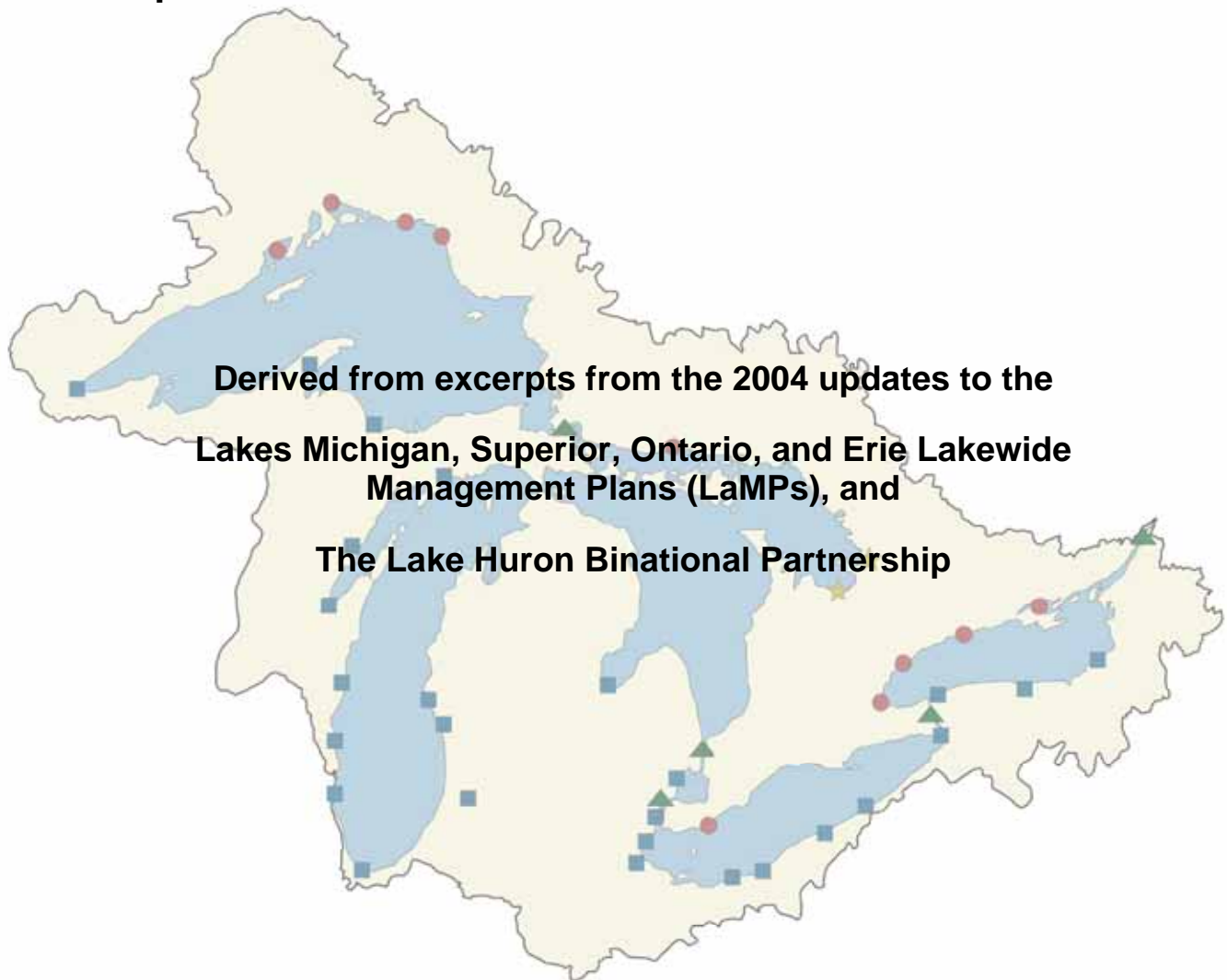


## Updated Information on Great Lakes Areas of Concern



April, 2004

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# Map of the Great Lakes Areas of Concern



# Lake Michigan

(Excerpts from 2004 Update to the Lake Michigan Lakewide Management Plan)

## Lake Michigan Areas of Concern Overview

There is an increasingly strong focus on remediating the problems of areas of concern (AOCs). The ultimate goal is to ensure the effective clean-up of these contaminated areas and protect them by utilizing watershed stewardship activities as a means of ensuring their on-going protection.

