

Appendix A:

**Lake Superior Areas of Concern/
Remedial Action Plan Summary Matrix and
Fact Sheets**

This document replaces LaMP 2004 Appendix A.



Islands off of Thunder Bay.
Photo Credit: John Marsden, Environment Canada.

**Lake Superior Lakewide Management Plan
2006**

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Appendix A

Lake Superior Areas of Concern/Remedial Action Plan Summary Matrix and Fact Sheets

A.0 INTRODUCTION

As noted in Chapter 1, Section 1.3.1, entitled Remedial Action Plans for Areas of Concern, the Remedial Action Plans (RAPs) and LaMPs are similar in that they both: use an ecosystem approach to assessing and remediating environmental degradation, consider the 14 beneficial use impairments outlined in Annex 2 of the Great Lakes Water Quality Agreement, and rely on a structured public involvement process. Forging a strong relationship between the LaMPs and the RAPs is important to the success of both efforts. The Areas of Concern (AOCs) can, in many cases, serve as point source discharges to the lake as a whole. Improvements in the AOCs will, therefore, eventually help to improve the entire lake. Much of the expertise related to the use impairments and possible remedial efforts resides at the local level; cooperation between the two efforts is essential in order for the LaMPs to remove lakewide impairments. Information on the progress of RAPs for the eight AOCs in Lake Superior is presented in both a summary matrix and individual AOC information sheets in this Appendix.

A.1 AREAS OF CONCERN SUMMARY MATRIX

AOC Name	Primary Contaminants	Geographic Area	Stressors	Beneficial Use Impairments	Funding Programs and Partners	Clean-Up Actions Completed	Key Activity Needed	Barriers	Next Steps
St Marys River Michigan/Ontario	<ul style="list-style-type: none"> PAHs Oil and grease Bacteria 	From the head of the river at Whitefish Bay (Point Iroquois - Gros Cap), downstream through the St. Joseph Channel to Humberg Point on the Ontario side, and to the straits of Detour on the Michigan side.	<ul style="list-style-type: none"> Combined sewer overflows Loss of wetlands Point and nonpoint source pollution Wastewater discharges Urban/industrial development Navigational structures Contaminated Sediment and sediment resuspension 	<ul style="list-style-type: none"> Fish and wildlife consumption restrictions Fish and wildlife degradation Fish tumors or other deformities Degradation of benthos Dredging activities Restrictions Eutrophication or undesirable algae Beach closings Aesthetics degradation Loss of fish and wildlife habitat 	<ul style="list-style-type: none"> Superfund Clean Water Act Navigational dredging Canada Ontario program Great Lakes Sustainability Fund Canada-Ontario Agreement Great Lakes Legacy Act 	<ul style="list-style-type: none"> Steel and paper mills in Sault Ste. Marie, ON improved quality of effluent Steel mill improvements through 2000-2005 Environmental Management Agreement among Algoma Steel, Canada and Ontario Infrastructure upgrades (Combined sewer separation and overflow storage tanks) by Sault Ste. Marie, Ontario Upgrade East End STP to secondary treatment 	<ul style="list-style-type: none"> Complete sediment assessment Complete Tannery Bay Legacy Act contaminated sediment Restoration Complete sediment remediation at former MGP site Monitor key fish separation and wildlife populations to confirm progress 	<ul style="list-style-type: none"> Resource limitations 	<ul style="list-style-type: none"> Monitoring to confirm restoration at cleaned contaminated sediment sites. Development and implementation of sediment management plan Update delisting criteria
Deer Lake Michigan	<ul style="list-style-type: none"> Mercury Historic Nutrient Loadings 	A 906-acre impoundment in central Marquette County, Michigan. The AOC includes Carp Creek, Deer Lake, and the Carp River downstream 20 miles to Lake Superior at Marquette.	<ul style="list-style-type: none"> Contaminated sediments from waste materials associated with historic iron, gold and silver mining practices 	<ul style="list-style-type: none"> Fish and wildlife consumption restrictions Eutrophication Degradation of Eagle Populations 	<ul style="list-style-type: none"> Michigan DEQ Water Bureau 	<ul style="list-style-type: none"> Sewer separation; primary treatment plants replaced by advanced secondary wastewater treatment Deer Lake was drawn down and refilled to allow methylation of mercury from exposed sediments 	<ul style="list-style-type: none"> Identify and restore beneficial uses of the Carp River watershed 	<ul style="list-style-type: none"> PRP and state negotiations nearing completion. Unknown 	<ul style="list-style-type: none"> Sediment remediation Complete analysis of beneficial use impairments Have begun Delisting Determination Document using state developed delisting guidance to determine which BUIs are eligible for delisting.
Torch Lake Michigan	<ul style="list-style-type: none"> Copper Mercury Arsenic Lead Chromium Heavy metals 	Torch Lake and immediate environs.	<ul style="list-style-type: none"> Contaminated sediments from mine tailings associated with historic copper mining and milling practices Upland mine tailings deposits from historic copper mining 	<ul style="list-style-type: none"> Fish and wildlife consumption restrictions Degradation of benthos Fish Tumors 	<ul style="list-style-type: none"> Superfund MDEQ, AOC and District 	<ul style="list-style-type: none"> Superfund - recommended remedial actions have been completed – coverage of exposed mine tailings and stamp sands 	<ul style="list-style-type: none"> Identification of potential PCB source related to fish consumption advisories 	<ul style="list-style-type: none"> PCB source remediation if necessary 	<ul style="list-style-type: none"> Have begun Delisting Determination Document using state developed delisting guidance to determine which

AOC Name	Primary Contaminants	Geographic Area	Stressors	Beneficial Use Impairments	Funding Programs and Partners	Clean-Up Actions Completed	Key Activity Needed	Barriers	Next Steps
St. Louis River Minnesota/Wisconsin	<ul style="list-style-type: none"> PAHs Mercury Suspended sediment PCBs Other metals Oil and grease Pathogens Nutrients 	St. Louis Bay, the Nemaji River basin and the St. Louis River basin to Cloquet, MN, including urban areas of Duluth, MN, and Superior, WI	<p>activities which have been deposited into area lakes and streams</p> <ul style="list-style-type: none"> Contaminated sediments Abandoned hazardous waste sites Poorly designed or leaky landfills Industrial discharges and chemical spills Infiltration and inflow Point and nonpoint sources Municipal and industrial runoff Turbidity Sedimentation Exotics Loss of habitat/wetland fills Sediment runoff, particularly from urban or construction sources Transportation sources and dredging 	<ul style="list-style-type: none"> Fish and wildlife consumption restrictions Fish and wildlife degradation Fish tumors or other deformities Degradation of benthos Dredging activities restrictions Excess loadings of nutrients and sediment to Lake Superior Beach closings Aesthetics degradation Loss of fish and wildlife habitat 	<ul style="list-style-type: none"> Superfund Navigational dredging Glnpo States Great Lakes Legacy Act Cities WI and MN Coastal Management Great Lakes Commission Other miscellaneous grant funding sources 	<ul style="list-style-type: none"> Wastewater treatment Sediment contamination studies to identify hotspots Evaluation of cleanup options at two Superfund sites Contaminated sediment database Habitat Management Plan Key habitat area acquisition Newton Creek /Hog Island Cleanup Grassy Point Wetland Restoration project 	<ul style="list-style-type: none"> Assessment of fish and wildlife health (body implications) Assessment of nonpoint sources of pollution to AOC and stormwater controls AOC specific wetlands protection and restoration program Selective clean up of contaminated sediments Cost-benefit analyses of clean up and habitat restoration alternatives Control of vessel discharges (ballast and bilge water) Updating of RAP documents – delisting goal development Reduction of invasive species 	<ul style="list-style-type: none"> Lack of dedicated resources for projects and staffing Lack of funding source to manage sediment contamination issues on an AOC-wide, bi-state basis Greater financial support from the federal government is needed Lack of cost estimates for protection, restoration, or clean up activities Lack of long term horizon – policies and funding Organizations focused on short term Difficulty in maintaining public support over the long term 	<p>BUIs are eligible for delisting.</p> <ul style="list-style-type: none"> Contaminated site remediation Mercury reduction Water quality protection Habitat restoration and protection Stormwater and infiltration and inflow control Update AOC-wide contaminated sediment strategy Develop “delisting roadmap” to identify ultimate goals and steps needed Outreach and education campaign
Thunder Bay Ontario	<ul style="list-style-type: none"> Mercury 	About 28 km along the shoreline and up to 9 km offshore, including the watershed	<ul style="list-style-type: none"> Contaminated sediments Industrial and municipal effluent Industrial development 	<ul style="list-style-type: none"> Fish and wildlife consumption restrictions Fish and wildlife degradation Degradation of benthos Dredging activities restrictions Beach closings Aesthetics degradation 	<ul style="list-style-type: none"> Great Lakes Sustainability Fund Canada Ontario Infrastructure Programs Canada-Ontario Agreement 	<ul style="list-style-type: none"> Secondary treatment installed for a number of pulp and paper mills clean up and rehabilitation of contaminated sediment at Northern Wood site 	<ul style="list-style-type: none"> Monitor fish and wildlife populations to confirm progress (eg. Kam River Sturgeon) 	<ul style="list-style-type: none"> Resource limitations 	<ul style="list-style-type: none"> Complete sediment assessment at north end of harbour Update delisting criteria

AOC Name	Primary Contaminants	Geographic Area	Stressors	Beneficial Use Impairments	Funding Programs and Partners	Clean-Up Actions Completed	Key Activity Needed	Barriers	Next Steps
Nipigon Bay Ontario	<ul style="list-style-type: none"> None 	A large portion of Nipigon Bay and the Nipigon River downstream of Alexander Dam. Two communities are located in the vicinity of the Bay: Red Rock (population: 1,300) and Nipigon (population: 4,900).	<ul style="list-style-type: none"> Water level and flow fluctuations Wastewater discharges 	<ul style="list-style-type: none"> Phytoplankton and zooplankton pops. Degradation Loss of fish and wildlife habitat Fish and wildlife degradation Eutrophication or undesirable algae Loss of fish and wildlife habitat 	<ul style="list-style-type: none"> Great Lakes Sustainability Fund Canada Ontario Infrastructure Programs Canada-Ontario Agreement 	<ul style="list-style-type: none"> Various habitat creation and enhancement projects Chippewa Beach restoration STP upgraded to secondary treatment Created water management plan for Nipigon River to regulate hydroelectric facilities' water use to help restore brook trout Various habitat restoration projects Secondary treatment installed at Norampac 	<ul style="list-style-type: none"> Upgrade primary STPs in Redrock and Nipigon (underway) Monitor fish and wildlife populations to confirm progress (coaster brook trout) 	<ul style="list-style-type: none"> Resource limitations 	<ul style="list-style-type: none"> Assist communities to obtain funding and/or undertake STP upgrades Update delisting criteria
Jackfish Bay Ontario	<ul style="list-style-type: none"> Solids (i.e. wood fiber) Dioxin 	The 14 km reach of Blackbird Creek between Kimberly-Clark Canada Inc. pulp mill and Jackfish Bay, including Lake A, Moberly Lake and Jackfish Bay itself.	<ul style="list-style-type: none"> Industrial discharge Contaminated sediments 	<ul style="list-style-type: none"> Fish and wildlife consumption restrictions Fish and wildlife degradation Fish tumors or other deformities Bird or animal deformities or reproductive problems Aesthetics degradation Loss of fish and wildlife habitat 	<ul style="list-style-type: none"> Great Lakes Sustainability Fund Canada-Ontario Agreement National Sciences and Engineering Research Council of Canada (NSERC) 	<ul style="list-style-type: none"> Effluent quality from paper mill improved Chlorine dioxide bleaching plant upgraded resulting in lower AOX levels 	<ul style="list-style-type: none"> Assess status of natural recovery 	<ul style="list-style-type: none"> Time for Natural recovery Best Available technology needs to be utilized at all times 	<ul style="list-style-type: none"> Continued natural recovery and monitoring Best Available technology needs to be updated Update delisting criteria

<p>Peninsula Harbour Ontario</p> <ul style="list-style-type: none"> ▪ Mercury ▪ PCB 	<p>Peninsula Harbour proper, and a portion of open Lake Superior immediately south of the peninsula.</p>	<ul style="list-style-type: none"> ▪ Contaminated sediments 	<ul style="list-style-type: none"> ▪ Fish and wildlife consumption restrictions ▪ Fish and wildlife degradation ▪ Degradation of benthos ▪ Dredging activities restrictions ▪ Loss of fish and wildlife habitat 	<ul style="list-style-type: none"> ▪ Great Lakes Sustainability Fund ▪ Canada-Ontario Agreement ▪ Marathon Pulp Inc. 	<ul style="list-style-type: none"> ▪ Pulp kraft mill installed secondary treatment for effluent; discharge moved out of AOC 	<ul style="list-style-type: none"> ▪ Complete Ecological risk assessment (underway) 	<ul style="list-style-type: none"> ▪ Complete sediment management strategy ▪ Update delisting criteria
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A.1 AREAS OF CONCERN FACT SHEETS

A.2.1 Canadian Fact Sheets

A.2.1.A Thunder Bay

Thunder Bay Area of Concern

General Information

Where?

