

Appendix A:

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



Waterfall on the Cypress River, Ontario.
Photo Credit: Tim Leblanc, Ontario Ministry of Natural Resources.

Lake Superior Lakewide Management Plan 2008

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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 	<ul style="list-style-type: none"> ▪ From the head of the river at Whitefish Bay (Point Iroquois - Gros Cap), downstream through the St. Joseph Channel to Humburg Point on the Ontario side, and to the straits of Detour on the Michigan side. 	<ul style="list-style-type: none"> ▪ Combined sewer overflows/storm sewer overflows ▪ Loss of wetlands ▪ Point and nonpoint source pollution ▪ Wastewater discharges ▪ Urban/industrial development ▪ Navigational structures ▪ Contaminated sediment 	<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 ▪ Eutrophication or undesirable algae ▪ Beach closings ▪ Aesthetics degradation ▪ Loss of fish and wildlife habitat ▪ Bird or animal deformities or reproductive problems (Michigan only) 	<ul style="list-style-type: none"> ▪ Superfund ▪ Clean Water Act ▪ Navigational dredging ▪ Canada Ontario Infrastructure Program ▪ Great Lakes Sustainability Fund ▪ Canada-Ontario Agreement ▪ Great Lakes Legacy Act ▪ EC Sediment Fund 	<ul style="list-style-type: none"> ▪ Upgrade East End STP to secondary treatment ▪ Tannery Bay Clean Up: Legacy Act project - mercury and chromium contaminated sediment. Shoreline restoration and reseeded 	<ul style="list-style-type: none"> ▪ Complete contaminated sediment assessment ▪ Monitor key fish and wildlife populations ▪ Continued water quality monitoring ▪ Beneficial Use Impairment restoration criteria 	<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 (underway in MI) ▪ Development of a F&W Restoration Plan for Michigan's portion of the AOC (underway in MI)
Deer Lake Michigan	<ul style="list-style-type: none"> ▪ Mercury ▪ Historic Nutrient Loadings 	<ul style="list-style-type: none"> ▪ Approximately 1,000-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 consumption restrictions ▪ Eutrophication ▪ Degradation of eagle populations 	<ul style="list-style-type: none"> ▪ Michigan DEQ Water Bureau ▪ CCIC ▪ Federal ▪ City of Ishpeming 	<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 ▪ Source Control- Remove ~30% of mercury loadings to Deer Lake by reducing or eliminating Partridge Creek's flow through Cliffs Mine Shaft via Ishpeming's storm sewers to Carp Creek ▪ Complete removal 	<ul style="list-style-type: none"> ▪ Sediment remediation ▪ Michigan DEQ Water Bureau completed negotiations with PRP in Nov. 2006. Consent Judgment available from Sharon Baker at MDEQ (Bakers9@michigan.gov) ▪ Resource limitations ▪ Fish Tissue 	<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. ▪ Complete BUI removals ▪ Remove the

AOC Name	Primary Contaminants	Geographic Area	Stressors	Beneficial Use Impairments	Funding Programs and Partners	Clean-Up Actions Completed	Key Activity Needed	Barriers	Next Steps
							process for Reproduction and Eutrophication BUIs. Further fish tissue analysis to document current status of Fish Consumption BUI. We suspect that this BUI might also be close to removal.	analysis Monitoring of the remedial action City of Ishpeming needs to determine which option they wish to pursue related to meeting their agreement with CCIC, and funding for this option needs to be found.	mercury source for the identified mercury loadings.
Torch Lake Michigan	<ul style="list-style-type: none"> ▪ Copper ▪ Mercury ▪ Arsenic ▪ Lead ▪ Chromium ▪ Heavy metals 	<ul style="list-style-type: none"> ▪ 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 activities which have been deposited into area lakes and streams 	<ul style="list-style-type: none"> ▪ Fish and wildlife consumption restrictions ▪ Degradation of benthos ▪ Fish Tumors BUI has been removed 	<ul style="list-style-type: none"> ▪ Superfund ▪ MDEQ, AOC and District ▪ GLNPO 	<ul style="list-style-type: none"> ▪ Superfund - recommended remedial actions in 1992 and 1994 RODS have been completed – coverage of exposed mine tailings and stamp sands ▪ In 2007, EPA Superfund completed emergency removals of arsenic, lead, and PCB contaminated soils and sediments at the Village of Lake Linden Recreation Park beach and marina areas, which were of immediate risk to human and environmental health. These actions resulted in the EPA Superfund - RB performing 	<ul style="list-style-type: none"> ▪ Identification of potential PCB source related to fish consumption advisories ▪ EPA and MDEQ performed sediment sampling to determine if there was a discrete PCB source. Data showed PCB concentrations in sediments below actionable levels. The levels did follow the same trends as earlier sampling with SPMDs and sediment sampling, which indicated higher levels near the Hubbell/Tamarack City area. 	<ul style="list-style-type: none"> ▪ PCB source remediation, if necessary ▪ Cannot begin removal documents for remaining BUIs until Superfund determines if they will perform further remedial actions 	<ul style="list-style-type: none"> ▪ Have reviewed the status of the Fish Consumption BUI and degraded Benthos BUI and are awaiting further analysis of data or determination of additional actions by Superfund ▪ Have removed the Fish Tumor BUI

AOC Name	Primary Contaminants	Geographic Area	Stressors	Beneficial Use Impairments	Funding Programs and Partners	Clean-Up Actions Completed	Key Activity Needed	Barriers	Next Steps
						<p>further analysis around Torch Lake. This work identified additional areas that may need further remedial investigations or remedial actions.</p>	<ul style="list-style-type: none"> ▪ In 2007, MDEQ and MDNR sampled fish as part of the Fish Contaminant Monitoring Program. Results are expected in April 2008. The fish residue results will determine whether the BUI can be delisted or if further work is needed. 		
<p>St. Louis River Minnesota/ Wisconsin</p>	<ul style="list-style-type: none"> ▪ PAHs ▪ Mercury ▪ Suspended sediment ▪ PCBs ▪ Other metals ▪ Oil and grease ▪ Pathogens ▪ Nutrients ▪ DDT ▪ Dieldren ▪ Dioxin 2378 TCDD ▪ Toxaphene ▪ <i>E. Coli</i> ▪ PCP 	<ul style="list-style-type: none"> ▪ 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 – extending 10 miles into Lake Superior 	<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 	<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 ▪ USACE Detroit (WRDA) ▪ Fond du Lac Tribe ▪ SLR Citizens Action Committee 	<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 ▪ Stryker Bay Remediation – Phase III ▪ Hog Island Restoration Plan 	<ul style="list-style-type: none"> ▪ Assessment of fish and wildlife health (body burden and health 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 	<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 	<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 ▪ Prioritize remediation, habitat restoration and protection strategies

