Lake Superior Committee

Ypsilanti Marriott at Eagle Crest
Ypsilanti, Michigan
23, 24 March 2004

Executive Summary

Members: Chair Tom Gorenflo (CORA), Vice Chair Ken Cullis (OMNR), Steve Hewett (WIDNR), Bill Mattes for Neil Kmiecik (GLIFWC), Steve Scott (MIDNR), Jack Wingate (MNDNR)

Highlights: Wild lake trout dominate predator community; lake herring dominate preyfish biomass, followed by chubs and smelt. Sea lamprey abundance increased from 2002.

1. Proposed Targets for Sea Lamprey to Support FCOs (attachment)
The LSC approved target sea lamprey populations to secure 5 marks per 100 lake trout.

2. Disease Screening for Sea Lamprey (attachment)
The LSC concurred with plans to screen sea lamprey for *Heterosporis* as well as restricted and emergency diseases listed in the Model Program before moving them between lakes. (The only exception is that lamprey to be moved among the Upper three lakes will not be screened.) Sea lamprey positive for *Heterosporis* will not be moved. Positive results for other diseases will be referred to the Fish Health Committee for recommendation to the Lake Committee responsible for the destination lake.

3. Environmental Objectives (attachment)
The LSC approved the environmental objectives template as prepared and presented by Tom Pratt (DFO). LSTC was charged to continue development of EOs including identifying indicators and long-term monitoring needs. LSTC will address this task at their summer 2004 meeting, and target their winter 2005 meeting for a final draft.

4. Update on Memoranda of Understanding and Agreement between the Council of Lake Committees and the US Geological Survey
J. Wingate and Leon Carl (USGS) reported that the MOU and MOA on the USGS large vessel program are in the process of being signed. The CLC wrote in support of bringing the 2005 budget up to historical base, i.e., adding $1.7 million. Leon Carl indicated that up to four research scientist positions will be advertised within a week, and USGS will seek full funding in the Administration's FY 2006 budget request.

5. Status of Lakewide Acoustic Surveys
Mark Ebener noted that acoustic surveys have occurred only in Ontario waters, and recommended that efforts be made to seek funding to survey the south shore as well. The first four years of a six year program will be completed this summer – it will take two

more years to complete the south shore. Questions remained regarding the costs and staff necessary to complete the south shore surveys. The Lake Superior Technical Committee will draft a coordinated proposal to complete the lakewide acoustic survey, for submission to the Restoration Act RFP in December 2004. Tom Hrabik (U of Minnesota) will supply the Lake Superior Technical Committee with an estimated budget for completing the lakewide acoustic survey in Wisconsin and Michigan. Don Schreiner (MNDNR) and Ken Cullis (OMNR) will supply Hrabik with sample budget and text from an earlier MOU for Minnesota and Ontario waters.

6. Coordination of Large Vessel Research and Assessment Activities
Don Schreiner (MNDNR) reported that he had formed an ad hoc task group associated with the Lake Superior Technical Committee to compare plans of large research and assessment vessels operated by USGS, EPA-Duluth, EPA-GLNPO, U of Minnesota-Duluth, and Environment Canada, with objective of coordinating sampling activities, sharing data, and perhaps sharing vessel time.

7. Chinook Salmon in Commercial Fishery
K. Cullis (OMNR) reported chinook salmon bycatch is increasing in commercial lake herring nets, and was seeking input from other agencies as to how they regulate salmon harvest. Ken indicated that moving the herring nets is not an option, and Ontario is struggling with developing regulations to address the bycatch issue. This year Ontario fishermen were allowed to record and give away five salmon (recreational daily catch limit) to any individulal. In future, fishermen may be reimbursed for handling incidentally caught salmon. Of the U.S. agencies, only CORA and GLIFWC fishermen are permitted to sell chinook or coho salmon.

8. Salmon Stocking in Lake Superior
Don Schreiner (MnDNR) noted that Michigan is conducting coho salmon stocking, while Minnesota has been expressing the opinion with its constituents that there is no need to stock salmon in Lake Superior waters. Don raised the possibility of drafting a coordinated news release educate lake-wide constituent groups. The LSC requested the assistance of Marc Gaden (GLFC) in compiling a “good news” statement on declining need to stock salmon, e.g., most returns are wild, hatchery returns are declining, lake trout eat young salmon.