The following matrix provides summary information for the Lake Michigan AOCs. It provides information regarding:

- AOC Name and Beneficial Use Impairments (BUIs)
- Primary Contaminants
- Geographic Area
- Stressors
- BUIs
- Programs
- Clean-Up Actions
- Key Activities Needed
- Challenges
- Next Steps

The BUIs are listed in the AOC name column using the following numeration.

- I. Restrictions on fish and wildlife consumption** - When contaminant levels in fish or wildlife populations exceed current standards, objectives or guidelines, or public health advisories are in effect for human consumption of fish and wildlife.
- II. Tainting of fish and wildlife flavor** - When ambient water quality standards, objectives, or guidelines for the anthropogenic substance(s) known to cause tainting are being exceeded or survey results have identified tainting of fish and wildlife flavor.
- III. Degraded fish and wildlife populations** - When fish or wildlife management programs have identified degraded fish or wildlife populations. In addition, this use will be considered impaired when relevant, field-validated, fish and wildlife bioassays with appropriate quality assurance/quality controls confirm significant toxicity from water column or sediment contaminants.
- IV. Fish tumors or other deformities** - When the incidence rates of fish tumors or other deformities exceed rates at unimpacted control sites or when survey data confirm the presence of neoplastic or preneoplastic liver tumors in bullheads or suckers.
- V. Bird or animal deformities or reproductive problems** - When wildlife survey data confirm the presence of deformities (e.g. cross-bill syndrome) or other reproductive problems (e.g. egg-shell thinning) in sentinel wildlife species.
- VI. Degradation of benthos** - When the benthic macroinvertebrate community structure

significantly diverges from unimpacted control sites of comparable physical and chemical characteristics. In addition, this use will be considered impaired when toxicity (as defined by relevant, field-validated bioassays with appropriate quality assurance/quality controls) of sediment associated contaminants at a site is significantly higher than controls.

- VII. Restrictions on dredging activities** - When contaminants in sediments exceed standards, criteria, or guidelines such that there are restrictions on dredging or disposal activities.
- VIII. Eutrophication or undesirable algae** - When there are persistent water quality problems (e.g. dissolved oxygen depletion of bottom waters, nuisance algal blooms or accumulation, decreased water clarity, etc.) attributed to cultural eutrophication.
- IX. Restrictions on drinking water consumption or taste and odor problems** - When treated drinking water supplies are impacted to the extent that: 1) densities of disease-causing organisms or concentrations of hazardous or toxic chemicals or radioactive substances exceed human health standards, objectives or guidelines; 2) taste and odor problems are present; or 3) treatment needed to make raw water suitable for drinking is beyond the standard treatment used in comparable portions of the Great Lakes which are not degraded (i.e. settling, coagulation, disinfection).
- X. Beach closings** - When waters, which are commonly used for total-body contact or partial-body contact recreation, exceed standards, objectives, or guidelines for such use.
- XI. Degradation of aesthetics** - When any substance in water produces a persistent objectionable deposit, unnatural color or turbidity, or unnatural odor (e.g. oil slick, surface scum).
- XII. Added costs to agriculture and industry** When there are additional costs required to treat the water prior to use for agricultural purposes (i.e. including, but not limited to, livestock watering, irrigation and crop-spraying) or industrial purposes (i.e. intended for commercial or industrial applications and noncontact food processing).
- XIII. Degradation of phytoplankton and zooplankton** - When phytoplankton or zooplankton community structure significantly diverges from unimpacted control sites of comparable physical and chemical characteristics. In addition, this use will be considered impaired when relevant, field-validated, phytoplankton or zooplankton bioassays (e.g. Ceriodaphnia; algal fractionation bioassays) with appropriate quality assurance/quality controls confirm toxicity in ambient waters.
- XIV. Loss of fish and wildlife habitat**- When fish or wildlife management goals have not been met as a result of loss of fish or wildlife habitat due to a perturbation in the physical, chemical or biological integrity of the Boundary Waters, including wetlands.