AOC Name	Primary Contaminants	Geographic Area	Stressors	Beneficial Use Impairments	Funding Programs and Partners	Clean-Up Actions Completed	Key Activity Needed	Barriers	Next Steps
			<ul style="list-style-type: none"> sources ▪ Transportation sources and dredging ▪ Sewage overflows ▪ Forest fragmentation ▪ Riparian development ▪ Exotics/Invasives 			<ul style="list-style-type: none"> Completed ▪ Near Shore reference ecotypes identified – NRRI GLEI ▪ Wastewater treatment-Surge tank Installation (SSO) ▪ Remedial design of Kopper's Wood Processing complete ▪ Sampling completed at Superior Water, Power and Light site ▪ Habitat Management Plan implementation 	<ul style="list-style-type: none"> and bilge water) ▪ Updating of RAP documents – delisting goal development ▪ Reduction of invasive species ▪ Develop monitoring strategies ▪ Write PBT Contaminant TMDL by 2011 ▪ Establish SLR AOC-Wide Delisting Targets by end of 2008 	<ul style="list-style-type: none"> and funding ▪ Organizations focused on short term ▪ Difficulty in maintaining public support over the long term ▪ Atmospheric deposition uncontrollable 	<ul style="list-style-type: none"> ▪ Secure long-term funding at federal and state levels
Thunder Bay Ontario	<ul style="list-style-type: none"> ▪ Mercury 	<ul style="list-style-type: none"> ▪ 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 ▪ Phytoplankton and zooplankton pops. degradation ▪ Loss of fish and wildlife habitat 	<ul style="list-style-type: none"> ▪ Great Lakes Sustainability Fund ▪ Canada Ontario Infrastructure Programs ▪ Canada-Ontario Agreement (MOE) ▪ EC Sediment Fund 	<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 ▪ Various habitat creation and enhancement projects ▪ Chippewa Beach restoration ▪ STP upgraded to secondary treatment 	<ul style="list-style-type: none"> ▪ Monitor fish and wildlife populations to confirm progress (e.g. 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 to determine preferred management option ▪ Update delisting criteria ▪ Draft monitoring plan
Nipigon Bay Ontario	<ul style="list-style-type: none"> ▪ None 	<ul style="list-style-type: none"> ▪ A large portion of Nipigon Bay and the Nipigon River downstream of Alexander Dam. 	<ul style="list-style-type: none"> ▪ Water level and flow fluctuations ▪ Wastewater discharges 	<ul style="list-style-type: none"> ▪ Fish and wildlife degradation ▪ Eutrophication or undesirable algae ▪ Loss of fish and 	<ul style="list-style-type: none"> ▪ Great Lakes Sustainability Fund ▪ Canada Ontario Infrastructure Programs 	<ul style="list-style-type: none"> ▪ Created water management plan for Nipigon River to regulate hydroelectric facilities' water use to 	<ul style="list-style-type: none"> ▪ Upgrade primary STP in Nipigon (planning completed) ▪ Monitor fish and 	<ul style="list-style-type: none"> ▪ Resource limitations 	<ul style="list-style-type: none"> ▪ Assist community to obtain funding and/or undertake STP upgrade ▪ Update delisting

AOC Name	Primary Contaminants	Geographic Area	Stressors	Beneficial Use Impairments	Funding Programs and Partners	Clean-Up Actions Completed	Key Activity Needed	Barriers	Next Steps
		Two communities are located in the vicinity of the Bay: Red Rock (population: 1,300) and Nipigon (population: 1,900).		wildlife habitat	<ul style="list-style-type: none"> Canada-Ontario Agreement 	<ul style="list-style-type: none"> help restore brook trout Various habitat restoration projects Secondary treatment installed at Norampac 	wildlife populations to confirm progress (coaster brook trout)		<ul style="list-style-type: none"> criteria Draft monitoring plan Area in Recovery Report
Jackfish Bay Ontario	<ul style="list-style-type: none"> Solids (i.e. wood fiber) Dioxin 	<ul style="list-style-type: none"> The 14 km reach of Blackbird Creek between Terrace Bay Pulp 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 Update sediment monitoring data Update delisting criteria Update long term monitoring plan Area in Recovery Report
Peninsula Harbour Ontario	<ul style="list-style-type: none"> Mercury PCB 	<ul style="list-style-type: none"> Peninsula Harbour proper, and a portion of open Lake Superior immediately south of the peninsula. 	<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 (MOE) Marathon Pulp Inc. EC Sediment Fund 	<ul style="list-style-type: none"> Pulp kraft mill installed secondary treatment for effluent; discharge moved out of AOC Ecological risk assessment completed 	<ul style="list-style-type: none"> Update Ecological Risk Assessment and complete Sediment Management Options assessment 		<ul style="list-style-type: none"> Update delisting criteria Create long term monitoring plan Detailed design for sediment strategy

A.2 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 kilometres (17 miles) along the shoreline of Lake Superior and up to 9 kilometres (5.5 miles) 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 (or beneficial use impairments) in the area included:

- fish consumption restrictions
- negative pressures on fish populations
- degradation of phytoplankton and zooplankton populations
- degradation of 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 (PAC) 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 involves the following steps:

- defining the problem (Stage 1 – completed in 1991)
- planning for implementation (Stage 2a – completed in 2004)
- implementing the actions (Stage 2 – underway)
- monitoring the restoration of the environment and eventual delisting (Stage 3)

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 (NWP) contributed to the [International Joint Commission](#)'s (IJC) identification of the Harbour as an AOC. 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 1,000 meter long rockfill containment berm to contain a portion of the contaminated sediment
- Environmental dredging to remove 11,000 m³ (14,400 yd³) of contaminated sediment from the Harbour
- Thermal treatment and off site disposal of 17,000 tonnes (18,700 tons) 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 (approximately 12 acres) 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

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, took seven years to complete at a cost of \$20 million (CDN), 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 RAP adopted an ecosystem approach to address environmental problems which 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 the RAP progress.

Members of the public, including individuals and organizations, participated in the RAP process as members of the 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 NOWPARC project. 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.

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 Bower 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 in the Thunder Bay RAP 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 PAC 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.

Although total mercury in surficial sediment (0-3 cm or 0-1 in) in the area adjacent to Cascades Fine Paper Inc. is lower than that observed in the early 1970's, results of the 2004 Environment Canada sediment assessment indicated that some sediment is toxic, although the causes do not appear solely related to mercury, and that benthic communities are altered compared to reference. Methyl mercury is transferred from sediment to benthic invertebrates, and under generally "intermediate and maximum" exposure and trophic transfer scenarios methyl mercury could bioaccumulate in receptors to levels that are not protective of adverse effects at some of the sites. These sediment studies agree with the conclusions from the Environmental Effects Monitoring program for the Cascades Fine Paper mill that the sediment is toxic and the benthic community is impaired in the vicinity of the mill outlet. A primary zone of contamination has been delineated and sediment management options have been screened. Capping and dredging are being carried forward as possible remediation options. Geotechnical studies and wind/wave effect studies are currently being conducted to determine the feasibility of capping the sediment in this zone. If capping is not feasible, the data from these studies will be used to assess the feasibility of dredging. This information is critical to the identification of any appropriate remedial actions to address contaminated sediment in the AOC.

Sediment at a site in the centre of the inner Thunder Bay Harbour, informally referred to as the Cascades Triangle, was found to be toxic to benthic organisms. Because chemicals of concern were not found to be elevated in this sediment, studies are currently underway to determine the cause of the toxicity.

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.

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.

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.

- [City of Thunder Bay](#)
- [Environment Canada](#)
- [Fisheries and Oceans Canada](#)
- [Great Lakes Sustainability Fund](#)
- [Lakehead Region Conservation Authority](#)
- [Lakehead University](#)
- [Ontario Ministry of Natural Resources](#)
- [Ontario Ministry of the Environment](#)
- [Public Advisory Committee](#)

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 (or beneficial use impairments) 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
- undesirable algal growth on substrates in the lower Nipigon River
- degradation of aesthetics on the waterfront
- loss of fish and wildlife 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) was developed for the Nipigon Bay Area of Concern (AOC). Implementation of the Nipigon Bay RAP is being achieved through a partnership between the Government of Canada and the Province of Ontario, with support from a 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 recreational groups, industry, municipalities and citizens.

This plan, which was initiated in 1987, 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. Most actions have already been implemented.

HIGHLIGHTS of the RAP

Since 1990, the Government of Canada's [Great Lakes Sustainability Fund](#) has made significant contributions towards restoring environmental impairments in the Nipigon Bay AOC. 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

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.