The Thunder Bay Area of Concern (AOC) extends approximately 28 km along the shoreline of Lake Superior and up to nine kilometres offshore from the City of Thunder Bay. The Thunder Bay watershed is drained by the Kaministiquia River system and a number of smaller rivers and creeks.

Why was this area listed?

Major environmental issues of concern in the area included:

- Fish consumption restrictions
- Negative pressures on fish populations
- Degradation of Phytoplankton and Zooplankton Populations
- Degradation Benthos
- Dredging restrictions
- Loss of species abundance and diversity
- Reduced recreational opportunities
- Decline in aesthetic values
- Loss of Fish and Wildlife Habitat

What is being done? How is it being done?

In order to improve the environmental conditions noted above, a Remedial Action Plan (RAP) has been developed for Thunder Bay. The Thunder Bay RAP is a partnership between the federal and provincial governments. Public involvement and participation in the RAP to date has been coordinated by a Public Advisory Committee which represents a variety of interests in the Thunder Bay community (e.g. private citizens, academia, industry, labour, recreational groups and property owners). The PAC has provided public input and advice throughout the RAP process, in addition to endorsing both the Stage 1 and 2 documents.

This plan[It was the RAP program that was initiated in 1987, not the Th B RAP] involves the following steps:

- defining the problem (Stage 1 – completed in 1991)
- planning for implementation (Stage 2 – completed in 2004)
- implementing the actions (Stage 2 – underway)

- monitoring the restoration of the environment and eventual delisting (Stage3)

The Stage 2 Report contains a list of recommended remedial actions to restore the above environmental conditions. It was developed through the RAP process, which included consultation with the public. Many of the actions have already been implemented.

HIGHLIGHT of the RAP

Contaminated sediments are recognized as significant contributors to impaired water quality in the Great Lakes. Thunder Bay Harbour sediment contamination from polycyclic aromatic hydrocarbons (PAHs), chlorophenols, dioxins and furans around Northern Wood Preservers contributed to the [International Joint Commission](#)'s (IJC) identification of the Harbour as an Area of Concern. A biological assessment study was conducted to establish site specific clean up criteria. Based on measured biological effects related to PAHs, three cleanup zones were identified corresponding to areas of acute toxicity, chronic toxicity and no measurable toxicity.

Abitibi Consolidated Inc., Northern Wood Preservers Inc., Canadian National Railway Co., [Environment Canada](#) and the [Ontario Ministry of the Environment](#) worked together to remediate the area around the Northern Wood Preservers site. The project, referred to as the Northern Wood Preservers Alternative Remediation Concept (NOWPARC), was a plan to isolate the contaminant source, clean-up the contaminated sediment, and enhance fish habitat. Extensive public consultation was undertaken to ensure public acceptance of the plan.

The primary components of the project have been completed. These improvements in the "integrity" of the local ecosystem were:

- A 1000 meter long rockfill containment berm to contain a portion of the contaminated sediment
- Environmental dredging to remove 11 000 m³ of contaminated sediment from the harbour
- Thermal treatment and off site disposal of 17 000 tonnes of contaminated sediment
- A Waterloo steel wall and environmental clay barrier were constructed around the NWP pier to prevent the movement of on-site contaminants back into the harbour
- A buffer zone of clean fill within the containment berm
- Stormwater controls to collect drainage and channel it through a settling pond prior to discharge into Thunder Bay Harbour
- 48,000 m² of fish habitat were created as compensation for the infilling activities
- A groundwater treatment plant to treat contaminated groundwater that accumulates behind the clay barrier.

The Northern Wood Preservers Alternative Remediation Concept (NOWPARC) was a significant project for the RAP. As such, it contributes to the objectives of the Lake Superior Binational Program's [Lakewide Management Plan](#) (LaMP), which includes the Zero Discharge Demonstration Program.

Through this project, the areas of highest sediment contamination were removed and treated, and additional fish habitat was created. Project implementation, including public consultation, has taken seven years to complete at a cost of \$20 million, forging linkages between the economy, the environment, and the community. Now that implementation is complete, the site has been decommissioned and a post-remediation monitoring plan is in place. To demonstrate adequate monitoring of effectiveness, the focus has now shifted to long-term monitoring of the isolation barriers, natural recovery of sediments outside the berm and fish habitat development.

This is a major achievement in the restoration and remediation of this once highly contaminated sediment site. This project, in concert with other RAP initiatives, will help to improve water quality and sediment conditions in the harbour, and will provide a more hospitable environment for plants, animals and people.

RAP Development/History

The Thunder Bay Remedial Action Plan (RAP) was developed by [Environment Canada](#) and the [Ontario Ministry of the Environment](#), with support from the general public.

The Remedial Action Plan adopted an ecosystem approach to environmental problems that incorporated land, water, air, plants, animals and ultimately people. Therefore, the cooperation and involvement of other federal and provincial government agencies has been key to RAP progress.

Members of the public, including individuals and organizations, participated in the RAP process as members of the Public Advisory Committee (PAC). The PAC provided a forum for community stakeholders and included private citizens, academia, industry, labour, recreational groups and property owners.

The Thunder Bay RAP was developed to identify use impairments, define specific goals for the region and describe appropriate remedial and regulatory measures to rehabilitate the AOC. Incorporating the needs identified by the PAC will ensure that the plan responds to the community needs and enjoys a high level of public support and implementation.

RAP Status

Strategies to address beneficial use impairments have been designed to increase aquatic and terrestrial habitat, enhance recreational opportunities, and to improve the aesthetic value of the harbour and its tributaries. The highest profile remediation project has been the Northern Wood Preservers Alternative Remediation Concept (NOWPARC). NOWPARC was designed to mitigate sediment contamination and to enhance existing habitat and aesthetic values. This project, in concert with other RAP initiatives, will help to improve water quality and sediment conditions in the harbour, and provide a hospitable environment for diverse biotic communities.

Many water quality issues have been addressed as a result of process changes and improved effluent treatment at local pulp and paper mills. Secondary treatment and 100 percent chlorine dioxide substitution at the Bowater pulp and paper mill have resulted in dramatic improvements in effluent quality. Likewise, the installation of secondary treatment at Abitibi Consolidated has resulted in the effluent being non-toxic since 1999. These improvements are expected to enhance sediment and water quality conditions and encourage the return of healthy biotic communities.

Various fish and wildlife habitat rehabilitation projects have been completed along the waterfront and on tributary streams. These have included improving walleye spawning habitat, restoring habitat diversity along floodways, creating nearshore nursery habitat and wetland sites, alleviating water quality barriers to fish migration, and enhancing habitat diversity within dredged navigation channels. These efforts will increase the extent of productive aquatic and terrestrial habitat by rehabilitating and protecting wetland and riparian environments.

The involvement of the public and their commitment to both rehabilitation and continued vigilance of the ecosystem are important to the success of the Thunder Bay RAP. Community involvement has been evident in such projects as organized cleanups of the Thunder Bay waterfront and participation in Lake Superior Day celebrations and waterfront development workshops. The Public Advisory Committee played a lead role in this process, making the public aware of progress towards the final goal of a healthy, balanced ecosystem and the ways in which this can be accomplished.

RAP Implementation

The Thunder Bay RAP Stage 2 Report contains a complete list of recommended remedial actions for the AOC, many of which are in progress or completed. A monitoring strategy will be developed to measure progress towards delisting. With the support of federal and provincial governments and the community, the remaining recommended actions will be completed and the monitoring strategy will be implemented.

Scientists are completing an assessment of sediment and bottom-dwelling animals from a site near Cascades Fine Paper Inc. To date, benthic community impairment, toxicity and biomagnification have been found at some locations within this site. Environmental Effects Monitoring data for the Cascades Fine Paper mill supports the conclusions that the sediment is toxic and the benthic community is impaired in the vicinity of the mill outlet. The results of this assessment will better delineate the zone of contamination and help to evaluate the potential risks posed by contaminated sediments at that location. This information is critical to the identification of any appropriate remedial actions to address contaminated sediment in the AOC.

A strategy has been implemented to address beach closures at Chippewa Beach, and as a result of this, the number of closures has been considerably reduced.

For the most part, recommended remedial actions to address the Northern Wood Preservers site are complete. The last remaining action, a post-remediation monitoring plan, is being implemented to evaluate the success of the project and to track the progress of natural recovery over time.

There is a commitment to ensure the gains realized through RAP implementation are maintained and progress towards restoration and ultimate delisting of Thunder Bay as an AOC continues.

RAP Accomplishments

Many projects have built on the notable successes in the Thunder Bay AOC. Several fish and wildlife habitat rehabilitation projects have been completed in wetlands, riverine shorelines, along the Thunder Bay waterfront, and within the river mouths draining into Thunder Bay. Contaminated sediments have been removed at the Northern Wood Preservers site and have undergone treatment and disposal. In 2005, the City of Thunder Bay, with assistance from the Canada Strategic Infrastructure Fund, completed construction of the Secondary Sewage Treatment facility at the Water Pollution Control Plant. In addition to secondary sewage treatment, the new facility includes nitrification to eliminate ammonia from the wastewater. In 2006 the disinfection process will be upgraded from chlorine treatment to ultraviolet radiation, which will eliminate the discharge of chlorine into the waters of Lake Superior.

RAP Participants

Cooperation is critical to the RAP process. Undertaking environmental restoration requires a large amount of local knowledge, scientific expertise and hard work. One agency or group cannot undertake such a large task on their own, without the help of others. Listed below are participants that contribute to the RAP program.

- [Environment Canada](#)
- [Fisheries and Oceans Canada](#)
- [Great Lakes Sustainability Fund](#)
- [Ontario Ministry of Natural Resources](#)
- [Ontario Ministry of the Environment](#)

- [City of Thunder Bay](#)
- [Lakehead Region Conservation Authority](#)
- [Lakehead University](#)

A.2.1.B Nipigon Bay

Nipigon Bay Area of Concern

General Information

Where?

The Nipigon Bay Area of Concern (AOC) is in the most northerly area of Lake Superior. The AOC encompasses a large portion of Nipigon Bay and, the largest tributary to Lake Superior, the Nipigon River.

Why was this area listed?

When listed in the late 1980s, the major environmental issues of concern in the area included:

- degradation of fish and wildlife populations - particularly the loss of walleye and yellow perch fisheries and decline in the brook trout and lake trout stocks
- degradation of benthos (bottom dwelling organisms)
- Restrictions on Dredging Activities (no longer a concern)
- undesirable algal growth on substrates in the lower Nipigon River
- degradation of aesthetics on the waterfront
- losses of habitat in the Nipigon River. Water level fluctuations from the generation of electricity continue to affect streambank erosion and sediment load

What is being done? How is it being done?

In order to improve the environmental conditions noted above, a Remedial Action Plan (RAP) has been developed for the Nipigon Bay. Implementation of the Nipigon RAP is being achieved through a partnership between the Government of Canada and the Province of Ontario, with support from a Public Advisory Committee. Many linkages and alliances have been developed as part of the RAP process between the RAP team and various other groups in the community including recreational groups, industry, municipalities and citizens.

This plan was initiated by the formalized establishment of RAPs under the 1987 revision of the Canada-United States Great Lakes Water Quality Agreement (GLWQA), and involves the following three stages:

1. defining and documenting the problem (Stage 1 Report completed in 1991)
2. developing and documenting a strategy of action to rehabilitate and protect the ecosystem (Stage 2 Report completed in 1995)
3. implementing the strategy of remedial and preventive actions and monitoring and confirming the eventual restoration of the impaired beneficial uses (Stage 3).

Thirty-five recommended remedial actions to restore the above environmental conditions were selected through the RAP process, which includes consultation with the public. The actions fall within five main areas including: municipal and industrial point source discharges, fish and wildlife population dynamics, benthic (bottom dwellers) population dynamics, aesthetics and education and stewardship. Most actions have already been implemented.

HIGHLIGHTS of the RAP

The federal government has provided support to environmental projects in the Nipigon Bay AOC. Since 1990, the Government of Canada's [Great Lakes Sustainability Fund](#) has made significant contributions towards restoring impaired beneficial uses in the Nipigon Bay Area of Concern. A number of projects have been completed to enhance fish and wildlife communities and to rehabilitate degraded aquatic and terrestrial habitat. Logs and debris were removed from historic spawning areas in the lower Nipigon River. The clean up of a former wetland site has resulted in natural regeneration of wetland features. A fish-stocking program was used to increase adult spawning potential in Nipigon Bay with more than 12 000 adult fish stocked over 3 years. A community-based effort was used to clean up and restore habitat in and around a once productive and aesthetic brook trout stream. These efforts are a step towards enhancing fish and wildlife populations in the AOC.

RAP Development/History

Public Advisory Committee (PAC) involvement in the Nipigon Bay RAP has been extensive and integral to the success of the process. The combination of local knowledge and community-based goals with scientific data and expertise has resulted in a pragmatic and defensible strategy to rehabilitate the remaining problems in the AOC ecosystem.

Early in the RAP process, the PAC evaluated and identified environmental impairments and developed a list of objectives for the remediation of the area. These objectives were incorporated into the Stage One document: *Environmental Conditions and Problem Definition*. An Options Discussion Paper then developed a list of remedial measures to address the identified environmental problems, carefully weighing each option and identifying preferences. The discussion paper went out for public comment, to assist in the selection of a preferred course of action.