Lake Michigan LaMP 2004

Lake Michigan Areas of Concern Lake Michigan Areas of Concern Lake Michigan Areas of Concern

| AOC Name and BUIs   | Primary Contaminants   | Geographic Area   | Stressors   | Programs  | Clean-Up Actions  | Key Activity Needed   | Challenges  | Next Step  |
|---|--|---|---|---|---|---|---|--|
| <p><b>Grand Calumet River Indiana</b></p> <p>I, II, III, IV, VI, VII, VIII, IX, X, XI, XII, XIII, XIV</p>   | <p>\$ PCBs \$ PAHs \$ Mercury \$ Cadmium \$ Chromium \$ Lead \$ Pathogens \$ Biochemical oxygen demand \$ Suspended solids \$ Oil and grease</p> | <p>Grand Calumet River: Lagoon, East Branch and West Branch Indiana Harbor and Ship Canal, The Lake George Branch of the Canal, Wolf Lake, George Lake and Nearshore Lake Michigan.</p> | <p>\$ Contaminated Sediments \$ Combined Sewer Overflows \$ Contaminated groundwater \$ Contaminated land sites \$ Habitat Fragmentation \$ Fire Suppression \$ ANS</p> | <p>\$ Superfund \$ RCRA \$ Clean Water Act \$ WRDA \$ Navigational Dredging \$ Natural Resource Trustee=s Damage Assessment</p> | <p>\$ USX dredging \$ West Branch Remediation – 14,200 cubic yards of sediment remediated \$ GSD Sed. Remediation \$ Navigational dredging \$ LTV cleanup \$ U.S. Lead - 19,000 cubic yards of sediment have been remediated \$ A total of 700,000 cubic yards of sediment have been remediated</p>   | <p>\$ Dredging \$ CSO Long Term Control Plans \$ Issue NPDES Permits \$ BUI Indicator Monitoring \$ TMDL underway \$ West Branch assessment</p> | <p>\$ Public concern regarding location of contaminated material disposal \$ Local funding and match for federal projects \$ Legal concerns \$ Permitting \$ Monitoring resources</p> | <p>\$ Dredging at USX complete \$ NRDA-Complete PRP negotiations. \$ ACOE-WRDA Diagnostic Feasibility Study \$ USX-Build Corrective Action Management Unit \$ GSD-Site Characterization \$ TMDL-Resolve modeling issues \$ Monitor BUI Indicators \$ ECI slurry wall</p> |
| <p><b>Kalamazoo River Michigan</b></p> <p>I, III, V, VI, VII, X, XI, XIV</p>                                | <p>\$ PCBs \$ Phosphorus \$ Sediments</p>  | <p>From Morrow Dam, which forms Morrow Pond and extends 80 miles downstream to Lake Michigan.</p>   | <p>\$ Nonpoint pollution \$ Sediments \$ Contaminated sediment landfills</p>  | <p>\$ Superfund \$ Clean Water Act \$ Brownfields \$ Natural Resource Trustee=s Damage Assessment</p>                           | <p>\$ Superfund removal of 150,000 cubic yards of PCB-contaminated sediments from Bryant Mill Pond \$ Nonpoint pollution projects \$ Erosion control programs</p>   | <p>\$ Dredging/Excavation \$ Superfund site cleanup decision \$ Stream buffers \$ Dam removal</p>   | <p>\$ PRP court case \$ Local funding match for federal projects</p>  | <p>\$ Continue NRDA assessment \$ Finish remedial investigation/remedial action \$ Investigate strategy and determine action</p>   |
| <p><b>Lower Fox River/Southern Green Bay Wisconsin</b></p> <p>I, III, V, VI, VII, VIII, IX, X, XI, XIII</p> | <p>\$ PCBs \$ NH3 \$ BOD \$ Phosphorus \$ Suspended solids \$ Mercury \$ Heavy metals \$ Pathogens</p>   | <p>The lower 11.2 km of the Fox River and a 55 square kilometer area of southern Green Bay out to Point au Sable and Long Tail Point.</p>   | <p>\$ Urban and rural runoff \$ Wastewater discharges \$ Sediments \$ Aquatic nuisance species \$ Coastal &amp; watershed habitat loss \$ Dams</p>                      | <p>\$ Clean Water Act \$ Superfund \$ Natural Resource Trustee=s Damage Assessment</p>  | <p>\$ Watershed NPS abatement \$ Remedial investigation/ remedial action nearly completed \$ Dredging and PCB removal (Deposit in 7,200 cubic yards of sediment removed and Deposit 56/57: 30,000 cubic yards of sediment removed) \$ Dissolved oxygen wasteload \$ Deposit N, 56, 57 \$ Cumulative sediments</p> <p>remediated from 1997-2002 – 87,500 cubic yards</p> | <p>\$ Dredging \$ Pollution Prevention \$ Stream buffers \$ Habitat protection and restoration</p>  | <p>\$ Rapid land development \$ Contaminated material disposal</p>  | <p>\$ Formal agency decision (Comment period ended January 21, 2002) \$ Removal of 10 million cubic yards of sediment.</p>   |