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 environmental impairments in the AOC ecosystem.

RAP Status

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 \$1.9 million (CDN) in the project. The Township of Nipigon will contribute the balance of the total eligible project cost of up to \$4 million (CDN). 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. Additional funding is required and is being sought to implement this upgrade.

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 this infrastructure project has been completed, the status of the environmental 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 AOC. The results of all these assessments will form the basis of the 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. These actions directed at brook trout will benefit other fish, wildlife, and benthic populations in the ecosystem with 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.

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

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 kilometres (155 miles) northeast of Thunder Bay. The AOC consists of a 14-kilometre (9 mile) stretch of Blackbird Creek between Terrace Bay Pulp Inc. (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 (or beneficial use impairments) 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.

This plan, 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 beneficial use impairments and the water use goals, developed by the PAC, were utilized. A number of potential solutions were developed and assessed. Natural recovery, where the ecosystem is allowed to recover on its own, was selected as the preferred strategy in the Stage 2 RAP report.

This was decided due in large part to achievement of higher standards of effluent quality at the Terrace Bay 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.

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 RAP 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 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, beneficial use 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 the Terrace Bay Pulp mill, 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

Additional remediation actions for the Jackfish Bay RAP are not feasible or recommended at this time, and it is recognized that the environmental recovery within the AOC will take some time.

Assessment of the recovery will continue to take place through long-term monitoring. The agencies propose to recognize the Jackfish Bay AOC as an Area in Recovery which will require a detailed long-term monitoring plan that will track the environmental recovery of the AOC. This decision is strongly supported by technical analysis and follows the direction given by PAC in the Stage 2 report.

Environment Canada (EC) revisited the area in September 2007 as part of a sediment/benthos recovery study, and it will be determined if additional toxicity work is required. Ontario Ministry of Natural Resources will be conducting a sport fish collection in the AOC (along with other Lake Superior AOCs). A full EC Benthic Assessment of Sediment (BEAST) assessment will be repeated in 2008. Cycle 4 (April 2007) Environmental Effects Monitoring results are being reviewed. A short- and long-term monitoring strategy to assess water quality, sediment quality, benthos, fish, and other biological indicators (i.e., wildlife) will be developed.

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 assess 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.

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](#)
- [Municipality of Terrace Bay](#)
- [Ontario Ministry of Natural Resources](#)
- [Ontario Ministry of the Environment](#)
- Public Advisory Committee
- Terrace Bay Pulp Inc. (formerly 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 (2.5 miles) from the Peninsula into Lake Superior.

Why was this area listed?

Major environmental issues of concern (or beneficial use impairments) 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 Jellicoe 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 the mercury-contaminated sediment in Jellicoe Cove.

In 2007, an ecological risk assessment (ERA) was conducted and potential risks to four types of receptors were evaluated: benthic invertebrates (sediment dwelling organisms), fish, piscivorous (fish-eating) birds, and piscivorous mammals. Human health risks were also identified in 2007.

A list of potentially feasible remediation options to solve this problem were previously identified in the draft Stage 2 report, but in 2007, a draft Sediment Management Options Assessment report has identified the following options for future consideration:

1. Removal and capping of the contaminated sediments
2. Capping of contaminated sediments
3. A combination of the above

When the preferred sediment management option has been identified, the RAP 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 AOC.

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 RAP adopted an ecosystem approach to environmental problems that incorporates 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 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 IJC 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

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. 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.

Currently, a detailed ecological risk assessment (ERA) is being updated to address mercury-contaminated sediment in the vicinity of Jellicoe Cove. The ERA has shown that current mercury levels may reduce reproductive success in longnose suckers and other bottom feeding species, although other fish species do not appear to be adversely affected by current levels of mercury or PCBs. Current concentrations of mercury in fish may reduce reproductive success in individual osprey and other piscivorous raptors foraging primarily within Jellicoe Cove, but any adverse effects on osprey or other piscivorous raptors are unlikely to have population-level consequences. Current concentrations of PCBs in fish may reduce reproductive success in mink and other piscivorous mammals foraging within Jellicoe Cove, the rest of Peninsula Harbour, or both areas in any proportion.

Human health risks were identified in 2007. Adult sport anglers who target lake trout are not predicted to be at risk from methylmercury in fish tissue but may be adversely affected by PCBs in fish. Adult subsistence anglers who consume longnose sucker, lake trout, and lake whitefish are predicted to be at risk from methylmercury in fish tissue if they derive 100% of the fish they consume from the AOC. Subsistence anglers may be adversely affected by PCBs in fish even if as little as 5% of the fish they consume is derived from the AOC.

Remediating sediments in the area of highest contamination may prevent further migration of nearshore mercury to offshore areas. For this reason, a sediment management strategy is being developed. 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.

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 of Environment Canada.

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. Process improvements at the mill in 1991 greatly reduced organic enrichment of the AOC. The mill was recognized for this pollution prevention approach in 1995 with an award from the Lake Superior Binational Program. In that same year, the mill constructed a secondary treatment basin (Aerated Stabilization Basin) to further improve effluent quality.

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](#)
- Marathon Pulp Inc.
- [Ontario Ministry of Natural Resources](#)
- [Ontario Ministry of the Environment](#)
- Public Advisory Committee
- [Town of Marathon](#)

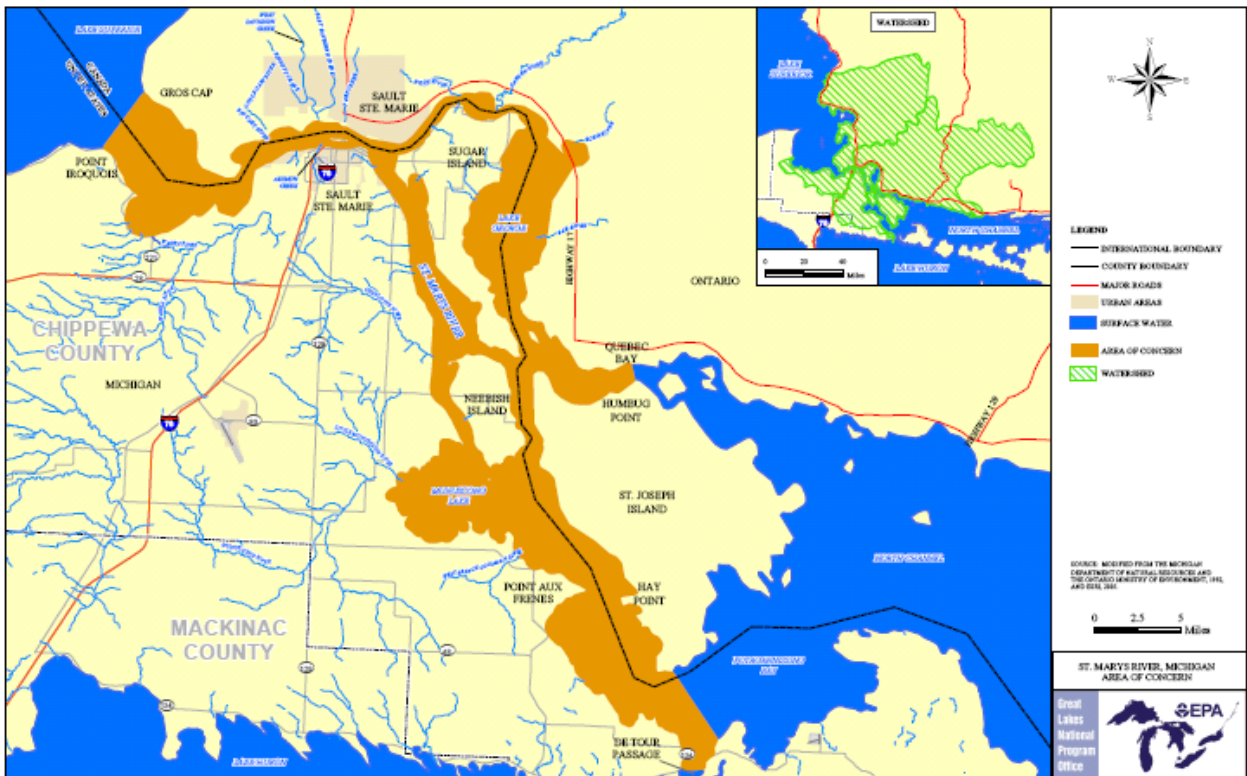
A.2.1.E St. Marys River

St. Marys River Area of Concern

General Information

Where?