9. Status of Mass Fish Tagging Proposal
Mark Ebener (GLFC, CORA) reported that Gary Whelan (MIDNR) is assessing hatchery needs and Chuck Bronte (USFWS) is evaluating tag recovery needs and capacity. M. Ebener will report to the CLC in April and October, which will decide in October on whether to seek funds to support mass-tagging. Washington DNR has agreed to lend a trailer this summer for demonstrating mass marking in the Great Lakes, e.g., lake trout at Iron River NFH and coho at the Platt River SFH. The GLFC will pay the cost of shipping the trailer.

10. Research Initiatives and Priorities
Not discussed.

Lake Superior Committee, March 23-24, 2004

Targets for Sea Lamprey Populations in Lake Superior

Purpose:

The Great Lakes Fishery Commission (GLFC) is soliciting input from the lake committees and their technical committees on proposed targets for sea lamprey abundance that meet the Fish Community Objectives (FCOs).

Estimating Targets:

- **FCO Direction –** The FCOs among the lakes generally call for sea lamprey to be suppressed to levels at which they affect insignificant mortality on lake trout and other fish. The Lake Superior Committee (LSC) revised their FCO for sea lampreys to reflect this thinking and called for suppression to the levels that cause insignificant mortality on lake trout. Insignificant mortality was described as an annual rate of less than 5%.

- **Fish Damage Status –** New summaries of comparable values for marking rates on lake trout have been compiled for all lakes. Raw data were assembled so that the stage (A1-3) and fish size (>21") could be compared among the lakes. Lake trout were used as an indicator of effects on fish communities because they are the preferred prey and are the native top-predator in cold-water portions of the lakes. The mortality caused by sea lampreys can be estimated from a relationship between marking rates and the probability of surviving an attack. This relationship suggests that marking rates of less than 5 marks per 100 fish would result in a tolerable annual rate of mortality of less than 5%.

- **Sea Lamprey Status –** Estimates of the number of spawning-phase sea lampreys were used as measures of abundance in each lake. We assumed low mortality during the period sea lampreys feed in the lake and used the spawning-phase abundance as an indicator of parasitic-phase abundance. Annual estimates of lake-wide abundance of spawning-phase sea lampreys and confidence intervals were extrapolated from a regression model that relates the run size in individual streams to the discharge and larval abundance (or treatment history) in all streams in which the animals spawn (Mulett et al, 2003).

- **Estimating Sea Lamprey Targets –** We estimated targets by selecting a period when observed marking rates had averaged less than 5 marks per 100 fish. The lowest observed rate of marking was during the 5-year period between 1994 and 1998. The mean sea lamprey abundance and confidence interval was estimated for this period.

Sea Lamprey Abundance Targets:

	Targets	95% CI	Years	Marks/100 fish
Superior	35,000	18,000	1994-1998	5.2
Michigan	58,000	13,000	1988-1992	4.7
Huron	74,000	20,000	1989-1993	25.9
Erie	3,000	1,000	1991-1995	4.4
Ontario	43,000	15,000	1991-1995	8.2

Using and Refining Targets:

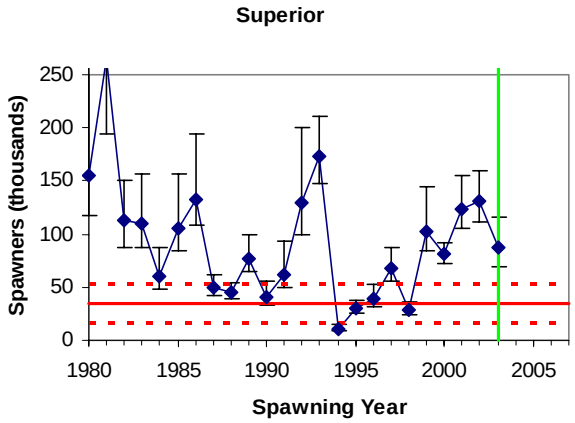
These targets will provide the basis for the lake committees to provide input to the GLFC on the following questions:

- ***How successful has sea lamprey control been relative to the Fish Community Objectives on your lake?***
- ***Will the proposed control program proposed for next year (e.g. 2004) move us toward those FCO targets?***

Consistent with its Vision, the GLFC will use the status of sea lampreys relative to these targets to guide its decisions on allocation of control. These targets will be refined with improvements in our understanding of the dynamics of the damage caused by sea lampreys, our estimates of the abundance of sea lampreys, and of the effectiveness and costs of control.