|   |   |  |  |  |   |   |
|---|---|--|--|--|---|---|
| <p><b>AOC Name and BUIs</b><br/> <b>Primary Contaminants</b><br/> <b>Manistique River</b><br/> <b>Michigan</b> I, VI, VII, X, XIV<br/> \$ PCBs \$ Heavy metals \$<br/> Pathogens <b>Menominee</b><br/> <b>River Michigan/</b><br/> <b>Wisconsin</b> I, III, VI, VII, X,<br/> XIV \$ Arsenic \$ Mercury \$<br/> PCBs \$ Oil and grease \$<br/> Pathogens <b>Milwaukee</b><br/> <b>Estuary Wisconsin</b> I, III,<br/> IV, VI, VII, VIII, X, XI, XIII,<br/> XIV \$ Phosphorus \$<br/> Nitrogen \$ Pathogens \$<br/> PCBs \$ Metals \$ PAHs<br/> <b>Muskegon Lake</b><br/> <b>Michigan</b> I, V, VI, VII, VIII,<br/> IX, XIV \$ PCBs \$ Mercury</p> | <p><b>Geographic Area Stressors</b> The last 1.7<br/> miles of the river to the mouth of the harbor<br/> at Lake Michigan \$Combined sewer<br/> overflow \$Sediments \$PCBcontaminated<br/> sawdust \$Wastewater discharges Lower 4.8<br/> km of river to the mouth and 5 km north and<br/> south of the mouth along the bay shore<br/> \$Sediments \$Coastal watershed habitat<br/> loss \$Nonpoint pollution \$Hardened<br/> shorelines The lower 5 km of the Milwaukee<br/> River ; the lower 4.8 km of the Menominee<br/> River; the lower 4 km of the Kinnickinnic<br/> River; the inner and outer Harbor and the<br/> nearshore waters \$Urban and rural runoff<br/> \$Wastewater discharges \$Sediments<br/> \$Habitat loss \$Dams The entire 4149 acre<br/> lake and several tributaries. \$Sediments<br/> \$Nonpoint pollution</p> | <p><b>Programs</b> \$<br/> Superfund \$ RCRA<br/> Corrective Action<br/> \$Clean Water Act<br/> \$Clean Air Act<br/> \$Superfund<br/> \$Brownfields<br/> \$Navigational<br/> dredging \$<br/> Brownfields \$<br/> Navigational<br/> dredging</p> | <p><b>Clean-Up Actions</b><br/> \$Dredging of<br/> contaminated sediments<br/> completed in 2001<br/> (123,000 cubic yards)<br/> \$Arsenic remediation<br/> (33,000 cubic yards)<br/> \$Combined sewer<br/> overflow project \$Water<br/> pollution abatement<br/> \$Pollution prevention<br/> education begun \$Dam<br/> removal \$7,000 cubic<br/> yards remediated<br/> \$Wastewater treatment<br/> upgraded \$Some<br/> tributary remedial actions<br/> underway</p> | <p><b>Key Activity Needed</b> \$<br/> Sampling and<br/> monitoring \$ Dredging \$<br/> Protect riparian and<br/> coastal habitat \$<br/> Pollution prevention<br/> \$Dredging \$Nonpoint<br/> source pollution control<br/> \$Stream buffers<br/> \$Pathogen source<br/> research \$ Dredging \$<br/> Stream buffers \$ More<br/> assessment</p> | <p><b>Challenges</b> \$<br/> Navigational<br/> dredging \$ CSO to<br/> be closed by 2020<br/> \$ High urban<br/> density and rapid<br/> development \$<br/> PCB disposal \$<br/> Local funding<br/> match for federal<br/> projects</p> | <p><b>Next Step</b> \$ Sampling<br/> and monitoring<br/> continuing as part of<br/> delisting process \$<br/> Arsenic dredging<br/> completed \$ Paint<br/> sludge deposit<br/> cleanup above river<br/> mouth \$ Complete<br/> assessment for<br/> Kinnickinnic River \$<br/> Estabrook<br/> Impoundment<br/> remediation needed \$<br/> Research into<br/> pathogen sources \$<br/> Remediation of<br/> brownfields and<br/> sediments as Clean<br/> Michigan Initiative<br/> funds become<br/> available</p> |
|---|---|--|--|--|---|---|