The St. Marys River is the 112 kilometre (70 mile) connecting channel from Lake Superior to Lake Huron. The Area of Concern (AOC) boundary includes the entire river which extends from Whitefish Bay between Point Iroquois, Michigan and Gros Cap, Ontario; east and downstream between Quebec Bay and Humbug Point, Ontario in the St. Joseph Channel; between the Michigan side of the river and St. Joseph Island, downstream to the De Tour Passage, Michigan.



Why was this area listed?

Major environmental issues of concern (or beneficial use impairments) 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
- bird or animal deformities or reproductive problems (michigan)

What is being done? How is it being done?

In order to improve the environmental conditions noted above, a Remedial Action Plan (RAP) process was initiated 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 local [Binational Public Advisory Council](#) (BPAC).

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

- defining the problem (Stage 1, completed in 1992)
- determining what remedial actions are needed to rectify the impairments (Stage 2a, completed in 2003)
- implementing the actions (Stage 2)
- monitoring the restoration of the environment and eventual delisting of the AOC (Stage 3)

The final Stage 2a RAP report was released in 2003. More than 60 recommended actions, including a number of restoration and protection measures already completed or in progress, were included in the report. A technical annex to the Stage 2a document has not been developed. The annex, once complete, will identify priorities for action, responsibilities, and a timeline for RAP accomplishments.

HIGHLIGHT of the RAP

The Cannelton Industries site is a former tannery located adjacent to Tannery Bay on the south shore of the St. Marys River, upstream from the city of Sault Ste. Marie, Michigan. Remedial investigation in the 1990's at the tannery site and bay indicated that sediments and wetland areas contained organic material contaminated with chromium and mercury. As a result, these areas were designated as a U.S. Environmental Protection Agency (US EPA) Superfund site under the Comprehensive Environmental Response, Compensation and Liability Act. The remedial action plan for the bay area called for natural recovery, allowing clean silt from St. Marys River to gradually cover the contaminated sediment. All remedial work under the Superfund program was completed in 1999. Remedial work completed included the excavation of 33,000 tons (of tannery waste materials and contaminated soils to off-site solid waste disposal facilities), construction of surface drainage works, a shoreline berm to prevent erosion, and seeding and mulching to revegetate the site. Environmental monitoring was to be performed indefinitely to monitor the natural recovery process.

However, after purchasing the tannery site, Phelps Dodge Corporation along with the city of Sault Ste. Marie, the BPAC, and the State of Michigan, expressed a preference for sediment removal instead of waiting for natural recovery. An application was submitted in 2004, and subsequently accepted for Great Lakes Legacy Act funding. In September 2006, US EPA, Michigan Department of Environmental Quality (MDEQ), and Phelps Dodge Corporation began a project to dredge approximately 40,000 cubic yards (30,600 m³) of contaminated sediment from the bay and soil from two small mercury-impacted wetland areas. Dredging was completed in 2007 and eliminated approximately 500,000 pounds (227,000 kg) of chromium and 25 pounds (11 kg) of mercury from the St. Marys River.

Significant improvements to the Sault Ste. Marie, Ontario, East End Wastewater Treatment Plant were completed in support of the St. Marys River RAP in 2006. These improvements were completed at a cost of \$73 million (CDN), with over \$21 million (CDN) provided by the Government of Canada and \$25.8 million (CDN) from the Government of Ontario. The upgraded plant has state-of-the-art wastewater treatment technology, and it is expected that significant improvements at the plant will result in improvements to water quality in the St. Marys River.

In response to concern from residents about beach closings and water quality in the Sugar Island area in the summer of 2006, the RAP team agencies partnered with representatives from local, tribal, state/provincial, and federal agencies in Canada and the U.S. to form the Sugar Island Monitoring Work Group (SIMWG) in 2007. The agencies involved in the SIMWG include: Algoma Public Health, Chippewa County Health Department, Ontario Ministry of Environment (OMOE), MDEQ, EC, Health Canada, US EPA, Bay Mills Indian Community, and Sault Ste. Marie Tribe of Chippewa Indians (Sault Tribe). The purpose of the SIMWG was to develop and carry out a coordinated monitoring plan for the St. Marys River along the north shore of Sugar Island. The workgroup's task was to conduct water quality monitoring, characterize the severity of water quality impairment, and identify potential sources of bacteria and floating solids.

The SIMWG worked with the RAP team to hold the Sugar Island and Lake George Channel Symposium on May 15, 2007, at the Cisler Center, Lake Superior State University (LSSU) in Sault Ste. Marie, Michigan. The purpose of the symposium was to provide the public with information about water quality impairments observed in 2006 on the north shore of Sugar Island and in the Lake George Channel, and to discuss the coordinated monitoring and event response procedures planned by the SIMWG for 2007.

After over 17 weeks of monitoring in 2007, the SIMWG ceased monitoring operations in October for the winter (though regulatory monitoring continues year-round). In total, over 800 samples were collected. The group is now in the process of preparing a report and developing recommendations for 2008.

RAP Development/History

Since the AOC includes an international waterway, the St. Marys River RAP requires a cooperative effort between Canadian and U.S. governments. EC, US EPA, OMOE, and MDEQ 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](#) (OMNR), Department of [Fisheries and Oceans Canada](#) (DFO), and [Michigan Department of Natural Resources](#) (MDNR), has been fundamental to the St. Marys River RAP program.

The 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 10-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 use goals and general delisting criteria
- establishment of [BPAC](#) office and library

The 1992 Stage 1 RAP report described the environmental conditions and identified the use impairments in the AOC. The Stage 2 RAP report was completed in 2003. There were a number of workshops within the Stage 2 process of the RAP, to ensure there was broad based public involvement. These workshops were the basis for developing the strategic plans and water use goals outlined in the RAP for restoring the impaired beneficial uses of the AOC.

RAP Status

The four agency managers have recently made some important decisions for the three upper connecting channel AOCs, including the St. Marys River, regarding development and application of specific, measurable criteria for removing Beneficial Use Impairments (BUIs). As outlined in the Stage 2 RAP, the four agencies and the BPAC developed water use goals and general criteria for removing BUIs for the entire AOC. The next step is to take those general criteria and from them determine specific, measurable criteria that can be applied to relevant remedial actions in both the U.S. and Canadian waters. The process is guided by the Four Agency Letter of Commitment (1998) and the Compendium of Positions Papers (revised in 2007).