The Stage Two document, *Remedial Strategies for Ecosystem Restoration*, used the selected options to outline stakeholder commitment and implementation timetables necessary to restore impaired beneficial uses.

RAP Status

A number of projects in the AOC have led to significant advances towards reducing the beneficial use impairments identified in the first stage of the RAP process. The projects have been completed to enhance fish and wildlife communities and to rehabilitate degraded aquatic and terrestrial habitat. Logs and debris were removed from historic spawning areas in the lower Nipigon River. Clean up of a former wetland site has resulted in natural regeneration of wetland features. A fish-stocking program was used to rejuvenate the walleye population in Nipigon Bay with more than 12 000 adult fish stocked over three years. Community based restoration projects to clean up and restore brook trout habitat in and around Clearwater and Kama Creeks are being implemented by the [Ontario Ministry of Natural Resources](#). These efforts are a step towards enhancing fish and wildlife populations in the AOC.

Most recommended specific remedial actions have been implemented in Nipigon Bay. The Town of Nipigon has undertaken an environmental study report which identifies options for upgrading its primary municipal wastewater treatment plant and has been successful in obtaining funding under phase one of the Canada-Ontario Municipal Rural Infrastructure Fund (COMRIF). Similarly, the Township of Red Rock completed a class environmental assessment for its wastewater treatment plant and has applied for funding in the next phase of COMRIF. Full implementation is contingent on funding availability.

RAP Implementation

Most of the recommended remedial actions have been completed, but until the municipal point source discharges have been addressed, Nipigon Bay will continue to be an Area of Concern. Upgrading the Nipigon and Red Rock Wastewater Treatment Plants is a key recommended action in the Stage 2 Report. Once this action has been implemented, the AOC will be able to move ahead to the formal delisting procedures of Stage Three.

On April 25, 2005, the Government of Canada, the Government of Ontario and the Township of Nipigon announced funding to upgrade the Nipigon sewage treatment plant. The governments of Canada and Ontario will each invest up to \$1,900,000 in the project. The Township of Nipigon will contribute the balance of the total eligible project cost of up to \$4,000,000. The Government of Canada's contribution is contingent on the successful completion of an environmental assessment of the proposed project under the Canadian Environmental Assessment Act. This investment, made under the first phase of the Canada-Ontario Municipal Rural Infrastructure Fund (COMRIF), will improve the quality of life for local residents. Work includes designing and constructing a rotating biological contractor secondary treatment system and a six-month sludge storage capacity lagoon.

The township of Red Rock has submitted a application for funding in the second phase of COMRIF and is prepared to proceed with the upgrade of their treatment plant if the application is successful.

Once these two infrastructure projects have been completed, the status of the beneficial use impairments will be reviewed in order to determine if the delisting targets have been met. Some of this review has already been completed. For example, scientists at [Environment Canada](#) have completed an assessment of sediment and bottom-dwelling organisms in the Area of Concern. The results of all these assessments will form the basis of the final Stage 3 delisting process.

RAP Accomplishments

The Nipigon River Water Management Plan was established, through public involvement, to reduce the impacts of the operation of hydroelectric dams on the Lake Nipigon/Nipigon River watershed and particularly on the Nipigon River fishery. The plan was in response to water level fluctuations that resulted in the exposure of brook trout spawning beds and affected the groundwater supply critical to the survival of brook trout embryos. The plan expands on an interim agreement between the Ministry of Natural Resources and Ontario Power Generation to maintain minimum flows. By these actions directed at brook trout, other fish, wildlife, and benthic populations in the ecosystem will benefit by a more natural cycle of river flow.

Notable successes have included the development of a bioengineered marina at Red Rock that features armour stone breakwalls that incorporate public access and fish and wildlife habitat; the Nipigon River Water Management Plan has provided a workable solution to water use conflicts arising from regulated flows; and improvements to brook trout habitat at Clearwater Creek.

There is a commitment to ensure the gains realized to date are maintained and progress towards restoration and ultimate delisting of Nipigon Bay as an AOC continues.

RAP Participants

Cooperation is critical to the RAP process. Undertaking environmental restoration requires a large amount of local knowledge, scientific expertise and hard work. One agency or group cannot undertake such a large task on their own, without the help of others. Listed below are participants that contribute to the RAP program.

- [Environment Canada](#)
- [Ministry of Northern Development and Mines](#)

- [Ontario Ministry of Natural Resources](#)
- [Ontario Ministry of the Environment](#)
- [Canada-Ontario Municipal Rural Infrastructure Fund \(COMRIF\)](#)
- [Ontario Ministry of Education](#)
- [Township of Nipigon](#)
- [Township of Red Rock](#)
- [Domtar Packaging](#)
- [Ontario Hydro](#)
- [Public Advisory Committee](#)

A.2.1.C Jackfish Bay

Jackfish Bay Area of Concern

General Information

Where?

The Jackfish Bay Area of Concern (AOC) is located on the north shore of Lake Superior approximately 250 km northeast of Thunder Bay. The AOC consists of a 14-kilometre stretch of Blackbird Creek between the Neenah Papers (formerly Kimberly–Clark) pulp mill and Jackfish Bay, and includes Lake “A”, Moberly Lake, and Jackfish Bay. The town of Terrace Bay is the closest community.

Why was this area listed?

Major environmental concerns in the area included:

- Restrictions on fish consumption
- Degradation of fish populations and fish habitat
- Fish tumours and other deformities
- degraded aesthetics
- condition of the sediments and the aquatic communities which utilize them

What is being done? How is it being done?

In order to improve the environmental conditions noted above, a Remedial Action Plan (RAP) has been developed for Jackfish Bay. The Jackfish Bay RAP was developed through a partnership between the Government of Canada and the Province of Ontario, with support from the Jackfish Bay Public Advisory Committee (PAC). Many linkages and alliances have been developed as part of the RAP process between the RAP team and various other groups in the community including private citizens, recreational groups, industry and municipalities.

The remedial action planning, implementation, and reporting process, which was initiated in 1988, involves the following three stages, each of which, when completed, results in a corresponding report:

1. defining the problem (Stage 1 Report completed in 1991)
2. developing a strategy of action to rehabilitate and protect ecosystem quality (Stage 2 RAP Report completed in 1997)
3. implementing the strategy of remedial and preventive actions (i.e., the RAP), and monitoring and confirming the eventual restoration of the impaired beneficial uses (Stage 3 Report)

In order to determine the actions required for remediation of the AOC, both the identification of the use impairments and the water use goals, developed by the PAC, were utilized. A number of potential solutions were developed and assessed in an Options Discussion Paper. Natural recovery, where the ecosystem is allowed to recover on its own, was selected as the preferred strategy.

This was decided due in large part to achievement of higher standards of effluent quality at the Neenah pulp mill resulting from improved treatment of effluent and changes in mill processes between 1987 and 1997. Acceptance of this plan is based on the fact that recovery is already occurring in many areas.

HIGHLIGHT of the RAP

The Government of Canada's [Great Lakes Sustainability Fund](#) and its partners have made significant contributions to sediment rehabilitation options and assessment of restoration of lake trout spawning habitat.

RAP Development/History

The Jackfish Bay Remedial Action Plan (RAP) was developed by [Environment Canada](#) and the [Ontario Ministry of the Environment](#) between 1988 and 1997, with support from the general public.

The Remedial Action Plan adopted an ecosystem approach to environmental problems that incorporated land, water, air, plants, animals and ultimately people. Therefore, the cooperation and involvement of many other federal and provincial government agencies has been key to RAP progress.

The general public (both individuals and organizations) participated in the RAP process as members of the Public Advisory Committee (PAC), providing a forum for the spectrum of interests existing within a community. The Jackfish Bay PAC encompassed the interests of private citizens, industry, labour, tourism operators and property owners.

Within the Stage One document, environmental impairments and objectives for the remediation of the AOC were identified. Upon completion, federal and provincial agencies and the [International Joint Commission](#) reviewed the document. An Options Discussion Paper then presented a list of remedial measures to address the identified environmental problems, carefully weighing each option and identifying preferences.

The Stage Two document was completed in 1997. This document recommends a "natural recovery" plan to address most of the impaired beneficial uses in the Area of Concern.

The natural recovery plan does not require the removal of contaminated sediment from the environment. This plan relies on natural processes to bury contaminants in the sediment, effectively isolating them from the water column and food web.

Essential to the natural recovery plan is the maintenance of higher standards of effluent quality by [Neenah](#), and continued monitoring of the effects of contaminated sediments on the ecosystem. In this way, progressive changes in the ecosystem can be evaluated, and delisting of the AOC can occur at the earliest opportunity.

RAP Status

Effluent, spills, and sediment contamination have deteriorated the ecosystem of the AOC. Sportfish consumption restrictions are based on a variety of chemicals, including dioxins and furans attributed to mill effluent. White suckers collected from Jackfish Bay prior to the installation of secondary effluent treatment at the mill had an increased incidence of liver cancer, and sediments in Moberly Lake were acutely toxic to bottom dwelling organisms. Lake trout spawning habitat in Moberly Bay has been destroyed through the deposition of organic materials and chemical contamination of sediments. Overfishing and sea lamprey predation have also contributed to the decline of trout populations.

The treated effluent from the [Neenah](#) pulp mill currently meets all Provincial Municipal/Industrial Sewage Abatement (MISA) and Canadian Environmental Protection Act (CEPA) requirements. This effluent is

discharged directly into Blackbird Creek and comprises most of its flow. However, due to historical discharges the creek is still considered to be contaminated along its entire length.

RAP Implementation

Ongoing monitoring and reporting are needed to evaluate the progress of natural recovery. It is recommended that changes in sediment and benthos be evaluated at least once every ten years. Environmental impacts of the pulp and paper industry are evaluated every four years to determine the effectiveness of mitigative measures. Contaminant levels in sport fish are evaluated at least every five years until consumption advisories can be removed. Sediment contamination and aquatic communities in Moberly Lake require regular evaluation to evaluate progress towards recovery.

[Environment Canada](#) and the [Ontario Ministry of the Environment](#) and the [Ontario Ministry of Natural Resources](#) cooperate to lead implementation actions.

RAP Accomplishments

Contaminant levels in effluent and receiving waters have decreased since the installation of secondary treatment and changes in mill processes to chlorine dioxide bleaching. Mill effluent presently tested has significantly reduced biological effects and is characterized as non-acutely toxic. Previously Lake A was clogged with extensive accumulation of organic material. Ten years ago effluent flow was diverted away from the lake, recovery has occurred and the lake is now a productive wetland.

Separate studies by [Environment Canada](#), the [Ontario Ministry of the Environment](#) and [Kimberly-Clarke](#) during 1999-2003 showed that mill-related effects were continuing. The 2000 [Kimberly-Clarke](#) study found that the community of bottom-dwelling organisms continued to show effects that were unchanged since a 1995 survey. In the 2002 [Environment Canada](#) study, sediment toxicity was observed at some sites. The 1999 [Ontario Ministry of the Environment](#) study showed little change in sediment quality, or water quality (for some parameters) at the mouth of Blackbird Creek, since the late 1980s. In general, however, studies in Jackfish Bay proper suggest that modest recovery of contaminated sediment is occurring.

Sub-lethal effects in benthic invertebrates and fish have been reported. The [Neenah](#) mill is therefore involved with a voluntary study of its various effluent streams in order to identify the cause. Significant biological effects measured to date in fish include delayed spawning, reduced egg production and increased deformities.

RAP Participants

Cooperation is critical to the RAP process. Undertaking environmental restoration requires a large amount of local knowledge, scientific expertise and hard work. One agency or group cannot undertake such a large task on their own, without the help of others. Listed below are participants that contribute to the RAP program.

- [Environment Canada](#)
- [Great Lakes Sustainability Fund](#)
- [Ontario Ministry of Natural Resources](#)
- [Ontario Ministry of the Environment](#)
- [Municipality of Terrace Bay](#)
- [Kimberly-Clark](#)

A.2.1.D Peninsula Harbour**Peninsula Harbour Area of Concern****General Information****Where?**

Peninsula Harbour is located on the northeastern shore of Lake Superior midway between Sault Ste. Marie and Thunder Bay. The Area of Concern (AOC) extends approximately four kilometres from the Peninsula into Lake Superior.

Why was this area listed?

Major environmental issues of concern in the area included:

- fish consumption advisories due to high levels of toxic contaminants
- degraded fish communities
- fish habitat destruction
- degraded lake bottom communities
- dredging restrictions due to contamination of the bottom sediments

The environmental impairments in Peninsula Harbour result, almost exclusively, from the presence of a substantial area of mercury contaminated sediments. This sediment contamination is particularly severe in Jellico Cove and is the result of historic discharges from the James River-Marathon chlor-alkali plant which closed in 1977. Other contaminants such as PCBs, as well as wood fibre, are found in the sediments, and are also of concern, although a lower priority compared to the mercury.

What is being done? How is it being done?

In order to improve the environmental conditions noted above, a Remedial Action Plan (RAP) is being developed for Peninsula Harbour. The Peninsula Harbour RAP is a partnership between the federal and provincial governments with cooperation from a Public Advisory Committee (PAC). Linkages and alliances have been made between the RAP team and various other groups in the community, including environmental groups, recreational groups, industry and municipalities.