| AOC Name and BUIs  | Primary Contaminants   | Geographic Area   | Stressors   | Programs  | Clean-Up Actions   | Key Activity Needed   | Challenges  | Next Step   |
|--|--|---|---|---|--|---|---|---|
| <b>Sheboygan River</b><br><br><b>Wisconsin</b><br><br>I, III, V, VI, VII, VIII, XIII | <input type="checkbox"/> Solids <input type="checkbox"/> PCBs<br><br><input type="checkbox"/> PAHs <input type="checkbox"/> Heavy Metals<br><br><input type="checkbox"/> Pathogens<br>\$ Phosphorus<br>\$ Nitrogen | The lower Sheboygan River downstream from the Sheboygan Falls Dam, including the entire harbor and nearshore waters | \$ Industrial & agricultural runoff                                   | <input type="checkbox"/> Superfund<br><input type="checkbox"/> Clean Water Act #319 | \$ Partial removal of PCB-contaminated sediments<br><br>\$ Agency decision (2001)  | \$ Completion of PCB remediation<br>\$ Completion of PAH remediation at Camp Marina coal gasification site<br>\$ Control buffers \$ Habitat protection<br>\$ NPS controls for urban and rural pollution |   | \$ 2004 dredging start \$ 2004 Site clean-up and removal of preferential pathways and groundwater monitoring.<br>\$ 2004 Upper River final sediment characterization as preparation for 2005 dredging.<br>\$ 2004 Municipal stormwater permits for the Village of Kohler, Town of Sheboygan and Town of Wilson. |
| <b>Waukegan Harbor Illinois</b><br><br>VI, VII, X, XIII, XIV                         | PCBs   | 1.2 square kilometers of industrial, commercial, municipal and open lands.  | Sediments   | \$ Superfund<br>\$ Brownfields  | \$ Approximately 1 million pounds of PCBs dredged from the harbor.   | \$ Dredging<br>\$ Brownfield development<br>\$ Habitat restoration<br>\$ New committee formed to act on being named environmental justice community by U.S. EPA   | \$ Corps navigation dredging Phase II<br><br>Sediment removal \$ Contaminated material disposal | \$ Final dredging and disposal of inner harbor extension sediments<br><br>\$ OMC building clean up  |
| <b>White Lake Michigan</b><br><br>I, III, VI, VII, VIII, IX, XI, XIV                 | \$ Heavy metals \$ Stormwater nonpoint pollution<br><br>\$ Arsenic \$ Chromium   | Includes White Lake and a one-quarter mile wide zone around the lake.   | \$ Sediments \$ Industrial contamination \$ Groundwater contamination | \$ Superfund<br>\$ RCRA   | \$ Public education \$ Dredging in ATannery Bay@ (2002) – 93,000 cubic yards of waste (hides, chromium, arsenic \$ Occidental Chemical site 2002 | \$ Dredging \$ Stream buffers   |   | \$ Spring 2004 monitoring   |