In the spring of 2007, the BPAC received a PAC support grant from the MDEQ to develop the fish and wildlife restoration criteria and Restoration Plan. The project is expected to be completed by the end of June 2008. In addition to the fish and wildlife BUIs, the MDEQ is offering the BPAC the opportunity to review the Michigan's statewide criteria outlined in the MDEQ's Guidance for Delisting Michigan's Great Lakes Areas of Concern document for the other eight BUIs listed for the AOC, and either accept the statewide criteria or develop local criteria. The BPAC is currently in the process of comparing criteria outlined in the Stage 2 RAP with the statewide criteria. Determination of the final suite of criteria for Michigan's portion of the AOC is also expected to be complete by the end of June 2008. Binational consultation will occur throughout the entire process. The MDEQ will proceed with approving BUI removal criteria for the St. Marys River AOC, as it has with other Michigan AOCs, by the end of 2008.

The bottom sediments of the river including the [Algoma Steel](#) boat slip are contaminated. Algoma Steel removed 3,200 cubic metres (4,200 cubic yards) of contaminated sediment in 2006 and had plans to remove residual contamination in 2007.

Bellevue Marine Park is the first depositional zone downstream from the major industries located in Sault Ste. Marie, and as a result, there is significant contamination of the existing sediment. Elevated levels of contaminants such as PAHs and TPHs have caused impairment of benthic communities and residual toxicity. In 1995, the chemical characteristics of sediment in Bellevue Marine Park were investigated by the OMOE. In 2005, OMOE/EC deployed sediment traps, and samples were sent for analyses. At sampling sites in George Lake and Little Lake George, OMOE found chironomids, mayflies, and clams, indicating there is a healthy benthic environment. Further sediment assessment is required.

RAP Implementation

On April 17, 1998, [EC](#), [US EPA](#), [OMOE](#), and the [MDEQ](#) signed a Four Agency Letter of Commitment. The Letter outlined agency roles and responsibilities during implementation of the RAPs for the St. Clair River, Detroit River, and St. Marys River binational AOCs.

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 AOC. The [Compendium](#) was signed on February 2, 2000, and was revised in 2007.

A RAP Coordinator for the St. Marys River has been hired in support of the current Canada-Ontario Agreement (COA) commitments (2007-2010). The RAP coordinator will assist in implementing the St. Marys River RAP, and will provide leadership on consultation with community participants. This position is funded by OMOE through COA and is the result of a unique partnership between the Sault Ste. Marie Region Conservation Authority, OMOE, and EC.

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.

The following are examples of the projects currently being implemented by various stakeholders:

- Process improvements, water treatment improvements and air quality monitoring at [Algoma Steel](#)
- Improvements to water treatment and air emissions at [St. Marys Paper](#)
- 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 has removed a total of 11,503 tons (10 435 tonnes) of contaminated soil and 7,519 tons (6 821 tonnes) of contaminated sediment from the site. Following removal, the upland areas, shoreline, and nearshore river bottom were stabilized and improved. The need for removal of additional river-based sediments is currently being investigated.
- The Sault Ste. Marie Area Watershed Management Plan (Michigan) has been approved by the MDEQ. A steering committee meeting was held in late 2007 to prioritize tasks and implement the plan. Many restoration and protection recommendations from the Stage 2a RAP related to Sault, Michigan, were incorporated into the Sault Ste. Marie Area Watershed Management Plan along with many more, detailed recommendations to improve water quality and habitat for the St. Marys River. In the near future, partners including BPAC, LSSU, the City of Sault Ste. Marie, and others will be seeking funding to implement the recommendations of the watershed plan.
- Since 2004, LSSU has been involved in a three-year project to determine the ecosystem health of the St. Marys River. The LSSU researchers are investigating coastal marshes to determine the status of habitat and the wildlife by collecting biological, sediment, and water samples and performing various types of chemical analyses. All field studies have been completed and indices of biotic integrity are being developed. Further refinement and development of biotic and chemical integrity models is ongoing. A final report is to be submitted to the USEPA in the summer of 2008.
- Bellevue Marina Sediment Management Strategy completed.
- The St. Marys River Fishery Task Group's St. Marys River Fisheries Assessment Plan outlines assessments and knowledge needs for the river to address stakeholder identified issues and concerns. In response, Task Group members from Ontario and Michigan have partnered to conduct sport fish harvest, fish population and annual young of the year walleye surveys on the river since 1999. Other assessment and monitoring projects are conducted individually by agencies in support of agency specific programs. Projects completed since the 2006 LaMP Update are highlighted below. Reports published by the Task Group may be viewed at <http://www.glfc.org/lakecom/lhc/lhchome.php#pub>
 - In 2005 and 2007, OMNR and MIDNR carried out an angler caught sport fish harvest survey of the lower St. Marys River.
 - Annual "young of the year" walleye electrofishing surveys to look at annual recruitment and stocking survival are conducted by members of the St. Marys River Fisheries Task Group which include OMNR and DFO. Established survey sites are covered each year along the east side of Lake George by OMNR and DFO. New sites in the St. Joseph Channel were surveyed in 2007 in an attempt to discover critical habitat locations for young of the year walleye.
 - The Task Group conducted a fish population gillnet survey in 2006. The survey covered 42 sites from Whiskai Bay in the upper river to Potagannissing Bay in the lower river. Ten of these sites were in Ontario waters. The report has been drafted and will be posted on the Great Lakes Fishery Commission web site when complete.
 - The United States Fish and Wildlife Service (USFWS) conducts annual exotic species trawls in the river. In 2006 and 2007, the USFWS trawled the Algoma Steel slip in the upper river and the shipping channel to Purvis Marine dock in the lower river specifically looking for the invasive fish Eurasian ruffe, which is slowly expanding its range eastward along the south shore of Lake Superior.
 - In 2006 and 2007, OMNR conducted a spring rainbow trout creel survey in the St. Marys River.

- In 2007, a short-duration lake herring creel survey was conducted in Potagannissing Bay by the OMNR. Tissue was also collected and sent to OMOE for contaminant analysis.
- LSSU conducted Atlantic salmon spawning success surveys in the St. Marys Rapids in 2007.

RAP Accomplishments

Although implementation of some remedial actions is just beginning, important steps forward have already been made in the St. Marys River AOC. A great deal of monitoring in the St. Marys River has occurred over the last 20 years, primarily in response to the St. Marys River being designated as an AOC. These activities are described in more detail in the 1992 and 2003 RAP documents. Examples of projects that have been completed since the 2006 LaMP Update are highlighted below.

- East End Wastewater Treatment plant was upgraded to secondary treatment, and the outfall pipe was relocated to deeper water.
- Cannelton Industries site dredging was completed in 2007 and eliminated approximately 500,000 pounds (227,000 kg) of chromium and 25 pounds (11 kg) of mercury from the St. Marys River.

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.

- [Algoma Steel](#)
- Anishinaabeg Joint Commission
- Bay Mills Indian Community
- [Binational Public Advisory Council](#)
- Chippewa Ottawa Resource Authority
- [City of Sault Ste. Marie, Michigan](#)
- [City of Sault Ste. Marie, Ontario](#)
- [Environment Canada](#)
- [Fisheries and Oceans Canada](#)
- [Great Lakes Sustainability Fund](#)
- [Health Canada](#)
- [Lake Superior State University](#)
- Local First Nations and Native American communities
- [Michigan Department of Environmental Quality](#)
- [Michigan Department of Natural Resources](#)
- [Ontario Ministry of the Environment](#)
- [Ontario Ministry of Natural Resources](#)
- [Sault Ste. Marie Region Conservation Authority](#)
- [Sault Ste. Marie Tribe of Chippewa Indians](#)
- [St. Marys Paper](#)

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



Mason Stamp Sand Parcel of Torch Lake AOC after remediation

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

- Restrictions on fish and wildlife consumption
- Fish tumors or other deformities
- Degradation of benthos

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/BUI Development and Status

- **2008 Report** – Torch Lake Sediments Report: A Sediment Chemistry Survey of Torch Lake, Houghton County Michigan. August 7, 8, and 9, 2007. Report # MI/DEQ/WB-08/011*.
- **2006** – PCB Study Using Semipermeable Membrane Devices in Torch Lake, Houghton County. MI/DEQ/WB-06/034*.
- **August 2001** – Torch Lake AOC RAP Update completed*.
- **1987** – Michigan Department of Natural Resources [Remedial Action Plan for the Torch Lake Area of Concern](#) completed.