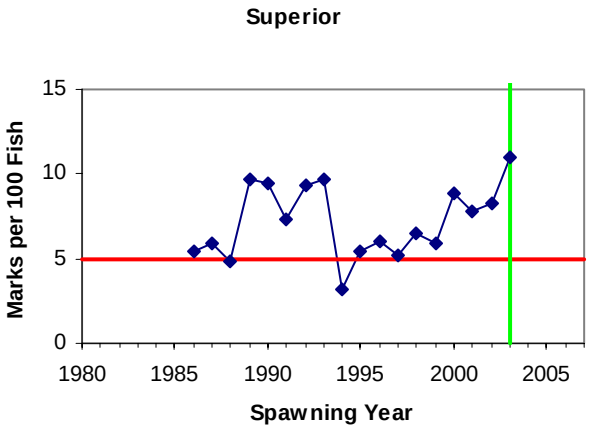
PANEL 1 - LAKE SUPERIOR

a. Sea Lamprey Status: spawning-phase numbers



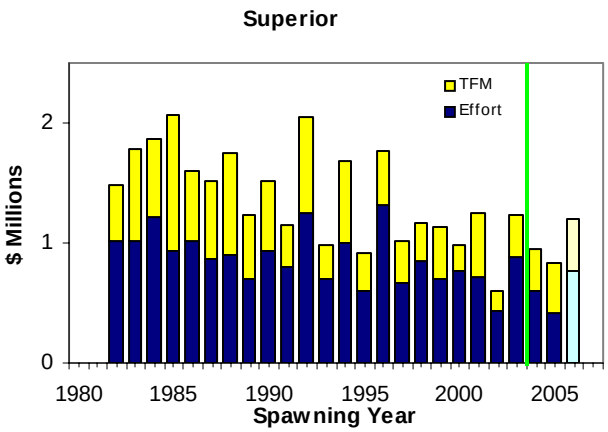
- Sea lamprey abundance above target levels during early 1980s, within targets during late 1980s and early 1990s, and increasing thereafter through 2002.
- Abundance reduced during 2003 toward target levels as a result of increased number of treatments during 2001.

b. Fish Damage Status: marks per 100 lake trout



- Was at 5 marks per 100 fish during middle 1990s.
- Increased during later 1990s-early 2000s as abundance of lampreys increased.
- Trend continues in 2003
- 2003 wounding did not show expected decline following the reduction in spawning-phase abundance.

c. Lampricide Control Actions: treatment costs



- Treatment effort and lampricide expenditures were greater in the 1980s than during the later 1990s. Overall downward trend.
- Less expenditures of treatments since start of ranking by ESTR (1996-2003) than before (1980-1995).
- In 2004 target-weighted allocation of added stream treatment effort will increase treatments to near the 2001 level.

Lake Superior Committee, March 23-24, 2004

Transfer of Sea Lampreys among Lakes and Disease Screening

Issue: The Great Lakes Fishery Commission (GLFC) seeks the Lake Superior Committee's review and concurrence with its plans to move sea lampreys from Lake Ontario to Lake Superior.

Background: The commission and the sea lamprey control agents are committed to leading in application of the fish health model program in order to minimize risk to fishes in the Great Lakes. We have met all previous requirements for testing of fish proposed for importation from outside the Great Lakes basin. During last year, we met all testing requirements for heterosporis following the Fish Health Committee's (FHC's) recommendation to the CLC to limit transfer of fish from Lake Ontario. We will continue to work with the FHC to ensure that adequate evaluations and screening procedures are in place for any transfer where there could be risk to fish in the wild. We will continue to work with the Lake Committees evaluate the trade-off between the risks of transfers versus their benefits to sea lamprey control.

Why move sea lampreys? Purposes for moving sea lampreys from Lake Ontario to Lake Superior include:

- larvae for mark-and-recapture estimates of larval populations to verify the accuracy of our assessment techniques; and
- adult males for sterilization and release for control on the St. Marys River

Larval sea lampreys in the Lake Ontario drainage are especially fast growing and productive offering opportunity to efficiently collect larger and metamorphosing specimens. Adults from Lake Ontario represent a source independent of the effects of the control effort on the St. Marys River and as such provide a valuable influx of males to this alternative control effort.