# Lake Superior

(Excerpts from 2004 Update to the Lake Superior Lakewide Management Plan)

| <b>Appendix A: Areas of Concern Summary Matrix Lake Superior LaMP 2004 For more information, see <a href="http://www.epa.gov/glnpo/aoc/index.html">http://www.epa.gov/glnpo/aoc/index.html</a> AOC Name</b> | <b>Primary Contaminants</b>  | <b>Geographic Area</b>  | <b>Stressors</b>  | <b>Beneficial Use Impairments</b>  | <b>Funding Programs and Partners</b>  | <b>Clean-Up Actions Completed</b>   | <b>Key Activity Needed</b>  | <b>Barriers</b>   | <b>Next Steps</b>  |
|---|--|---|---|--|---|---|---|---|--|
| <b>St Marys River Michigan/ Ontario</b>   | <input type="checkbox"/> PAHs<br><input type="checkbox"/> Arsenic<br><input type="checkbox"/> Cyanide<br><input type="checkbox"/> Phosphorus<br><input type="checkbox"/> Benzene<br><input type="checkbox"/> Toluene <input type="checkbox"/> Oil and grease<br><input type="checkbox"/> Phenols<br><input type="checkbox"/> Ammonia<br><input type="checkbox"/> Pathogens/ Bacteria | 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. | <input type="checkbox"/> Combined sewer overflows <input type="checkbox"/> Loss of wetlands <input type="checkbox"/> Point and nonpoint source pollution<br><input type="checkbox"/> Wastewater discharges<br><input type="checkbox"/> Urban/industrial development<br><input type="checkbox"/> Navigational structures | <input type="checkbox"/> Fish and wildlife consumption restrictions <input type="checkbox"/> Fish and wildlife degradation<br><input type="checkbox"/> Fish tumors or other deformities<br><input type="checkbox"/> Degradation of benthos<br><input type="checkbox"/> Dredging activities restrictions<br><input type="checkbox"/> Eutrophication or undesirable algae <input type="checkbox"/> Beach closings<br><input type="checkbox"/> Aesthetics degradation<br><input type="checkbox"/> Loss of fish and wildlife habitat | <input type="checkbox"/> Superfund <input type="checkbox"/> Clean Water Act<br><input type="checkbox"/> Navigational dredging<br><input type="checkbox"/> Canada Ontario infrastructure program <input type="checkbox"/> Great Lakes Sustainability Fund <input type="checkbox"/> Canada-Ontario Agreement funds (provincial) | <input type="checkbox"/> Superfund site restored<br><input type="checkbox"/> Combined sewer separation for Sault Ste. Marie, MI. <input type="checkbox"/> Steel and paper mills in Sault Ste. Marie, ON improved quality of effluent<br><input type="checkbox"/> Environmental Management Agreement among Algoma Steel, Canada and Ontario<br><input type="checkbox"/> Infrastructure upgrades by Sault Ste. Marie, Ontario | <input type="checkbox"/> Complete contaminated sediment assessment<br><input type="checkbox"/> Upgrade East End STP to secondary treatment (underway) |   | <input type="checkbox"/> Superfund monitoring at cleaned site.<br><input type="checkbox"/> Development and implementation of sediment management program |
| <b>Deer Lake Michigan</b>   | \$ Mercury \$<br>Historic Nutrient Loadings  | A 906-acre impoundment in central Marquette County, Michigan that includes the Carp River watershed, comprised of Carp Creek, Deer Lake, and  | <input type="checkbox"/> Contaminated sediments from waste materials associated with historic iron, gold and silver mining practices  | <input type="checkbox"/> Fish and wildlife consumption restrictions<br><input type="checkbox"/> Dredging activities restrictions   | <input type="checkbox"/> Contaminated sediments   | <input type="checkbox"/> Sewer separation and primary treatment plants secondary wastewater treatment <input type="checkbox"/> Deer Lake was drawn down and   | <input type="checkbox"/> Dredging<br><input type="checkbox"/> Identify and restore beneficial uses of the Carp River watershed                        | <input type="checkbox"/> Lack of dedicated resources<br><input type="checkbox"/> PRP and state negotiations have not been completed | <input type="checkbox"/> Sediment remediation<br><input type="checkbox"/> Complete analysis of beneficial use impairments                                |