* MDEQ reports available by contacting Sharon Baker MDEQ, Water Bureau at 517-335-3310 or Bakers9@michigan.gov.

RAP Implementation

The 1987 Torch Lake RAP suggested the following actions to enhance the recovery of Torch Lake:

- Promote revegetation of tailings to minimize erosion of the particulates associated with the mine tailings by wind and water into the lake;
- Continue the upgrade of local wastewater treatment facilities; and
- Institute sauger/walleye restocking.

Remedial Actions

The Torch Lake AOC 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 AOC. 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, the state will assume Operation and Maintenance of the areas, including 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.
- In 2007, the Fish Tumor BUI was deleted from this AOC.
- Ongoing investigations by MDEQ and US EPA, working in consultation with the PAC, to determine if there is a source of PCBs in the lake that is driving the fish consumption advisory.
- In August 2007, US EPA performed an emergency removal of arsenic-, lead-, and PCB-contaminated soils and sediments above direct-contact criteria established to be protective of human health.
- In late 2007, the US EPA Superfund program performed an Area Assessment and found that further remedial investigation may be warranted.¹
- In August 2007, MDEQ and the US EPA *R/V Mudpuppy* collected sediment samples to locate any potential sources of PCBs in the lake. Results indicate there may be a source of low level PCBs, but the concentrations were not high enough to warrant remedial action.²
- Currently, MDEQ, Torch Lake PAC, and US EPA are awaiting the results of the 2007 MDEQ Fish Contaminant Monitoring Program fish tissue sampling to determine if the Fish Consumption BUI for PCBs is still appropriate.

RAP-Related Publications

- **2007** – [Summary Report for the Torch Lake Area Assessment, Torch Lake NPL Site and Surrounding Areas, Keweenaw Peninsula, Michigan.](#)
- **2005** – [NPL Fact Sheets for Michigan: Torch lake](#), US EPA Region 5

¹ 2008-Summary Report for the Torch Lake Area Assessment, Torch Lake NPL Site and Surrounding Areas, Keweenaw Peninsula, Michigan. Report prepared by the US EPA Emergency Response Branch upon request of US EPA Remedial Branch.

² Torch Lake Sediments Report: A Sediment Chemistry Survey of Torch Lake, Houghton County Michigan. August 7, 8, and 9, 2007. Report # MI/DEQ/WB-08/011.

- **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

US EPA RAP Liaison:

Brenda R. Jones, RAP Liaison
U.S. Environmental Protection Agency
Great Lakes National Program Office
77 West Jackson Blvd. (SR-6J)
Chicago, IL 60604
(312) 886-7188 phone
(312) 886-4071 fax
iones.brenda@epa.gov

State RAP Contact:

Sharon Baker, RAP Contact
Michigan Department of Environmental Quality
Water Bureau
P.O. Box 30273
Lansing, MI 48909-7773
PH: 517-335-3310
FAX: 517-373-9958
BAKERS9@michigan.gov

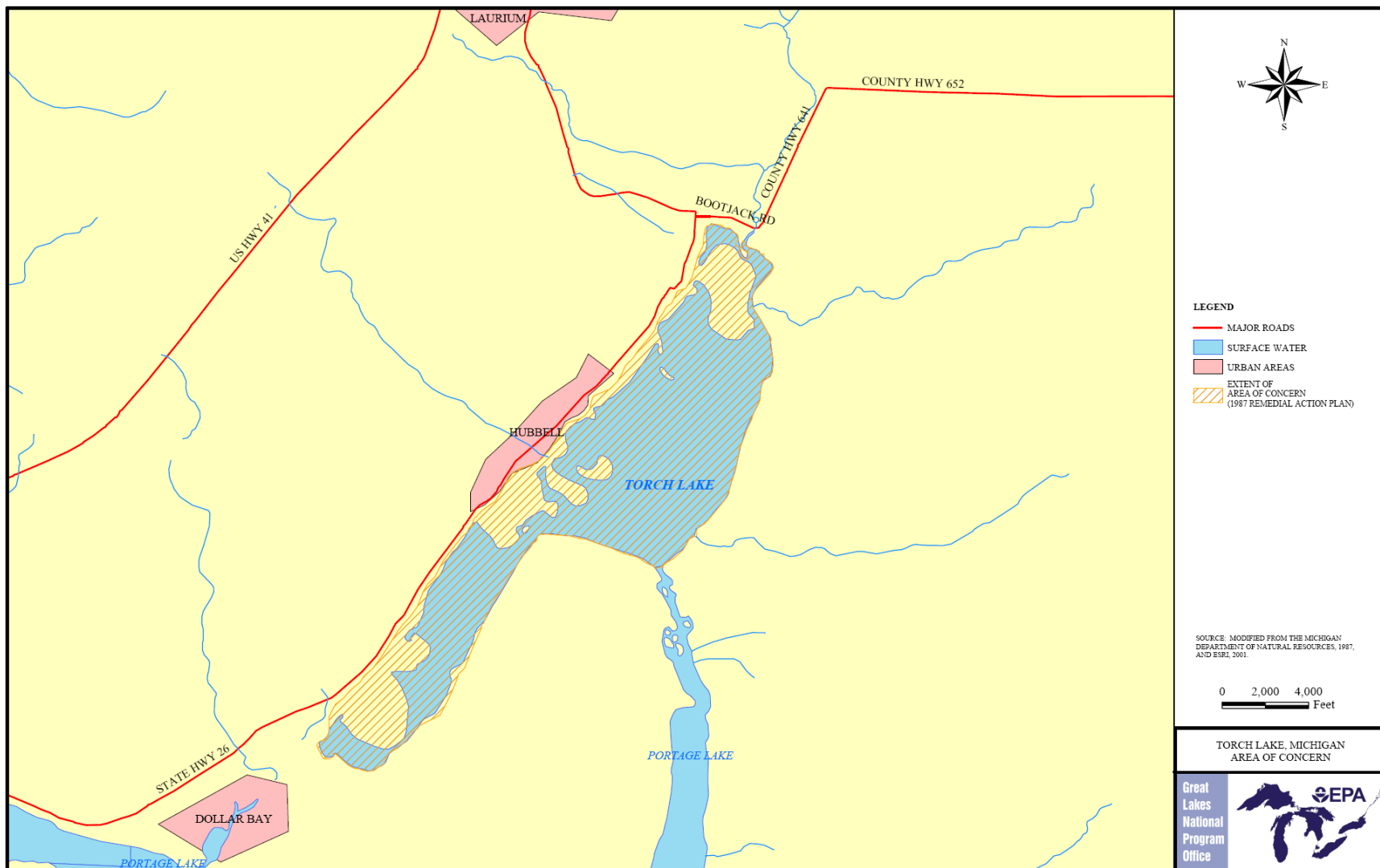
Torch Lake Public Advisory Council:

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Dan Lorenzetti, Secretary
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Fax: 906-482-49931
Dan@superiorblock.com

