geological Survey
Bill Mattes, Great Lakes Indian Fish and Wildlife Commission
Mike Donofrio, Keweenaw Bay Indian Community
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Mike Fodale, U.S. Fish and Wildlife Service, Sea Lamprey Management
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