The disease issue: The FHC has recommended that fish movement from Lake Ontario be minimized in order to prevent the spread of the microsporidian parasite heterosporis from Lake Ontario. Further, the FHC has recommended that the model program screening for restricted diseases be carried out on sea lampreys moved among the lakes. Sea lampreys have been found to harbour a number of diseases that are common in to other Great Lakes fishes including, for example, bacterial kidney disease and enteric redmouth. The model program seeks to restrict movement of diseases that have a limited geographic range in the lakes. Along with heterosporis, members of the FHC are concerned about movement of the following geographically isolated or non-evident diseases: whirling disease, anti-biotic resistant furunculosis, and EED.

Our proposal for screening: We propose to screen all sea lampreys moved from Lake Ontario for heterosporis along with the emergency and restricted diseases from the model program. **We do not intend to screen sea lampreys transferred among the upper three lakes.** We consider the upper three lakes to be open systems and have clear

evidence of sea lampreys moving among these lakes (mark and recapture results). We will continue to move animals among the upper lakes as we have for the last decade for SMRT release and for mark and recapture without screening. We do not intend to transfer sea lampreys from Lake Erie this year.

We intend to solicit help with this screening from members of the FHC. Rapid turn around is critical to efficiently and effectively carrying out these transfers. We will ask the FHC to provide further review of the details of our screening plans.

Screening results and recommendations to the lake committee: We will work with the chair to establish a subcommittee of the FHC to review the results of the screening and make recommendation to the lake committee based on these results.

Positive observations of heterosporis will result in no transfer from the source location. Observations of other diseases or pathogens will have to be reviewed by the FHC and, based on determination of their geographic distribution and potential effect, recommendation on the transfer will be made to the lake committee.

Future direction: We intend to continue the transfer of sea lampreys to improve assessment and control to support the Fish Community Objectives in all the Great Lakes. We are supportive of transmission studies on heterosporis in order better understand risk of transfer with sea lampreys. We also support a formal risk analysis of the costs and benefits of movement of sea lampreys from Lake Ontario to the upper lakes.

Attachment to Item 3

Draft Template for Lake Superior Environmental Objectives

Tom Pratt, Fisheries & Oceans Canada
Susan Greenwood, Ontario Ministry of Natural Resources
Henry Quinlan, U.S. Fish & Wildlife Service
Neville Ward, Fisheries & Oceans Canada

Background

The 1997 revision of the Joint Strategic Plan for Management of Great Lakes Fisheries reiterated the need for each lake to develop environmental objectives in order to support the successful implementation of fish community objectives. The plan was first proposed in December 1980 as a commitment to inter-jurisdictional coordinated fishery management based upon an ecosystem approach (GLFC 1980). The Strategic Vision of the Great Lakes Fishery Commission for the First Decade of the New Millennium (2001) also stated that ecosystem protection was necessary for the restoration of healthy, diverse Great Lakes fish communities. As such, Lake Committees were tasked with identifying environmental issues that may interfere with the implementation of Fish-Community Objectives (FCOs) on each Great Lake. The publication of FCOs for Lake Superior (Horns et al. 2003) provides an opportunity to develop environmental objectives (EOs) for Lake Superior around current FCO's.

Lake Superior environmental objectives were specifically developed to promote the achievement of Lake Superior FCO's by identifying ecological conditions required to meet Lake Superior FCO's. For the purposes of this report, Lake Superior is considered to start in the St. Louis Estuary and Nipigon Bay in the west, and end at the St Marys River compensating gates in the east. Many of the environmental concerns potentially impairing the achievement of FCOs occur outside of the lake proper, so the development of EOs included an assessment of watershed level processes.

Guiding Principles

The usefulness of any EO depends on whether it addresses relevant issues at the appropriate temporal and spatial scale, and as such EOs should:

- be quantifiable
- maintain or restore habitat diversity
- speak to emerging ecosystem issues

Development of Lake Superior Environmental Objectives

To this point, an ad hoc committee, consisting of Tom Pratt (Fisheries & Oceans Canada), Sue Greenwood (Ontario Ministry of Natural Resources), Henry Quinlan (United States Fish and Wildlife Service), and Neville Ward (Fisheries & Oceans Canada) have developed draft Lake Superior EOs without substantive comment from other Lake Superior Technical Committee (LSTC) members. To ensure that the process becomes more inclusive, the broader LSTC community should comment on this draft before the document is presented for wider consultation.

There are three draft Lake Superior EOs. We define EOs as long-term environmental outcomes required to support the achievement of FCOs. Each EO is followed by a table which consists of a hierarchy of supporting environmental criteria, which we define as conditions or processes by which EOs may be assessed, and a list of which FCO that each criteria addresses. Every criterion has one or more elements (a grouping of related indicators) and indicators (quantitative measure), an explanation of the importance of the element, and an assessment of potential data availability and/or gaps.