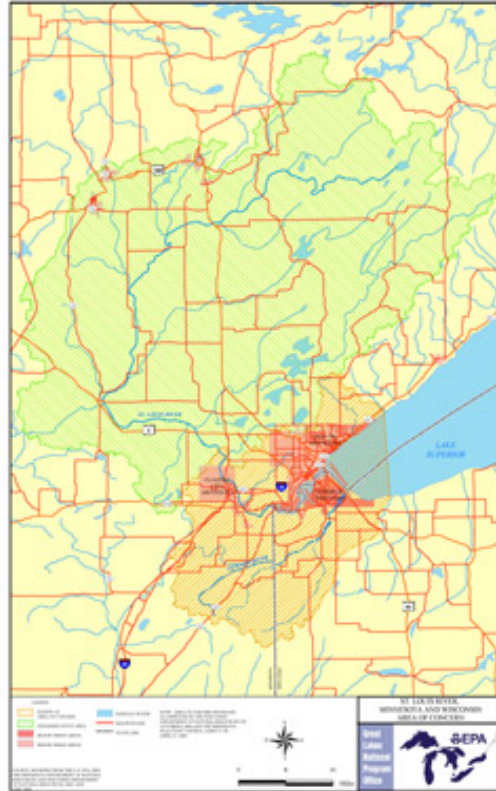
Local Coordinator:

James Trevethan, SPAC Representative
17463 Osma Plat Rd.
Houghton, MI 49931
Ph: 906-482-4951



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 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.

St. Louis River Beneficial Use Impairments

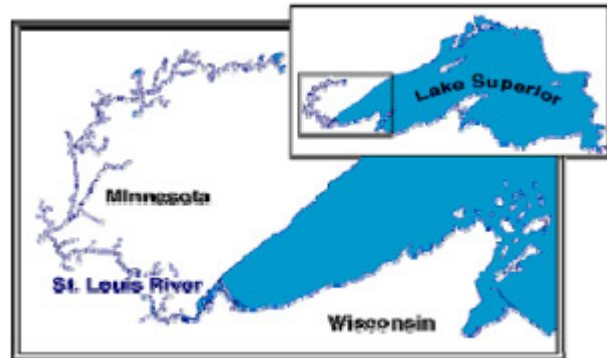
- Restrictions on fish and wildlife consumption
 - *Tainting of fish and wildlife flavor (unclear)*
- Degradation of fish and wildlife populations
- Fish tumors or other deformities
 - *Bird or animal deformities or reproduction problems (unclear)*
- Degradation of benthos
- Restrictions on dredging activities
- Excessive Loading of Sediment and Nutrients
 - *Restrictions on drinking water consumption, or taste and odor problems*
- Beach closings
- Degradation of aesthetics
 - *Added costs to agriculture or industry*
 - *Degradation of phytoplankton and zooplankton populations*
- Loss of fish and wildlife habitat

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 WDNR and the MPCA. The Wisconsin Proposed Delisting Targets were published in October 2007. The proposed targets for each of the BUIs within the St. Louis River AOC provide a good starting point for the SLRCAC, in partnership with the WDNR and MPCA, to move forward with the public comment process (scheduled for Summer 2008) and complete a “delisting roadmap”. AOC-wide delisting targets will be finalized by the end of 2008. The targets will serve as the roadmap for actions to lead to delisting the AOC.

The SLRCAC was awarded a grant through the WDNR to facilitate work on the delisting implementation strategies 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 implementation strategies development process. In brief, the SLRCAC will craft, facilitate public and agency review, publish, post on web sites, and distribute the delisting implementation strategies 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

- **2007** – Working with harbor partners, WDNR released proposed Delisting Targets.
- **2004** – The SLRCAC proposed [restoration goals](#) for many of the impaired uses through a citizen process and submitted them to the WDNR and the MPCA.
- **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

Erie Pier Management Plan: The Harbor Technical Advisory Committee completed the Erie Pier Management Plan, converting the designated Confined Disposal Facility (CDF) into a dredge material recovery and recycle area. A subcommittee is currently developing marketing strategies for the use of materials in regional projects such as mining reclamation, landfill daily cover, and road construction (www.dsmic.org/dredge).

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. US EPA Great Lakes National Program Office (GLNPO) 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.

Cleanup of this Great Lakes Legacy Act site, a joint project of GLNPO and WDNR, 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 were 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.

Remediation of Contaminated Sediments:

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

At the St. Louis River/Interlake/Duluth Tar Site in the St. Louis River AOC in 2006, a 2,000-foot long sheet pile wall was placed around the eastern portion of Stryker Bay, and a cap of sand sandwiching a geo-textile mat was placed within the enclosed area. A rock dike with a clay liner was constructed to cut-off Slip 6 from the river. In 2007, a water filtration plant was constructed to treat water from the Contained Aquatic Disposal (CAD) facility. The CAD received contaminated sediments from Stryker Bay and other areas where the dredging of materials containing PAH levels over 13.7 ppb had occurred. Activities slated for 2008 include dredging a small segment of the St. Louis River, removing the sheet pile wall, and capping the remaining area. Restoration activities scheduled for 2009 will focus on dredging around Tallas Island (www.slridt.com).

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.



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



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

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.)



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

Through a grant from US EPA GLNPO, the University of Minnesota - Natural Resources Research Institute applied Great Lakes Environmental Indicator data to the AOC to establish ecotype reference sites for six near-shore ecotypes identified in the St. Louis River Habitat Plan. These reference sites were then field-truthed, and vegetative assessments were performed.

GLNPO led a design process for a restoration master plan at Hog Island. A multi-agency, stakeholder-driven collaborative effort defined specific measures for restoring ecological processes and key habitats within Hog Island and Newton Creek, providing a template for how restorations can occur throughout the Great Lakes watershed.

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.

RAP-Related Publications

- Wisconsin Proposed Delisting Targets, Short Elliot Henderson for Wisconsin Department of Natural Resources, October 2007.
- Hog Island and Newton Creek – Draft Ecological Restoration Master Plan, Biohabitats for Environmental Protection Agency (GLNPO) and Douglas County, WI, April 2007.
- St. Louis River AOC Sediment Quality Management Plan, Emmons and Oliver Resources, Inc. for MN Pollution Control Agency, September 2005.
- 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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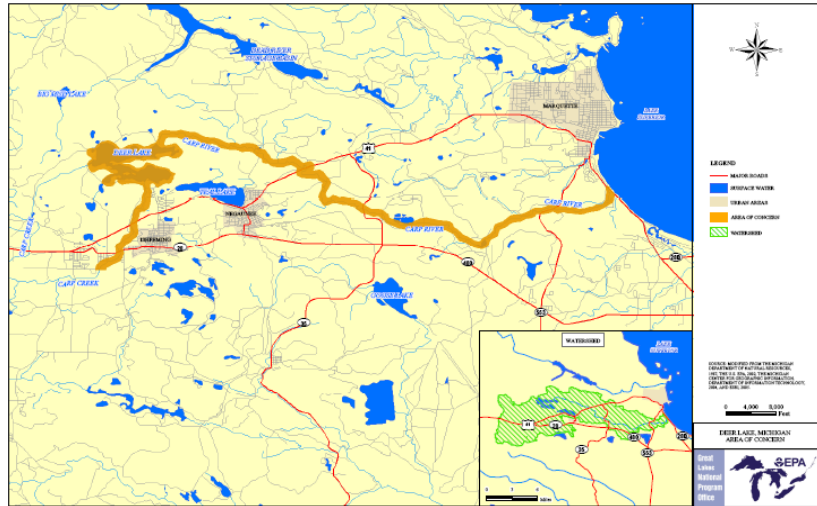
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Fax: 218-723-4794
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Fond du Lac Tribe:

Nancy Schuldt
Water Projects Coordinator
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(218) 878-8010

A.2.2.C Deer Lake

Deer Lake Area of Concern



Deer Lake AOC Boundary Map

Background

Deer Lake is an approximately 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 and includes Deer Lake and the Carp River flowing downstream through the dam from the north basin of Deer Lake about 20 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 in an amalgamation process to recover gold from ore between 1882 and 1897 at a location west of the north basin of Deer Lake. Mine tailings were submerged as successive dams were built.