This plan, which was initiated in 1987, involves the following steps:

- defining the problems (Stage 1 – completed in 1991)
- identifying and planning the required remedial actions (Stage 2 draft completed)
- implementing the actions (Stage 2)
- monitoring the restoration of the environment and eventual delisting (Stage 3)

Currently, the RAP is planning for implementation, and a list of remedial actions is being developed to address the environmental problems in the AOC.

The most important of these problems is, of course, the mercury contaminated sediment. A list of potentially feasible remediation options to solve this problem has been compiled in the draft Stage 2 report, along with the advantages, disadvantages, and conditions of applicability for each. Included in this list are the following:

1. Removal or removal and treatment of the contaminated sediments
2. In situ treatment of contaminated sediments (treating the sediment without removing it)
3. Natural recovery and monitoring for incremental progress; no further intervention at this time.

After considering the alternative options, it was decided that, unless monitoring studies indicate otherwise, the preferred course of action should be to dredge and dispose of the sediments from the area of highest contamination (i.e. Jellico Cove) and allow for the natural recovery of the remaining area. When the planning process for the remedial actions has been completed, and the necessary reviews carried out, the Remedial Action Plan for Peninsula Harbour will be published in the final RAP Stage 2 Report. This Report will guide the restoration and monitoring efforts until Peninsula Harbour is no longer considered an Area of Concern.

HIGHLIGHT of the RAP

Currently the planning process for the “Peninsula Harbour Contaminated Sediment Removal and Carden Cove Waterfront Project” is nearing completion. The planning project is being funded by the Government of Canada's [Great Lakes Sustainability Fund](#), the [Ontario Ministry of the Environment](#), [FedNor](#), the [Great Lakes Renewal Foundation](#) and the [Town of Marathon](#). The project addresses the issue of mercury-contaminated harbour sediment.

RAP Development/History

The Peninsula Harbour Remedial Action Plan (RAP) is being developed by [Environment Canada](#) and the [Ontario Ministry of the Environment](#), with support from [Fisheries and Oceans Canada](#), [Ontario Ministry of Natural Resources](#), and the general public.

The Remedial Action Plan will adopt an ecosystem approach to environmental problems that incorporated land, water, air, plants, animals and ultimately people. Therefore, the cooperation and involvement of other federal and provincial government agencies has been key to RAP progress.

The general public (both individuals and organizations) participated in the RAP process as members of the Public Advisory Committee (PAC), providing a forum for the spectrum of interests existing within a community. The Peninsula Harbour PAC encompassed the interests of environmental groups, recreational groups, industry and municipalities.

The Stage One RAP Report provided a definition and detailed description of the environmental problems with the AOC and identified the beneficial use impairments for the harbour. The PAC evaluated the use impairments and developed specific water use goals and objectives designed to assist in the restoration and protection of the AOC. These goals provided community-based guidelines for the remediation of impairments in Peninsula Harbour.

The Stage One document was reviewed by federal and provincial agencies and was submitted to the [International Joint Commission \(IJC\)](#) in 1991. The [International Joint Commission](#) concluded that there was sufficient information to proceed with Stage Two.

When completed, the Stage Two RAP Report will present the remedial options to address the environmental problems within the harbour. In the report, each option will be evaluated and the preferred course of action for the AOC will be identified.

RAP Status

Currently, a detailed ecological risk assessment is being planned to address mercury contaminated sediment in the vicinity of Jellicoe Cove.

Remedial strategies for Peninsula Harbour focus on the shallow water areas of the harbour, while leaving remediation of the deeper areas to natural sedimentation processes. The high levels of mercury found in the nearshore areas may provide a reservoir for the contamination of offshore sediments, and contribute to long term restrictions on fish consumption. Remediating sediments in the area of highest contamination may prevent further migration of nearshore mercury to offshore areas. For this reason, this area is being considered for the development of a sediment management strategy and is the focus of an ecological risk assessment.

RAP Implementation

The Stage One RAP Report provided a definition and detailed description of the environmental problems with the AOC and identified the beneficial use impairments for the harbour. The PAC evaluated the use impairments and developed specific water use goals and objectives designed to assist in the restoration and protection of the AOC. These goals provided community-based guidelines for the remediation of impairments in Peninsula Harbour.

The Stage One document was reviewed by federal and provincial agencies and was submitted to the [International Joint Commission \(IJC\)](#) in 1991. The [International Joint Commission](#) concluded that there was sufficient information to proceed with Stage Two.

A draft Stage 2 RAP was prepared in 1999. When finalized, the Stage Two RAP Report will present the remedial options to address the environmental problems within the harbour. In the report, each option will be evaluated and the preferred course of action for the AOC will be identified.

The draft version of the Peninsula Harbour Stage 2 Remedial Action Plan (RAP) Report was developed by [Environment Canada](#) and the [Ontario Ministry of the Environment](#), with support from [Fisheries and Oceans Canada](#), [Ontario Ministry of Natural Resources](#), and the general public.

The Remedial Action Plan adopted an ecosystem approach to environmental problems that incorporated land, water, air, plants, animals and ultimately people. Therefore, the cooperation and involvement of other federal and provincial government agencies has been key to RAP progress.

The general public (both individuals and organizations) participated in the RAP process as members of the Public Advisory Committee (PAC), providing a forum for the spectrum of interests existing within a community. The Peninsula Harbour PAC encompassed the interests of environmental groups, recreational groups, industry and municipalities.

RAP Accomplishments

The former chlor-alkali plant, which operated adjacent to the pulp mill from 1952 to 1977, was the main source of mercury contamination to the harbour. Mercury contaminated material has since been removed from the plant itself and safely deposited at the facility's own mercury disposal site. Effluent from the Marathon kraft pulp mill is now treated to remove organic pollutants.

Recent studies have confirmed the severity of the mercury contamination problem. A 2002 biomagnification study completed by [Environment Canada](#) concluded that there was biotic uptake of mercury from the sediments, and an [Ontario Ministry of the Environment](#) sport fish collection in 2002 found elevated PCB and mercury levels in white suckers.

Additional work has been completed to analyze results from 2003 field work on sport fish, caged clams and sediment sampling conducted by [Ontario Ministry of the Environment](#). Additional sediment studies of core chemistry and sediment stability have been carried out by the [National Water Research Institute](#).

The assessment and management of contaminated sediment is an intensive process. All participants will continue to work together to ensure that an acceptable outcome is achieved.

RAP Participants

Cooperation is critical to the RAP process. Undertaking environmental restoration requires a large amount of local knowledge, scientific expertise and hard work. One agency or group cannot undertake such a large task on their own, without the help of others. Listed below are the participants that have contributed to the RAP program.

- [Environment Canada](#)
- [Great Lakes Sustainability Fund](#)
- [Ontario Ministry of Natural Resources](#)
- [Ontario Ministry of the Environment](#)
- [Town of Marathon](#)
- [Marathon Pulp Inc.](#)

A.2.1.E St. Marys River**St. Marys River Area of Concern****General Information****Where?**

The St. Marys River is the 112 km connecting channel from Lake Superior to Lake Huron. The Area of Concern (AOC) extends from the head of the river at Whitefish Bay downstream approximately two-thirds of the river and includes the Canadian and U.S. cities of Sault Ste. Marie.

Why was this area listed?

Major environmental issues of concern in the area included:

- Restrictions on fish and wildlife consumption
- Unhealthy fish and wildlife populations
- Fish tumours and other deformities
- Unhealthy populations of bottom-dwelling organisms
- Restrictions on dredging
- Undesirable algae due to excess nutrients in the water
- Beach closures
- Poor aesthetics
- Loss of fish and wildlife habitat

What is being done? How is it being done?

In order to improve the environmental conditions noted above, a Remedial Action Plan (RAP) was developed for the St. Marys River. The St. Marys River RAP is a partnership between Canadian and U.S. federal governments, provincial (Ontario) and state (Michigan) governments, with cooperation from the [Binational Public Advisory Committee](#) (BPAC).

The Remedial Action Planning process, which was initiated in 1988, involves the following three stages:

- defining the problem (Stage 1)
- determining what remedial actions are needed to rectify the impairments (Stage 2)
- implementing the actions (Stage 2)
- monitoring the restoration of the environment and eventual delisting of the AOC (Stage 3)

The final Stage 2 Report was released in 2003. More than 60 recommended actions, including a large number of restoration and protection measures already completed or in progress, were included in the report.

Activities in the American portion of the AOC are being coordinated by US agencies, and more information about those activities can be found on the [US EPA Web site](http://www.epa.gov/grtlakes/aoc/stmarys.html) (<http://www.epa.gov/grtlakes/aoc/stmarys.html>).

HIGHLIGHT of the RAP

Algoma Steel Inc. (ASI) signed a three party [Environmental Management Agreement](#) (EMA) with [Environment Canada](#) and the [Ontario Ministry of the Environment](#) in early 2001. The objective of this EMA was to clearly define a list of initiatives with negotiated timelines for environmental activities which [Algoma Steel](#) agreed to undertake. The activities identified in the agreement dealt with issues which the three stakeholders agreed are priorities but which had specific objectives which were beyond the compliance regime administered by [Environment Canada](#) or the [Ministry of the Environment](#). It was a voluntary initiative which complemented the existing regulatory process and assisted [Algoma Steel](#) in planning and prioritizing a multi year environmental program. The agreement covered the period from date of signing to December 31, 2005. Prior to its expiration, negotiations were initiated to renew the Environmental Management Agreement for another term.

As of August 2004, the following achievements had been reported under the EMA:

- air emissions reduced from 1993 levels by 80.4 percent for benzene, 71.4 percent for PAHs
- reduced visible emissions from blast furnace
- developed annual Cokemaking Environmental Plans. The “year 2004 plan” was implemented January 1, 2004
- Total destruction of PCB since 1999 is 51,674.104 litres, or equivalent to 116.3 percent of stored PCB waste inventory .
- boat slip survey and sediment assessment completed in 2001(this was repeated in 2005 - results pending).
- landfill groundwater survey planned for 2005, and closure plan completed
- Waste mercury inventory removal completed. Direct removal policy in place.
- 80 percent of Environment Code of Practice for Integrated Steel Mills Recommendations met

The [complete text of the agreement](#) may be found on [Environment Canada's](#) Internet site.

RAP Development/History

Since the Area of Concern includes an international waterway, the St Marys River RAP requires a cooperative effort between Canadian and U.S. governments to coordinate the remedial action process.

[Environment Canada](#), [U.S. Environmental Protection Agency](#), [Ontario Ministry of the Environment](#) and [Michigan Department of Environmental Quality](#) have worked in partnership to further clarify areas of joint leadership and responsibility.

The cooperation and involvement of the Four Agencies, along with the [Ontario Ministry of Natural Resources, Fisheries and Oceans Canada](#), and [Michigan Department of Natural Resources](#) has been fundamental to the St. Marys River RAP program.

The [Binational Public Advisory Committee](#) (BPAC) was formed in 1988 to provide informed and continuous public participation in the St. Marys River RAP. The citizen based group represents interests from both Ontario and Michigan. Members work with and advise RAP participants on key aspects of the planning process. Members have included representatives from industry, academia, First Nations, and elected officials.

It is important to acknowledge the contributions of the [BPAC](#), which has played a crucial role in the development of the RAP during its 12 year history. These accomplishments include:

- Identification of Impairments and Conditions
- Development of Water Use Goals
- Identification of Remediation Needs and Options
- Assessment of Community Programs and Projects
- Development of Delisting Criteria
- Establishment of [BPAC](#) Office and Library
- Creation of the Friends of the St. Marys River

The Stage One report of the RAP described the environmental conditions and identified the use impairments in the Area of Concern. Federal, state and provincial agencies and the [International Joint Commission](#) reviewed this document.

There have been a number of workshops within the Stage Two process of the RAP, to ensure there has been broad based public involvement. These have been the basis for developing the strategic plans for the restoration of impaired beneficial uses. [The brochure](#), which was concurrently released with the Stage 2 Report, outlines the plans for restoration that will be implemented in the future.

RAP Status

Delisting criteria have been drafted for many of the beneficial use impairments in the St. Marys River AOC. The criteria are used to guide the development of remedial actions, preventative measures, regulatory programs and to direct monitoring efforts. These guidelines will assist in measuring progress towards achievement of water use goals and remediating use impairments in the AOC. This [brochure](#) contains a complete list of the recommended remedial actions for the St. Marys River AOC as of December 2002.

Improvements to the City's wastewater treatment system are being supported under the [Canada-Ontario Infrastructure Program](#) through a joint project announced in 2001. Through this project, the [City of Sault Ste. Marie, Ontario](#) has installed sewage overflow tanks and rehabilitated sewers in areas of high infiltration. Work has been completed to re-route sewers and upgrade two sewage pumping stations and sewage containment tanks. Furthermore, the East End Water Pollution Control Plant is being upgraded to increase primary treatment capacity and secondary treatment will be added. When the last of these improvement projects have been completed, it is expected that there will be no more raw sewage by-passes into the storm water collection system.

The bottom sediments of the river including the [Algoma Steel](#) boat slip are contaminated and a contaminated sediment management strategy is being developed.