Fish Community Objectives

In order to assess the draft Lake Superior EOs, it is necessary to have a summary of Lake Superior FCOs. They include:

(1) Habitat—*Achieve no net loss of the productive capacity of habitat supporting Lake Superior fishes. Where feasible, restore habitats that have been degraded and have lost their capacity for fish production. Reduce contaminants so that all fish are safe to eat. Develop comprehensive and detailed inventories of fish habitats*

(2) Prey Species—*A self-sustaining assemblage of prey dominated by indigenous species at population levels capable of supporting desired populations of predators and a managed commercial fishery*

(3) Lake Trout—*Achieve and maintain genetically diverse self-sustaining populations of lake trout that are similar to those found in the lake prior to 1940, with lean lake trout being the dominant form in nearshore waters, siscowet lake trout the dominant form in offshore waters, and humper lake trout a common form in eastern waters and around Isle Royale*

(4) Lake Whitefish—*Maintain self-sustaining populations of lake whitefish within the range of abundance observed during 1990-99*

(5) Walleye—*Maintain, enhance, and rehabilitate self-sustaining population of walleye and their habitat over their historical range*

(6) Lake Sturgeon—*Rehabilitate and maintain spawning populations of lake sturgeon that are self-sustaining throughout their native range*

(7) Brook Trout—*Maintain widely distributed, self-sustaining populations in as many of the historical habitats as is practical*

(8) Pacific Salmon, Rainbow Trout, and Brown Trout—*Manage populations of Pacific salmon, rainbow trout, and brown trout that are predominantly self-sustaining but that may be supplemented by stocking that is compatible with restoration and management goals established for indigenous fish species*

(9) Sea Lamprey—*Suppress sea lampreys to population levels that cause only insignificant mortality on adult lake trout*

(10) Nuisance Species—*(i) Prevent the introduction of any non-indigenous aquatic species that is not currently established in Lake Superior; (ii) Prevent or delay the spread of non-indigenous nuisance species, where feasible; (iii) Eliminate or reduce populations of non-indigenous nuisance species, where feasible*

(11) Species Diversity—

Protect and sustain the diverse community of indigenous fish species not specifically mentioned earlier (burbot, minnows, yellow perch, northern pike, and suckers). These species add to the richness of the fish community and should be recognized for the ecological importance and cultural, social, and economic value

Environmental Objectives

1. Maintain, protect and rehabilitate habitats to ensure habitat diversity is conserved

Environmental Criteria	FCO linkages	Elements of EO	Indicators of EO	Importance of element	Data available/data requirements
Maintenance and enhancement of habitat linkages	Habitat Prey Species Lake Trout Lake Whitefish Walleye Lake Sturgeon Brook Trout PcSm, RbTrt & Brn Trt Species Diversity	Tributary access	- area of upstream habitat gained with barrier removal/mitigation - increase reach lengths between barriers	FCO's for a number of species (walleye, lake sturgeon, brook trout) rely on improved access to traditional spawning areas	- barrier number, location, fish passage capability - watershed-level GIS-based estimates of habitat availability - spatial habitat inventory - knowledge of species-specific habitat requirements
		Nursery access	- area of wetlands reconnected or rehabilitated	Wetlands contain the highest fish diversity of any Great Lakes aquatic habitat, and it is estimated that over 90% of Great Lakes fishes use wetlands at some point in their life cycle	- wetland inventory (current and historic) - knowledge of species-specific habitat requirements
Protection, maintenance and enhancement of important habitats	Habitat Prey Species Lake Trout Lake Whitefish Walleye Lake Sturgeon Brook Trout	Spawning (reef and tributary) habitat	- area protected or rehabilitated - # water management plans that include restored natural hydrologic function - area of tributaries with	Problems include sedimentation (land-use, dredging), low water levels, egg predation, channelization	- knowledge of area-per-individual requirements - knowledge of species-specific habitat requirements