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.

From 1929 to 1963 all wastewater generated in the City of Ishpeming and Ishpeming Township was 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 loadings into Deer Lake; for example, phosphorus loading decreased by 86 percent.



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

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.

The matrix below shows the history of the Deer Lake, Carp Creek, and Carp River Fish Consumption Advisories. These advisories are all based on methylmercury found in fish tissue. Please review the Michigan Department of Community Health website at http://www.michigan.gov/mdch/1,1607,7-132-2944_5327-13110--00.html before consuming fish from Michigan waters.

Deer Lake Beneficial Use Impairments

- Restrictions on fish and wildlife consumption
- Bird or animal deformities or reproduction problems
- Eutrophication or undesirable algae

YEAR	Deer Lake	Carp Creek	Carp River
1981	No Consumption	No Advisory Issued	No Advisory Issued
1982 – 1995	No Consumption of Any Species		
1996 – 2000	No Consumption	Brook Trout Unrestricted / All Other Species-No Consumption	
2001 – 2006	No Consumption	<ul style="list-style-type: none"> • Brook Trout-Restricted • All Other Species-No Consumption 	<ul style="list-style-type: none"> • Brook Trout-No Restrictions • Northern Pike-Restricted • All Others Species-No Consumption
2007	No Consumption	<ul style="list-style-type: none"> • Brook Trout & White Sucker-Restricted • All Other Species-No Consumption 	<ul style="list-style-type: none"> • Brook Trout & White Sucker-No Restrictions • Northern Pike-Restricted • All Other Species-No Consumption

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 US 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 to understand the current status of the BUIs identified for this AOC. This investigation has resulted in the development of BUI Removal documents for the Eutrophication and Reproduction BUIs (currently in the review process outlined in the Guidance). The technical committee is still conducting investigations related to the Fish Consumption BUI.

RAP Development and Status

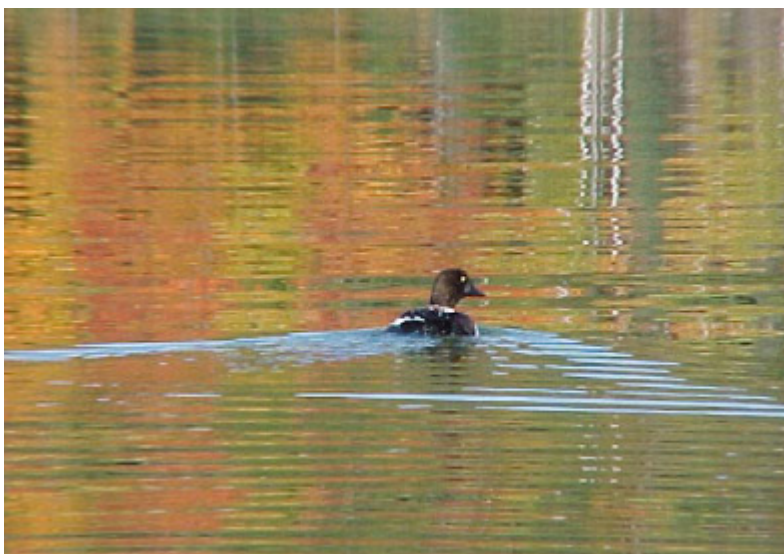
A [Remedial Action Plan \(RAP\) for Deer Lake Area of Concern](#) was published by the MDEQ in 1987. The Deer Lake RAP Update is currently in draft form and will be used as the basis for the Deer Lake Delisting Determination Document.

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 2008 Deer Lake AOC RAP Update will outline all of the remedial actions and milestones implemented in this AOC since the 1987 Deer Lake RAP (currently in MDEQ Review Process).

Significant recent activities include:

- **2007** – MDEQ and the PAC Technical Committee completed an assessment of the Eutrophication or Undesirable Algae BUI and concluded that the Deer Lake AOC had recovered from hypereutrophication through processes put in place prior to the 1989 RAP document. The PAC Technical Committee recommended that the Eutrophication or Undesirable Algae BUI be removed based on the states Delisting Guidance criteria (MDEQ, 2006a)
- **2007** – MDEQ and the PAC Technical Committee completed an assessment of the Bird or Animal Deformities or Reproduction Problems BUI, which was directly related to former perceived causes of the bald eagle reproductive failures. The committee concluded that the Deer Lake AOC eagle population had been effected by historic DDT, and these sources had either been controlled through regulatory actions by the federal government or the sources were outside of the basin or not under the direct control of the state. The PAC Technical Committee recommended that the Bird or Animal Deformities or Reproduction Problems BUI be removed based on the states Delisting Guidance criteria.
- **2006** – Amendments to the Consent Judgment (CJ) for Deer Lake between CCIC and the state were completed, which set management, monitoring, and other criteria for Deer Lake. This CJ is available from the MDEQ-Water Bureau.
- **2005 & 2006** – Winter monitoring by MDEQ (2005) and CCIC (2006) showed additional improvements in dissolved oxygen (ELM, 2005). Dissolved oxygen concentrations were sufficient to support fish growth and survival to a depth of 25 feet.
- **2005** – Manolopoulos and Hurley, University of Wisconsin, data showed that chlorophyll a concentrations in the reservoir had decreased significantly since 1972. Data showed that the sediments were still heavily contaminated with total mercury and methylmercury. It was also observed that the lake still stratifies in both basins.



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

RAP Implementation

Recent Progress and Achievements

- **2007** – MDEQ and the PAC Technical Committee completed an assessment of the Eutrophication or Undesirable Algae BUI and concluded that the Deer Lake AOC had recovered from hypereutrophication through processes put in place prior to the 1989 RAP document. The PAC Technical Committee recommended that the Eutrophication or Undesirable Algae BUI be removed based on the states Delisting Guidance criteria (MDEQ, 2006a)
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- **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.



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 has reviewed the status of the BUIs for the AOC as part of the request by the PAC to delist this AOC. The criteria used for this status assessment was based on the Guidance for Delisting Michigan’s Great Lakes Areas of Concern. Based on this review, the committee has begun the documentation to remove the Reproduction BUI based on bald eagle productivity and the Eutrophication BUI. This review determined that the development of a Delisting Determination Document cannot move forward at this time until known sources of contamination driving the fish consumption BUI are controlled. Monitoring is required by CCIC under the Consent Judgment. Ongoing projects include:

- Ongoing investigations by MDEQ and US EPA, working in consultation with the PAC, to determine status of the fish consumption advisory. Activities include proposed fish tissue monitoring for 2008.
- Ongoing facilitations by MDEQ and US EPA to aid CCIC and the City of Ishpeming to resolve mercury loadings to Cliffs Shaft Mine via Partridge Creek and the city’s stormwaters. After Partridge Creek exits the mine, it becomes a tributary to Carp Creek and contributes greater than 20 percent of the mercury load to Deer Lake.

RAP-Related Publications

- **2008** – MDEQ Deer Lake AOC 2008 RAP Update is currently in the MDEQ review process.
- **2006** – Amended Consent Judgment (CJ) completed between Cleveland Cliffs Iron Company and the state. CJ and related materials and fact sheets are available by contacting MDEQ-Water Bureau, Sharon Baker at 517-335-3310 or BakerS@michigan.gov.

- **2006** – Guidance for Delisting Michigan’s Great Lakes Areas of Concern.
- **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 stream bank, 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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