Sea lamprey control efforts will help restore impaired fisheries in the St. Marys River as well as northern Lake Huron and Lake Michigan. A long term, continuing effort is needed since the opportunistic lamprey can take quick advantage of any lapse in larvae and adult control measures.

RAP Implementation

On April 17, 1998, [Environment Canada](#), [U.S. Environmental Protection Agency](#), [Ontario Ministry of the Environment](#) and [Michigan Department of Environmental Quality](#) signed a Four Agency Letter of Commitment. The Letter outlined agency roles and responsibilities during implementation of the Remedial Action Plans for the St. Clair River, Detroit River and St. Marys River binational Areas of Concern.

The Agencies have worked in partnership to further clarify areas of joint leadership and responsibility. A [Compendium of Position Papers](#) has been written and describes how the agencies work together to provide leadership for the RAPs, by involving the public, monitoring and reporting on progress, with the ultimate goal of delisting the Areas of Concern. The [Compendium](#) was signed on February 2, 2000.

Implementation of the actions recommended in the Stage 2 Report have not all proceeded at the same pace. Some actions are still in the early stages, while others are either complete or have been ongoing for some time.

Some of the projects already implemented or being implemented by individual stakeholders are:

- Process improvements, water treatment improvements and air quality monitoring at [Algoma Steel](#)
- Improvements to water treatment and air emissions at [St. Marys Paper](#)
- Improvements to pump stations, installation of combined sewer overflow tanks, ongoing improvements to the East End Wastewater Treatment Plant in [Sault Ste. Marie, Ontario](#) that will upgrade it to secondary treatment.
- Land based investigations and remedial actions are ongoing at the site of a decommissioned manufactured gas plant downstream of the Sault Edison power plant beside MCM Marine. Consumers Energy is removing about 5,000 cubic yards on-shore. River-based sediment investigations are done, and in the first phase of in-water dredging 2,000 to 4,000 cubic yards of sediment will be removed.
- Pilot test of chemical injection system to treat contaminated sediments
- Remediation of the Cannelton Industries Superfund site
- Bellevue Marina Sediment Management Strategy
- Little Rapids restoration project
- Enhanced fish access to Munuscong Bay Waterfowl Sanctuary
- The Chippewa/East Mackinaw Conservation District, with funding from MDEQ, has started work on a non-point source Watershed Planning project for the St. Marys River watershed. This project will assess urban pollution impacts to water quality and the nonpoint source pollutants for the St. Marys River originating from the Sault Ste. Marie watershed.
- Securement of 1500 hectares of wetlands through conservation agreements and landowner tax incentive programs
- The “Partners In Wetland Conservation” (PIWC) program, managed by Ducks Unlimited Canada (DUC), with funding from EC, is:
 - Empowering municipalities to conserve wetlands by increasing cooperation, data sharing and by helping them to identify and map wetlands within their boundaries and formally protect them through Official Plan revisions.
 - Evaluating additional wetlands within the AOC. Increasing efforts to secure wetland acres through the Conservation Land tax Incentive Plan (CLTIP) and the Managed Forest Tax Incentive Plan (MFTIP) incentive programs and DUC conservation agreements.
 - Engaging the public through a stronger public education component to value and conserve wetlands.
 - Gathering and facilitating volunteer participation in Canada’s “Marsh Monitoring Program”
- establishment of Lake George wetland interpretive site

Two RAP reviews were completed in 2004. The first was focused on synthesizing existing scientific data on contaminated sediment in order to identify data gaps and begin the development of sediment management options. The second was a broader review of the RAP which re-engaged stakeholders, reported on progress, and made a number of recommendations including a risk management decision making framework for the clean-up of contaminated sediments.

MDEQ recently released its 1992-2003 Great Lakes Connecting Channels Data Evaluation and Trend Analysis Report. The report is a summary of spatial and temporal water quality trends in the St. Marys, St. Clair and Detroit River connecting channels. In 2004, MDEQ conducted chemical and biological sampling on Charlotte River, Ashmun Creek, and Wilmar creek on Sugar Island. Reports are now complete, and available from MDEQ.

In 2005, MNR and MIDNR carried out a fish harvest survey of the lower St. Marys River. MNR and DFO also partnered to collect “young of the year” walleye along the east side of Lake George to look at recruitment and stocking. US agencies also completed sites on the US side.

The BPAC draft document “Report on Scope of Contaminated Sediments in the St. Marys River Area of Concern,” was released April 5, 2005, and has been reviewed by the agencies and comments provided to BPAC. .

As the St. Marys River RAP evolves further into the implementation phase, even more stakeholders will get involved, and the administration of projects and relationships between stakeholders will evolve as well.

RAP Accomplishments

Although implementation of some remedial actions is just beginning, important steps forward have already been made in the St. Marys River RAP.

Notable successes have included the sixty million dollar Canada-Ontario Infrastructure project through which the City of Sault Ste. Marie, Ontario installed sewage overflow tanks, made upgrades to increase primary treatment capacity, rehabilitated sewers in areas of high infiltration, and is adding secondary treatment to the East End water pollution control plant. These upgrades should drastically reduce the probability of future sewage overflows.

Other achievements include the development of wetland protection strategies, fostering the recovery of walleye populations and supporting the design of habitat features in the city's waterfront development.

A complete list of notable achievements is published in the St. Marys RAP Stage 2 [Brochure](#).

RAP Participants

Cooperation is critical to the RAP process. Undertaking environmental restoration requires a large amount of local knowledge, scientific expertise and hard work. One agency or group cannot undertake such a large task on their own, without the help of others. Listed below are participants that contribute to the RAP program.

- [Environment Canada](#)
- [Fisheries and Oceans Canada](#)
- [Health Canada](#)
- [Ontario Ministry of the Environment](#)
- [Ontario Ministry of Natural Resources](#)
- [United States Environmental Protection Agency](#)
- [Michigan Department of Environmental Quality](#)
- [Michigan Department of Natural Resources](#)
- [Great Lakes Sustainability Fund](#)

- [City of Sault Ste. Marie, Ontario](#)
- [City of Sault Ste. Marie, Michigan](#)
- [Algoma Steel](#)
 - [Environmental Management Agreement](#)
- [St. Marys Paper](#)
- [Binational Public Advisory Committee](#)
- [Friends of St. Marys River](#)
- [Sault Ste. Marie Region Conservation Authority](#)
- [Local First Nations and Native American communities](#)
- [Lake Superior State University](#)

A.2.2 U.S. Fact Sheets

A.2.2.A Torch Lake

Torch Lake Area of Concern



Torch Lake AOC Boundary Map
 (click on map to view in separate window)
[Torch Lake shape file](#)

Background

Torch Lake became an Area of Concern (AOC) due to fish tumors of unknown origin which resulted in fish consumption advisories. The 1987 RAP document identified three Beneficial Use Impairments (BUIs) for the Torch Lake AOC. Fish Tumors; Degraded Benthos; Fish Consumption Advisories.

The Torch Lake Area of Concern is located on the Keweenaw Peninsula within Houghton County on the northwestern shore of Michigan’s Upper Peninsula and on Lake Superior’s southern shore. The region is locally known as the Copper Country. Deposits of native (elemental) copper are found in the Portage Lakes Lava Series, a long narrow bedrock formation which extends from the tip of the



Mason Stamp Sand Parcel of Torch Lake AOC after remediation

Keweenaw Peninsula southwest to the Michigan-Wisconsin border covering a distance of over one hundred miles.

Copper-bearing ore on the Keweenaw Peninsula contains copper in its native or natural metallic form. For this reason, it has been a source of copper for people for thousands of years. More recently, it is the waste products from the industrial milling, smelting, and leaching operations of the mined copper bearing ore that have created the present environmental concern. These industrial processes began during the 1840s and continued for more than a century until all mining and related operations ceased in 1968. Those processes left stamp sands and slags deposited either on the surface of the surrounding landscape or in adjacent lakes and streams. Portions of the surficial materials eroded into nearby waterbodies.



Mason Stamp Sand Parcel of Torch Lake AOC before remediation

It is estimated that more than 10.5 billion pounds of copper were produced in the Copper Country between the mid-1840s and 1968. Half of this output was processed at sites scattered across the Copper Country landscape. The remainder was processed along the western shoreline of Torch Lake, a 2,700 acre body of water in Houghton County. About 200 million tons of copper ore tailings were deposited in Torch Lake, displacing about 20 percent of the lake's original volume (MDNR 1987).

The Torch Lake Area of Concern Boundary was described in the 1987 Torch Lake Remedial Action Plan (RAP) document ".....Torch Lake and its immediate environs." Immediate environs can be described as those areas along the shore of Torch Lake proper where wastes from the production of copper contributed directly to the contaminate loadings of Torch Lake. These areas had stamp sands and water quenched slags dumped on the shore and into the lake during the copper production process. The AOC boundary was formally agreed to by the Torch Lake Public Advisory Council (TLPAC), US EPA and the Michigan Department of Environmental Quality in 2005.

Beneficial Use Impairments

The 1987 RAP document identified three Beneficial Use Impairments (BUIs) for the Torch Lake AOC:

- Fish Tumors
- Degraded Benthos
- Fish Consumption Advisories

Torch Lake Beneficial Use Impairments	
<ul style="list-style-type: none"> • Restrictions on fish and wildlife consumption <p>Tainting of fish and wildlife flavor (likely) Degradation of fish and wildlife populations (likely)</p>	<p>Eutrophication or undesirable algae (unknown)</p> <p>Restrictions on drinking water consumption, or taste and odor problems Beach closings</p>
<ul style="list-style-type: none"> • Fish tumors or other deformities <p>Bird or animal deformities or reproduction problems (likely)</p>	<p>Degradation of aesthetics</p> <p>Added costs to agriculture or industry</p>
<ul style="list-style-type: none"> • Degradation of benthos <p>Restrictions on dredging activities</p>	<p>Degradation of phytoplankton and zooplankton populations</p> <p>Loss of fish and wildlife habitat</p>

Delisting Criteria/Restoration Targets

The Torch Lake AOC Public Advisory Council has requested that the State of Michigan begin the AOC delisting process for their AOC. A technical committee was developed comprised of staff from state and federal agencies and the PAC. The technical committee determined to use delisting criteria based on the recently released [Guidance for Delisting Michigan's Great Lakes Areas of Concern](#) document, released January 2006.

RAP Development and Status

- December 2005: First draft of the Delisting Determination Document for the Torch Lake Area of Concern completed. (unavailable)
- 2002: Draft Remedial Action Plan Update completed. (unavailable)
- 1987: Michigan Department of Natural Resources [Remedial Action Plan for the Torch Lake Area of Concern](#) completed.

RAP Implementation

Remedial Actions

The Torch Lake Area of Concern included four of 14 Superfund Areas that were divided into operable units (OU). Two of three OUs, i.e. OU 1 and OU2, as designated under the two Superfund Record of Decisions, were applicable to the Torch Lake Area of Concern. These were:

- OU 1 - includes the stamp sands, water quenched slags and other mining wastes deposited along the Torch Lake shoreline.
- OU 2 - includes ground water, surface water and submerged stamp sands and sediments in Torch Lake, Portage Lake, the Keweenaw Waterway/Portage Ship Canal, the Lake Superior Shoreline from south of the North Entry to Freda/Red Ridge, Boston Pond and Calumet Lake



Mason Stamp Sand Parcel of Torch Lake AOC after Superfund remediation. Note dredge and smelter leftover from the copper mining days.

The selected remedy for OU 1 was to cover with soil and seed down to prevent erosional actions by wind and water. Remedial actions for the Torch Lake Superfund Site were completed by September 2005. Some parcels have already been deleted from the National Priorities List (NPL). Once all parcels are deleted, planned for 2008, the state will assume Operation and Maintenance of the areas which includes long term monitoring of all OUs. Under the ROD for OU 2, natural attenuation was the selected remedy for the lakes. OU 2 has been deleted from the NPL.

The selected remedy for OU 1 was to cover with soil and seed down to prevent erosional actions by wind and water. Remedial actions for the Torch Lake Superfund Site were completed by September 2005. Some parcels have already been deleted from the National Priorities List (NPL). Once all parcels are deleted, planned for 2008, the state will assume Operation and Maintenance of the areas which includes long term monitoring of all OUs. Under the ROD for OU 2, natural attenuation was the selected remedy for the lakes. OU 2 has been deleted from the NPL.



*Hubbell/Tamarack City Stamp Sand Parcel of Torch Lake AOC during remediation (left)
Hubbell/Tamarack City Stamp Sand Parcel of Torch Lake AOC after remediation (right)*

Current Projects and Outlook

- Delisting Determination Document under development.

RAP-Related Publications

- 2005: [NPL Fact Sheets for Michigan: Torch lake](#), US EPA Region 5
- 2001: Baseline Study Report: Torch Lake Superfund Site, Houghton County, Michigan, US EPA-Superfund.
- 1996: A Mining Legacy: Torch Lake and Area of Concern (18-minute video), Houghton/Keweenaw Soil and Water Conservation District.
- 1994: Declaration for the Record of Decision for Operable Unit II, Houghton County, Michigan, US EPA.
- 1992: [Declaration for the Record of Decision for Operable Units I & III, Houghton County, Michigan](#), US EPA.