	PcSm, RbTrt & Brn Trt Species Diversity		maintained or restored natural channel morphology		
		Nursery habitat	- area protected or rehabilitated - area of nursery areas with improved hydrologic function	Problems include low water levels, biotic degradation (aquatic nuisance species)	- knowledge of species-specific habitat requirements
Restoration of natural hydrological processes and water fluctuation patterns	Habitat Prey Species Walleye Lake Sturgeon Brook Trout PcSm, RbTrt & Brn Trt Species Diversity	Water exchange between pelagic and nearshore areas	- area restored to natural hydrologic function	Lake circulation patterns in nearshore areas are affected by human development (dredging, revetments, etc.)	- inventory of habitat status - knowledge of species-specific habitat requirements
		Lake levels	- restoration of natural water fluctuation regime - ensure no export permits issued		
		Tributary flows	- # water management plans that include restored natural hydrologic function		

2. Maintain, protect and restore native community function

Environmental Criteria	FCO linkages	Elements of EO	Indicators of EO	Importance of element	Data available/data requirements
Protection, maintenance and enhancement of self-sustaining native food web	Habitat Prey Species Lake Trout Lake Whitefish	Primary producers	- year round chlorophyll concentrations at 40-50 $g/m^2/yr$ (or summer	Bottom-up effects limit overall lake productivity; maintaining current	- GLNPO data

	Walleye Lake Sturgeon Brook Trout PcSm, RbTrt & Brn Trt Sea Lamprey Nuisance Species Species Diversity		concentrations > 0.4 g/m^3?)	diverse phytoplankton community is important for important energy transfer to higher trophic levels; no current problems	
		Secondary producers	- offshore spring zooplankton density > 0.6 gDW/m^2 -offshore *Diporeia* density of >1500/m^2		- GLNPO data
		Prey fish forage base	- species richness target of ? - density/biomass target of ? -lake herring compromise > 50% of LT diet		- base richness and biomass / density targets on USGS bottom trawl data? - each agency continue to collect and analyze diet data
		Piscivores / top predators	- estimate of density? - estimate of biomass? - # spawning stocks		- agency data
Protection of genetic diversity	Prey Species Lake Trout Lake Whitefish Walleye Lake Sturgeon Brook Trout	Genetic diversity	- # spawning stocks restored - # historic spawning sites reclaimed		
Maintenance of sustainable fishery	Prey Species Lake Trout Lake Whitefish Walleye	Commercial fishery	- total mortality <45% - total quota <0.25 kg/ha		

	Lake Sturgeon Brook Trout				
		Sport fishery	- angler harvest <0.1 kg/ha		
		Sea lamprey control	- wounding rates <1/100 - reduce sea lamprey mortality to < 5% of total mortality		
Cease introduction of non-indigenous species		Aquatic species introductions	- # new introductions - ballast water standards - # biota from connected watersheds		
		Stocking	- stocking densities	Cease stocking when indigenous species are self-sustaining	-agency data

3. Maintain, protect and restore water quality

Environmental Criteria	FCO linkages	Elements of EO	Indicators of EO	Importance of element	Data available/data requirements
Maintain oligotrophic conditions in nearshore and offshore areas, and enhance water quality in tributaries and embayments	Habitat Prey Species Lake Trout Lake Whitefish Walleye Lake Sturgeon Brook Trout PcSm, RbTrt & Brn Trt Nuisance Species Species Diversity	Nutrient levels	- open lake phosphorus concentrations (<5*u*g/L?) - open lake nitrogen concentrations (<400 *u*g/L?) - changes in wastewater treatment facilities		
		Water temperature	- seasonal temperatures (e.g. summer < 12°C, winter < 4°C in open lake)	Maintain community structure; reduce spread of exotics	

			- thermal discharge temperatures - decelerate climate change indicators	Land-use practices can significantly alter water temperatures in tributaries	
		Dissolved oxygen	- oxygen concentrations	More important in future with climate change?	
		Sediment loading and suspension	- sedimentation rates (kg/ha/yr) - turbidity (NTU's)	Results in loss of spawning areas for tributary and shoal spawners Physical disturbance (e.g. vessel wake) can suspend sediments in shipping areas	
Ensure zero discharge of contaminants in Lake Superior basin	Habitat Prey Species Lake Trout Lake Whitefish Walleye Lake Sturgeon Brook Trout PcSm, RbTrt & Brn Trt Nuisance Species Sea Lamprey Species Diversity	Bioaccumulation sources	- airborne chemical concentrations - point source concentrations - # contaminated sites cleaned up		
		Fish consumption advisories	- Hg <0.45 ppm; PCBs<0.5 ppm, Mirex < 0.013 ppm, toxaphene < 0.2 ppm, dioxins and furans <10ppt, etc.		