Community/Local RAP Group Involvement

Public election of the members of the Torch Lake Public Advisory Council (TLPAC) took place in the spring of 1997. In less than one year the group adopted its by-laws, mission statement, goals and objectives, and incorporated as a tax-exempt, nonprofit Michigan corporation. It has received contributions from local governments, businesses, environmental groups, and private individuals to help defray logistical expenses. In addition, TLPAC has been awarded over \$24,000 from agency grants and private foundations.

Currently, there are seven schools within the AOC that have instituted Adopt-A-Stream projects. The Keweenaw Waterway Trail Association, in cooperation with local and state agencies, has developed a series of low-impact boating campsites along the waterway.



Wildlife abounds on the newly vegetated stamp sands of Torch Lake AOC. Small mammal survey results show wildlife is quite abundant on newly revegetated stamp sands compared to unremediated stamp sands where we did not find any wildlife at all.

Partners and Stakeholders

- Adams Township
- Calumet Township
- Chassell Township
- [City of Hancock](#)
- [City of Houghton](#)
- Elm River Township
- Franklin Township
- Hancock Township
- Houghton Co. Natural Resources Conservation Service
- Houghton County Board of Commissioners
- [Keweenaw Bay Indians](#), Band of Chippewa
- [Keweenaw National Historical Park](#)
- [Lake Linden Village](#)
- [Michigan Department of Environmental Quality](#)
- Michigan Department of Natural Resources
- [Michigan Statewide Public Advisory Council](#)
- [Michigan Technological University, Center for Science and Environmental Outreach](#)
- Osceola Township
- Portage Township
- Quincy Township
- Schoolcraft Township
- Stanton Township
- Torch Lake Public Advisory Council
- Torch Lake Township
- [US EPA - Great Lakes National Program Office](#)
- [US EPA - Superfund](#)

Torch Lake AOC Contacts

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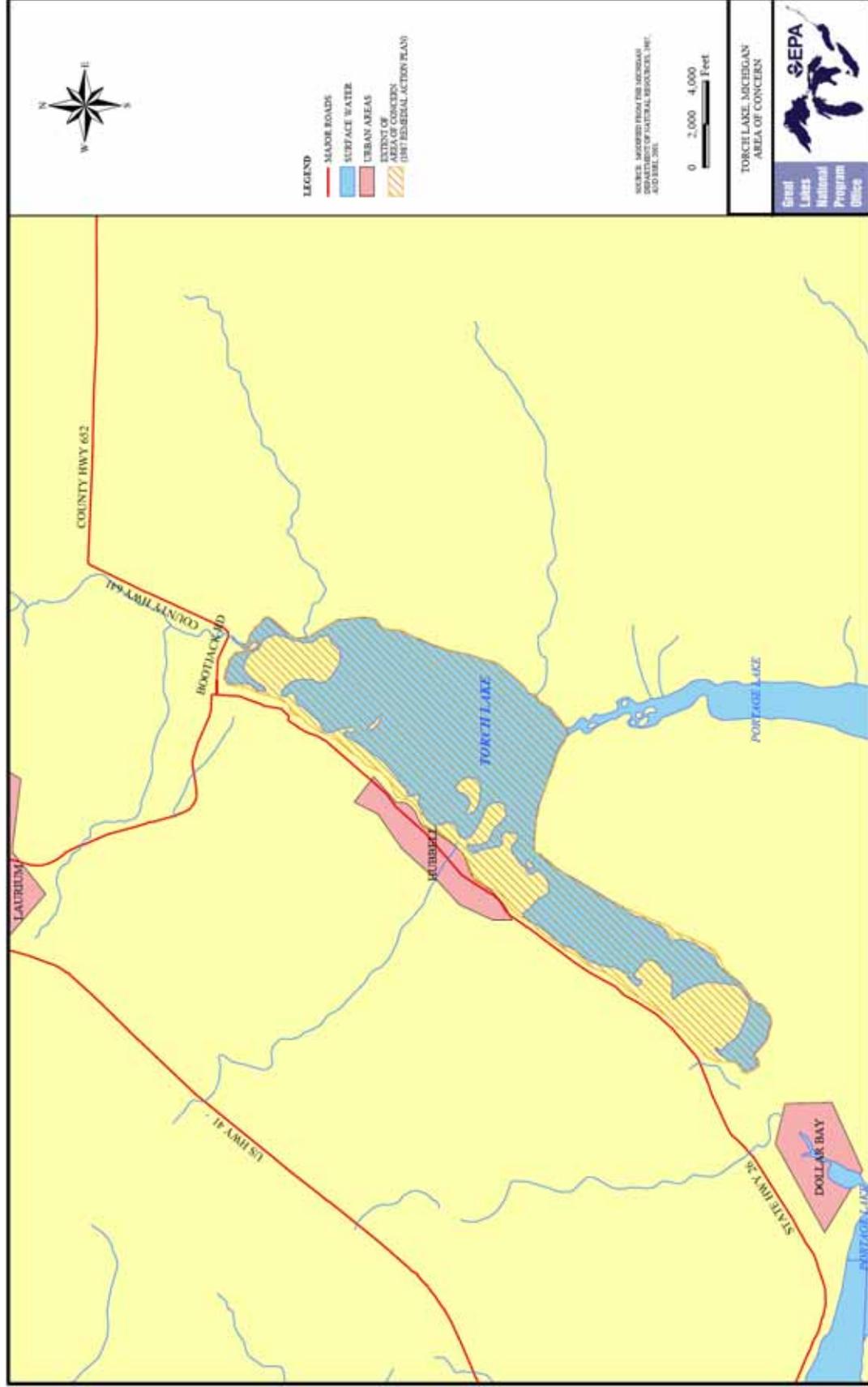
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A.2.2.B St. Louis River

St. Louis River Area of Concern



St. Louis River AOC Boundary Map
(click on map to view in separate window)
[St. Louis River shape file](#)

Background

The St. Louis River, the largest U.S. tributary to [Lake Superior](#), drains 3,634 square miles, entering the southwestern corner of the lake between Duluth, Minnesota and Superior, Wisconsin. The river flows 179 miles through three distinct areas: coarse soils, glacial till and outwash deposits at its headwaters; a deep, narrow gorge at Jay Cooke State Park; and red clay deposits in its lower reaches. As it approaches Duluth and Superior, the river takes on the characteristics of a 12,000 acre freshwater estuary. The upper estuary has some wilderness-like areas, while the lower estuary is characterized by urban development, an industrial harbor and a major port. The lower estuary includes St. Louis Bay, Superior Bay, Allouez Bay, Kimball's Bay, Pokegama Bay, Howards Bay and the lower Nemadji River.



The St. Louis River System [Area of Concern](#) (AOC) is the area being addressed by the St. Louis River System Remedial Action Plan (RAP). While system-wide in its approach, the St. Louis River AOC focuses primarily on the lower 39 river miles and the entire 360 square mile Nemadji River watershed. The Nemadji River is split almost equally between Minnesota and Wisconsin and discharges into the Duluth-Superior Harbor near the natural outlet of the St. Louis River.

The RAP began in 1989 as a collaborative effort between the Minnesota Pollution Control Agency (MPCA) and the Wisconsin Department of Natural Resources (WDNR). At that time, the agencies created a Citizens Advisory Committee (CAC). In 1997, with agency assistance, the CAC opened its doors as an independent nonprofit organization known as the [Citizens Action Committee](#). Many of the original citizen and agency partners are still active in the RAP and CAC.

Beneficial Use Impairments

The [RAP](#) process determined that nine of 14 identified [beneficial uses](#) were impaired. Some impairments were associated with the physical loss and degradation of habitat, with an estimated 7,700 acres of wetland and open water habitat altered or destroyed since settlement. Other problems were related more to pollution and toxicity. For years, the river smelled bad from industrial discharges. That changed in 1978, when the Western Lake Superior Sanitary

St. Louis River Beneficial Use Impairments	
<ul style="list-style-type: none"> • Restrictions on fish and wildlife consumption <p>Tainting of fish and wildlife flavor (unclear)</p>	<ul style="list-style-type: none"> • Excessive Loading of Sediment and Nutrients <p>Restrictions on drinking water consumption, or taste and odor problems</p>
<ul style="list-style-type: none"> • Degradation of fish and wildlife populations 	<ul style="list-style-type: none"> • Beach closings
<ul style="list-style-type: none"> • Fish tumors or other deformities <p>Bird or animal deformities or reproduction problems (unclear)</p>	<ul style="list-style-type: none"> • Degradation of aesthetics <p>Added costs to agriculture or industry</p>
<ul style="list-style-type: none"> • Degradation of benthos 	<p>Degradation of phytoplankton and zooplankton populations</p>
<ul style="list-style-type: none"> • Restrictions on dredging activities 	<ul style="list-style-type: none"> • Loss of fish and wildlife habitat

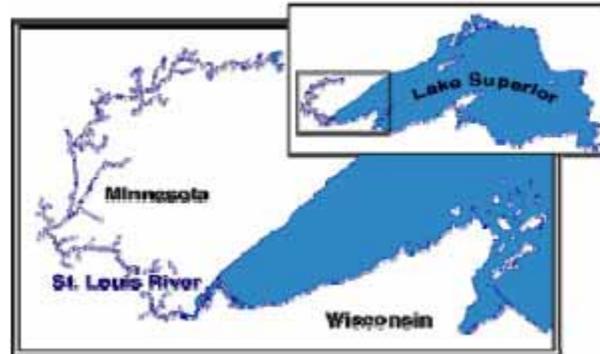
District (WLSSD) wastewater treatment plant began operation. Nevertheless, pollution continues to come from sources such as contaminated sediments, abandoned hazardous waste sites, poorly designed or leaky landfills, airborne deposition, industrial discharges, chemical spills, improperly sewered wastes, and surface runoff.

For further information and details on all of the BUIs, see a corresponding [St. Louis River Beneficial Use Impairments](#) document, the [Restoration Goals for Beneficial Use Impairments](#) SLRCAC web page, and the Remedial Action Plan (RAP) documents listed in the [RAP Development and Status](#) section below.

Delisting Criteria/Restoration Targets

In 2004, the SLRCAC proposed [restoration goals](#) for many of the impaired uses through a citizen process and submitted them to the Wisconsin Department of Natural Resources (WDNR) and the Minnesota Pollution Control Agency. The agencies will review the proposed goals in light of environmental data and potential actions. The state agencies' review, revisions and clarifications, and adoption of the delisting targets is the next phase that needs to be accomplished. The targets will serve as the roadmap for actions to lead to delisting the AOC.

The SLRCAC has been awarded a grant through the WDNR to facilitate work on the delisting roadmap document for the St. Louis River AOC. During this project, SLRCAC will coordinate information exchange between federal, state, tribal agencies and local governments. SLRCAC will guide public participation in the roadmap development process. In brief, the SLRCAC will craft, facilitate public and agency review, publish, post on websites, and distribute the delisting roadmap document for the St. Louis River AOC.



RAP Development and Status

A progress report containing the CAC's 43 Stage Two recommendations was published in 1995. Implementation began immediately and continues today. Some recommended actions are well underway or completed, such as: (1) land acquisition, with 34,000 acres bordering the river permanently protected by purchase or donation, (2) connection of Fond du Lac, MN, responsible for a high percentage of failing septic systems, to the WLSSD, (3) programs to reduce sewage bypasses by keeping stormwater out of sanitary sewer systems, (4) completion of a habitat plan for the lower St. Louis River, and (5) implementation of a three-phase sediment strategy to reduce impairments associated with sediment contamination.

The Stage One document was published and reviewed in 1992. The IJC gave the RAP high marks for broadening the geographic scope of the AOC and expanding the definition of the use impairments in order to fully encompass local environmental concerns.

Significant RAP Milestones

- **2004:** The SLRCAC proposed [restoration goals](#) for many of the impaired uses through a citizen process and submitted them to the Wisconsin Department of Natural Resources (WDNR) and the Minnesota Pollution Control Agency.
- **2002:** [Lower St. Louis River Habitat Plan](#) completed. The CAC worked with several partners from city, county, state, and federal agencies and entities on this document.
- **1999:** The CAC received funding to implement the [habitat plan recommendation](#).
- **1996:** [St. Louis River Citizens Action Committee](#) formed.
- **1995:** [RAP Recommendation Implementation Status](#) document drafted.
- **1995:** [St. Louis River System RAP Progress Report](#) completed.
- **1992:** [The St. Louis River System RAP Stage One](#) document completed.

RAP Implementation

Recent Progress and Achievements

Hog Island Great Lakes Legacy Act Project Completed:

November 28, 2005 marked the completion of the Great Lakes Legacy Act sediment cleanup at Hog Island in Superior, Wisconsin. Great Lakes National Program Office Director Gary Gulezian joined Wisconsin Governor Jim Doyle and 85 residents, local officials, and legislative aids to celebrate this event. The \$6.3 million project removed nearly 55,000 tons of petroleum-contaminated sediment from Newton Creek and parts of Hog Island Inlet. Further replanting and re-seeding will occur in the spring of 2006, and the local community is developing plans for further restoration of the area.



Hog Island Inlet. Because of past pollution, the inlet has not been safe for swimming or fishing.

Cleanup of this Great Lakes Legacy Act site, a joint project of the U.S. Environmental Protection Agency's Great Lakes National Program Office and Wisconsin Department of Natural Resources, began in July 2005 and the sediment cleanup portion was completed in November 2005. The banks of the creek and inlet were landscaped to prevent erosion. The result will be a healthier habitat for fish and other aquatic life, and the inlet will be safe for recreation.

Approximately \$4.1 million of the funds to pay for this project are provided by the [Great Lakes Legacy Act](#). The act authorizes \$270 million over a five-year period to clean up contaminated sediment in Great Lakes [Areas of Concern](#)." The state of Wisconsin and other parties are providing 35 percent of the project's cost, or about \$2.2 million. These are nonfederal matching funds required by the Legacy Act.



Close-up view of the contaminated sediments being removed from Hog Island Inlet.

Remediation of Contaminated Sediments:

Surveys conducted in recent years have provided a great deal of useful information about local sediment contamination.

In Minnesota, clean ups are underway at the two state Superfund sites on the river (USX and Interlake). Each site has a community work group.

In Wisconsin, WDNR and Murphy Oil are working together to clean up the Newton Creek System, which includes Hog Island Inlet. This is a staged clean-up process that began with Murphy Oil building a new waste water treatment plant. In fall 1997, Murphy Oil began cleaning up the headwaters of Newton Creek.

Pollution Prevention:

The RAP helped Oliver, Wisconsin, solve its wastewater treatment problems. Oliver and the Western Lake Superior Sanitary District (WLSSD) in Duluth agreed to lay a pipe under the river and treat Oliver's waste at WLSSD.

Water quality continues to improve, due to pollution prevention efforts, better pre-treatment programs and new stormwater management activities, including efforts to control storm-related "inflow and infiltration," which has caused sewage bypasses in Duluth, with untreated sewage flowing directly into Lake Superior.

MPCA, WDNR and WLSSD are encouraging pollution prevention in outreach programs aimed at citizens and businesses.

Habitat Protection and Improvement:

In 2002, the [Lower St. Louis River Habitat Plan](#) was completed. The CAC worked with several partners from city, county, state, and federal agencies and entities on this document. The Plan is being used to protect and restore the river. The plan classifies specific areas of the entire estuary into habitat types and recommends what actions are

needed to restore, protect or enhance the river. The Plan has been embraced by all levels of government and by other groups and organizations. Most recently it was a basis for the part of the remediation of a Superfund site cleanup located in the river at Stryker Bay on the Minnesota side of the river. Recommendations in the Habitat Plan were also used in the Great Lakes Legacy Act contaminated sediment cleanup site on the Wisconsin side, Hog Island Inlet. (See above.)

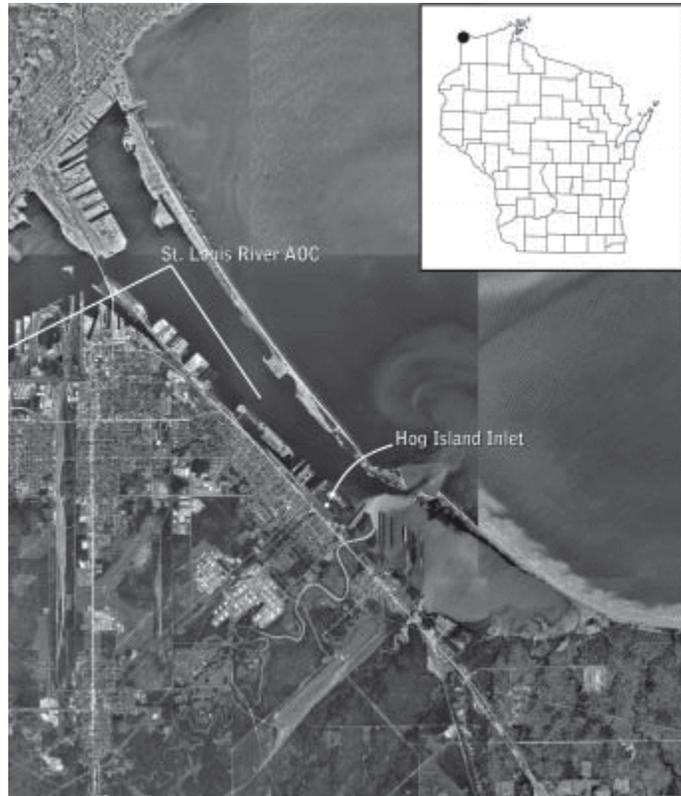
The RAP was instrumental in the creation of WDNR's St. Louis River Streambank Protection Project, upstream of Oliver, which purchased 6,900 acres, including shorelands bordering five miles along the St. Louis River and 13 miles along the Red River and its main tributaries. The project includes most of the Red River watershed, which is characterized by steep slopes and highly erodible red clay soils.

The St. Louis River Board developed an even larger protection project along the St. Louis, Cloquet and Whiteface River (all in the St. Louis River watershed). Some 22,000 acres were acquired and transferred to the Minnesota Department of Natural Resources.

Bio-control is being used on purple loosestrife infestations in wetlands on both the Minnesota and Wisconsin sides of the lower estuary.

Current Projects and Outlook

See [Priority Action Items in the St. Louis River AOC](#) for a look at current projects and what the RAP partners hope to accomplish in the near future.



This is an aerial view of the area where contaminated sediment and soil were removed from Newton Creek and Hog Island Inlet.

RAP-Related Publications

- Natural & Cultural History of the Lower St. Louis River: On-the-Water Guide for Canoeists, Kayakers & Boaters. St. Louis River Citizens Action Committee, August 2001.
- Historic Reconstruction of Property Ownership and Land Uses along the Lower St. Louis River. St. Louis River Citizens Action Committee, October 1999.
- Lake Superior/Duluth-Superior Harbor Toxics Loading Study. Minnesota Pollution Control Agency, September, 1999.
- Issue Paper Concerning Wet Weather Flow Issues: Sanitary Sewer Overflows Developed For the WLSSD Effluent Quality Master Plan Project. Western Lake Superior Sanitary District, 1999.
- Wisconsin's Lake Superior Coastal Wetlands Evaluation: A Report to the Great Lakes National Program Office, US EPA. Wisconsin DNR PUB ER-09599, 1999.
- Lake Superior Basin Water Quality Management Plan. Wisconsin DNR PUBL-WT-278-99-REV, March 1999.
- Lake Superior Lakewide Management Plan 2000. [Lake Superior Binational Program](#), April 2000.
- Erosion and Sedimentation in the Nemadji River Basin. Natural Resources Conservation Service and U.S. Forest Service, 1998.
- Newton Creek System Sediment Contamination Site Characterization Report. Wisconsin Department of Natural Resources, December 1995.

More information on these publications can be obtained by contacting the individuals listed in the [St. Louis River AOC Contacts](#) section below.

Community/Local RAP Group Involvement

The [St. Louis River Citizens Action Committee](#), or SLRCAC, consists of people of all ages and walks of life who work together to improve the St. Louis River. The independent nonprofit organization incorporated as a 501(c)(3) organization in 1996 to encourage implementation of the RAP and restoration of the AOC. The SLRCAC has a successful track record of bringing parties together to implement projects and facilitate multi-jurisdictional strategies for the AOC. A prime example is the [Lower St. Louis River Habitat Plan](#) (2002) developed by the SLRCAC with federal, state, tribal, and local resource management professionals and citizens. This plan is used extensively by the resource management agencies and local communities.

The St. Louis River System RAP has been recognized since its inception for its high level of citizen participation and community involvement. Hundreds of individuals, representing a broad cross-section of the community, have worked together to identify problems, develop and/or implement recommendations and encourage environmental stewardship. They have provided crucial support for the RAP process and helped to improve the health of the St. Louis River ecosystem.

Just as the St. Louis River and estuary are important components of the Lake Superior Basin Ecosystem, the RAP activities are important to the [Lake Superior Binational Program](#) and the [Lakewide Management Plan](#). RAP actions, from contaminated sediment cleanup to habitat protection, pollution prevention, and community involvement are all important to meet the Lake Superior basin goals.

Public Outreach and Education:

River Watch Program in Minnesota and Water Watch Program in Wisconsin have involved numerous area teachers and school children in hands-on, field-oriented, water-quality education and monitoring. These efforts have also included a spring River Congress, annual stormdrain stenciling and several art/science collaborations.

The RAP helped get signs posted to warn recreational users about contaminated sediments at Stryker Bay in Duluth and at Hog Island Inlet in Superior.

The SLRCAC has organized clean ups at the Connors Point Recreation Area and Wisconsin Point in Superior as well as Grassy Point and Erie Pier in Duluth.



The sign at the entrance to the Newton Creek/Hog Island Inlet Great Lakes Legacy Act Cleanup.

Partners and Stakeholders

- 1854 Authority(www.1854authority.org)
- Arrowhead Regional Development Commission (www.ardc.org)
- City of Duluth, MN (<http://www.ci.duluth.mn.us>)
- City of Superior, WI (www.ci.superior.wi.us)
- Fond du Lac Tribe (www.fdlrez.com)
- Harbor Technical Advisory Committee
- [Lake Superior Binational Program](#)
- [Minnesota Department of Natural Resources](#)
- [Minnesota Pollution Control Agency](#)
- [Minnesota Sea Grant](#)
- [River Watch Project](#)
- River Quest
- [St. Louis River Citizens Action Committee](#)
- [The Nature Conservancy](#)
- [U.S. Army Corps of Engineers](#)
- [US EPA](#)
- [U.S. Fish and Wildlife Service](#)
- Western Lake Superior Sanitary District (www.wlssd.com)
- [Wisconsin Department of Natural Resources](#)
- [Wisconsin Sea Grant](#)

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A.2.2.C Deer Lake

Deer Lake Area of Concern



**Deer Lake AOC Boundary Map
Not Yet Available/Pending Approval**

Background

Deer Lake is a 1,000-acre impoundment in central Marquette County near Ishpeming, Michigan. The [Area of Concern](#) (AOC) boundary is considered to be Carp Creek from the discharge point of the old Ishpeming Township A Wastewater Treatment Plant flowing downstream to the south basin of Deer Lake. The AOC also includes Deer Lake, and the Carp River flowing downstream through the dam from the north basin of Deer Lake about twenty miles to [Lake Superior](#) near Marquette.

International Joint Commission, Environmental Protection Agency, and Michigan Department of Environmental Quality guidance materials describe that AOCs should

be considered on a watershed basis. In most AOCs the watershed is considered a potential source area to that AOC. Contaminant sources to Beneficial Use Impairments (BUIs) that are identified within the watershed, even if not located within the defined AOC boundaries, would be given every consideration for remedial actions, when meeting all federal and state guidance.



Early fall in South Basin looking toward the narrows.

In 1981 fish in Deer Lake were discovered to have concentrations of mercury that exceeded the 1.5 mg/kg "ban on total consumption" by the Michigan Department of Community Health (MDCH). Mercury concentrations in Deer Lake fish also exceeded the mercury levels found in fish from similar lakes at that time.

There were two known industrial sources of mercury to the Deer Lake AOC. The first industrial use of mercury occurred in the 1880s in the northwestern portion of the Deer Lake AOC watershed by the Ropes Gold and Silver Company. Liquid (elemental) mercury was used to recover gold from ore between 1882 and 1897 at a location west of the north basin of Deer Lake.

The second industrial use of mercury occurred in the Carp Creek watershed. Mercury salts were used in iron ore assays in laboratories of The Cleveland-Cliffs Iron Company (CCIC). Mercury-containing wastewater from the CCIC laboratories was discharged to the City of Ishpeming wastewater treatment system between 1929 and 1981. During that time the City wastewater treatment plant discharged primary-treated municipal wastewater into Carp Creek which then flows into the south basin of Deer Lake.



Sunset view of the South Basin of Deer Lake looking toward the Narrows.

From 1929 to 1963 all wastewater generated in the City of Ishpeming and Ishpeming Township discharged without treatment through combined sanitary and storm sewers into Carp Creek. From 1964 to 1985 three Primary Treatment Plants treated municipal wastewater before it was discharged into Carp Creek. In 1970 these primary treatment systems were determined to be inadequate by the State Water Resources Commission. The combined sewers were separated into sanitary sewers and storm sewers by 1985. An Enhanced Secondary Wastewater Treatment Plant replaced the three Primary treatment plants in April 1986. The new wastewater treatment system significantly decreased nutrient loading into Deer Lake; for example, phosphorus loading decreased by 86 percent.

Beneficial Use Impairments

Three beneficial use impairments (BUIs) have been identified for the Deer Lake AOC. These include:

Restrictions on Fish and Wildlife Consumption

Some fish sampled from Deer Lake contain mercury concentrations that exceed the 1.5 mg/kg “do not consume” threshold that has been established by the MDCH. Currently, there is a possession ban for all fish from Deer Lake. There is no fish consumption advisory for brook trout in Carp Creek and the Carp River, however, consumption of other species in these streams is not advised. There are no consumption advisories for wildlife in the Deer Lake AOC.

Deer Lake Beneficial Use Impairments	
<ul style="list-style-type: none"> Restrictions on fish and wildlife consumption 	<ul style="list-style-type: none"> Eutrophication or undesirable algae
Tainting of fish and wildlife flavor	Restrictions on drinking water consumption, or taste and odor problems
Degradation of fish and wildlife populations	Beach closings
Fish tumors or other deformities	Degradation of aesthetics
<ul style="list-style-type: none"> Bird or animal deformities or reproduction problems 	Added costs to agriculture or industry
Degradation of benthos	Degradation of phytoplankton and zooplankton populations (unknown)
Restrictions on dredging activities	Loss of fish and wildlife habitat

Bird or Animal Deformities of Reproductive Problems

Bald eagles maintained a nest at Deer Lake between 1963 and 1980, but did not successfully rear young during that time. Eagles were documented to be reproducing successfully again beginning in 1998.

Eutrophication or Undesirable Algae

Deer Lake was characterized as eutrophic (nutrient-rich) by the U.S. Environmental Protection Agency (US EPA) during a national lake survey in 1972. A 1974-75 study by Northern Michigan University concluded that Deer Lake was hypereutrophic (excessively nutrient-rich). Dissolved oxygen (DO) concentrations have been used to assess and monitor the trophic (nutrient) status of the AOC.

Delisting Criteria/Restoration Targets

The Deer Lake AOC Public Advisory Council has requested that the State of Michigan and the U.S. Environmental Protection Agency (EPA) begin the delisting process for the AOC. An AOC Technical Committee was developed comprised of staff from state and federal agencies and the PAC's technical committee. The technical committee determined to use delisting criteria based on the January 2006 [Guidance for Delisting Michigan's Great Lakes Areas of Concern](#) document. The AOC Technical Committee is initiating the development of a Delisting Determination Document based on the State of Michigan delisting guidance. This document will determine the status of the BUIs. The Technical Committee will develop a timeline to set goals and track progress. The timeline will use elements from the PAC's delisting checklist.

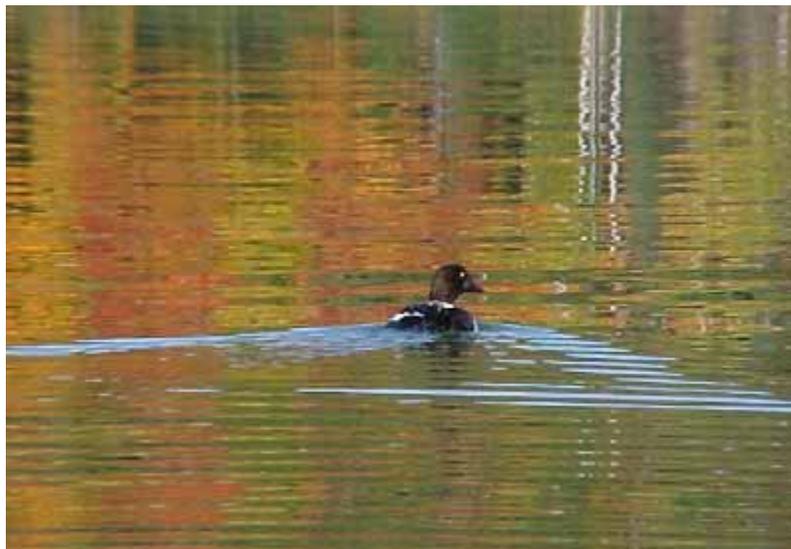
RAP Development and Status

A [Remedial Action Plan \(RAP\) for Deer Lake Area of Concern](#) was published by the MDEQ in 1987. The Deer Lake PAC drafted a RAP Update in 2002 that is being reviewed by the MDEQ.

The Deer Lake RAP Update is currently in draft form and will be used as the basis for the Deer Lake Delisting Determination Document.

Significant RAP Milestones

As described in the original 1987 RAP, several restoration milestones were achieved prior to the AOC listing process. In addition, many more milestones have been achieved since the RAP was published. The table below provides a chronological list of the RAP implementation milestones for each BUI.



A loon swimming during Autumn; from Fred Minnich's Wildlife Survey conducted July 2004- June 2005.

Chronological List of BUI RAP Milestones in the Deer Lake Area of Concern

Year	Fish Consumption BUI milestones	Eagle reproduction BUI milestones	Eutrophication BUI milestones
2006	Michigan published Delisting Guidelines		
2006	Fish Consumption BUI identified in the State Delisting Guidance as a BUI for the AOC based on the 1987 RAP	Eagle Reproduction BUI identified in the State Delisting Guidance as a BUI for the AOC based on the 1987 RAP	Eutrophication BUI identified in the State Delisting Guidance as a BUI for the AOC based on the 1987 RAP
2005	Deer Lake PAC requested that the DEQ and EPA begin investigating the delisting process for the AOC		
2005	PAC monitored Deer Lake water quality; PAC completed a wildlife study; PAC water quality data report concluded that valve operation has reduced in-lake methylation by 65 percent	One adult occupied territory	MDEQ observed additional improvements in winter DO compared with 1999
2004	PAC monitored Deer Lake water quality and began a wildlife study	Eagle nest occupied; two eaglets fledged	
2003	Fish study completed at Deer Lake AOC; valve opened to minimize mercury methylation during summer stratification; MDEQ identified that Partridge Creek is a conduit that transports mercury from an unknown source to the AOC	Eagle nest occupied; two eaglets fledged;	
2002	MDEQ drafted a Focused Feasibility Study for AOC; PAC set a goal for Fish Consumption BUI based on large fish; PAC drafted RAP update; PAC monitored Deer Lake water quality; PAC recommended remedies for AOC	Eagle nest occupied; two eaglets fledged	
2001		Eagle nest occupied; two eaglets fledged	
2000	MDEQ concluded that small fish in Deer Lake were similar in mercury content as comparable fish from nearby lakes (Day 2000)	Eagle nest occupied; two eaglets fledged	
1999	CCIC and MDEQ studies confirm that large Deer	Eagle nest occupied; two eaglets fledged	CCIC study observed additional improvements

Year	Fish Consumption BUI milestones	Eagle reproduction BUI milestones	Eutrophication BUI milestones
	Lake fish contain more mercury than comparable fish from nearby lakes; (Day 2000)		in winter DO compared with 1989
1998		Eagle nest occupied; two eaglets fledged	
1995			The Kerfoot 1995 Study indicated that Deer Lake had become mesotrophic-27 ug/l Total Phosphorus in the south basin.
1994	Brook trout consumption advisory lifted from Carp Creek and Carp River		
1991	Fish consumption advisory changed to catch-and-release only		
1990	Slot cut in the spillway to assist in maintaining a stable water level		
1989			MDEQ monitoring observed improvements in Winter DO compared with 1974 DEQ data
1987	The Deer Lake reservoir refilled; and a stable water level is maintained; yellow perch and walleye were stocked; MDEQ published the RAP that identified fish consumption as the sole BUI; RAP remedy is natural attenuation of sediments and maintenance of a stable water level to minimize mercury methylation		
1986	Carp Creek diverted around vestige of Deer Lake; remaining fish eradicated with rotenone, eradicated fish returned to Deer Lake under the ice		New Enhanced Secondary Wastewater Treatment Plant (with nitrogen and phosphorus removal) replaced 3 old primary plants
1985	Deer Lake remained drawn down to facilitate mercury de-gassing from sediments		Separation of septic and storm sewers in Ishpeming completed
1984	Deer Lake drawn down and fish eradicated by MDNR; eradicated fish returned to Deer Lake under the ice.		
1982	Fish consumption advisory extended to Carp Creek	Laboratory analysis of Deer Lake fish	

Year	Fish Consumption BUI milestones	Eagle reproduction BUI milestones	Eutrophication BUI milestones
	and Carp River	determined that only trace amounts of DDT and PCBs were present in eagle food	
1981	CCIC laboratory ceased discharge of mercury-containing reagents to City of Ishpeming wastewater treatment system; Fish consumption advisory implemented for Deer Lake; standard pike ¹ contained 2.13 mg/kg mercury (DEQ data)	One adult eagle occupied territory; standard white sucker ² contained 0.96 mg/kg mercury	Ludwig 1981 Study concluded Deer Lake was eutrophic- 86 ug/l Total Phosphorus in south basin.
1976-1980		New eagle nest location occupied but failed	
1977			Bills, Northern Michigan University pub.1977 Study from 1974 -1975 concluded Deer Lake was hypereutrophic- 278 ug/l Total Phosphorus in south basin
1973-1975		Eagle nest occupied, but failed	Study by Northern Michigan University observed severe winter oxygen depletion in Deer Lake
1972		Eagle nest unoccupied	
1971		Eagle nest occupied, outcome uncertain	
1970		Eagle nest occupation uncertain	Michigan Water Resources Commission ordered the City and Township to remove phosphorus from wastewater
1965-1969		Eagle nest occupied, but failed	
1964		Eagle nest occupied, but failed	Three (one City and two Township) Primary Wastewater Treatment Plants began operation in Ishpeming area

RAP Implementation

Recent Progress and Achievements

- **2006:** The AOC Technical Committee was developed with representatives from the Michigan Department of Environmental Quality, Michigan Department of Natural Resources, the Deer Lake PAC, and US EPA to investigate BUI status and potential for delisting individual BUIs or the entire AOC.
- **2005:** The Deer Lake PAC requested that the State of Michigan and US EPA begin the AOC delisting process for the AOC based on the 2006 MDEQ Guidance for Delisting Michigan's Great Lakes Areas of Concern.
- **2003:** Valve operation in the Deer Lake dam was resumed to minimize methylation of mercury within the reservoir. The PAC water quality monitoring program provided data that were used to monitor hypolimnion water withdrawals evaluate the valve settings and monitor lake conditions relative to mercury methylation.
- **2002:** The Deer Lake PAC drafted a Remedial Action Plan Update. The PAC developed a delisting goal for the fish consumption BUI, recommended remedies to decrease fish mercury concentrations, and began monitoring Deer Lake water quality on a weekly basis.
- **2001:** A study by Michigan State University concluded that there is evidence of natural attenuation of sediments in Deer Lake, although natural attenuation is presently arrested. If natural attenuation again starts, and if the rates are similar to historical patterns, 21 to 24 years are estimated for recovery (based on accumulation of six inches of clean sediment). The report indicated that some natural attenuation had occurred in both basins of Deer Lake, with slightly faster recovery in the south basin.
- **2000:** MDEQ determined that small fish in Deer Lake have mercury concentrations that are equal to comparable fish from reference (Day 2000) lakes, but the mercury content of large fish in Deer Lake remained elevated.
- **1998-2004:** Bald eagles begin reproducing successfully at Deer Lake.
- **1997:** Deer Lake PAC was formed.
- **1994:** Mercury content of "standard" (24-inch) northern pike decreased below 1.5 mg/kg, which is the MDCH trigger for "no consumption." The fish consumption advisory for brook trout in Carp Creek and Carp River was removed.
- **1993:** Mercury content in brook trout collected from the Carp River is well below 0.5 mg/kg, which is the MDCH trigger for restricting consumption.
- **1989:** MDEQ monitoring determined that the dissolved oxygen content of Deer Lake during the winter had improved, only three years after the improvements in wastewater treatment were implemented.
- **1987:** MDEQ published the [RAP for Deer Lake AOC](#).



Eaglet in tree near nest on Deer Lake North Basin, hatched and fledged 2004; from Fred Minnich's Wildlife Survey.



Mink on Rocky shore; from Fred Minnich's Wildlife Survey.

Current Projects and Outlook

The Technical Committee is initiating the development of a Delisting Determination Document which will be based on the [Guidance for Delisting Michigan's Great Lakes Areas of Concern](#). This document will evaluate the status of the BUIs in the AOC. The Technical Committee is currently developing a timeline for the document's development.

RAP-Related Publications

- **2002:** Draft RAP update developed by PAC, work continues on this document.
- **1999:** Updated AOC brochure produced.
- **1987:** [Remedial Action Plan for Deer Lake Area of Concern](#) completed.

Community/Local RAP Group Involvement

A Public Advisory Council (PAC) was formed for the Deer Lake AOC in 1997. The formation of the PAC was a very positive step, with strong community support from a large stakeholder base. The PAC has 21 voting members, plus three non-voting state agency representatives who serve in an advisory capacity. PAC membership represents a broad cross-section of interests, including:

- [City of Ishpeming](#)
- [Cleveland-Cliffs Iron Company](#)
- Education
- Environmental Organizations
- Fishing (2 members)
- Human Health Resources
- Lakeshore Residents (4 members)
- Local Businesses (2 members)
- [Marquette County](#)
 - Board of Commissioners
 - Drain Commissioner

- Road Commission
- Native Americans
- Recreation
- [Township of Ishpeming](#)
- Wastewater Treatment
- Watershed residents at large

Additional Outreach Projects:

- Yearly water quality monitoring provided by the PAC.
- Local community and PAC members continue monitoring Carp Creek to control beaver populations to maintain the coldwater fisheries by removal of beaver dams. PAC supplied waders to support these efforts.
- Ongoing volunteer streambank, lakeshore, public access site, and island cleanup projects.
- Water quality signage related to fish consumption advisories maintained by PAC.
- Fish spawning bed established by PAC pass-through grant.

Partners and Stakeholders

- Deer Lake Public Advisory Council
- [Michigan Department of Community Health](#)
- [Michigan Department of Environmental Quality](#)
- [Michigan Department of Natural Resources](#)
- [U.S. Army Corps of Engineers](#)
- [U.S. Environmental Protection Agency, Great Lakes National Program Office](#)

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