|                            |  |  |   |   |   |   |   |   |  |
|----------------------------|--|--|---|---|---|---|---|---|--|
|                            |  | the Carp River downstream 20 miles to Lake Superior at Marquette.  |   |   |   |   | refilled to allow methylation of mercury from exposed sediments     |   |  |
| <b>Torch Lake Michigan</b> | \$ Copper \$<br>Mercury \$<br>Arsenic \$<br>Lead \$<br>Chromium \$<br>Heavy metals | The lower portion of the Keweenaw Peninsula, (368 sq. miles), encompassing the Keweenaw Waterway, (North Entry Harbor of Refuge, Portage Lake, and Torch Lake), its watershed, portions of 2 other adjacent watersheds (Trout R. and the Eagle R. Complex), and several miles of its western Lake Superior shoreline | <input type="checkbox"/> Contaminated sediments from mine tailings associated with historic copper mining and milling practices <input type="checkbox"/> Upland mine tailings deposits from historic copper mining activities which have been deposited into area lakes and streams | <input type="checkbox"/> Fish and wildlife consumption restrictions<br><input type="checkbox"/> Degradation of benthos<br><input type="checkbox"/> Dredging activities restrictions<br><input type="checkbox"/> Drinking water consump. restrictions, or taste or odor<br><input type="checkbox"/> Aesthetics degradation<br><input type="checkbox"/> Loss of fish and wildlife habitat | <input type="checkbox"/> Superfund<br><input type="checkbox"/> MDEQ Superfund, AOC and District | <input type="checkbox"/> 97% of the Superfund - recommended remedial actions have completed – coverage of exposed mine tailings and stamp sands<br><input type="checkbox"/> Completion of<br><input type="checkbox"/> Final Suprfund remedial actions expected 2005 | <input type="checkbox"/> Completion of Superfund-recommended remedy | <input type="checkbox"/> Requires \$15.2M dedicated to Superfund remedial activities from Federal and State funds | <input type="checkbox"/> Completion of Superfund site remediation<br><input type="checkbox"/> Completion of Superfundsite delisting discussions and delisting <input type="checkbox"/> Begin BUI/AOC delisting discussions and recommendations |

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**March 30, 2004 Draft Appendix A – Areas of Concern Summary Matrix Lake Superior LaMP**

| AOC Name | Primary | Geographic Area | Stressors | Beneficial Use | Funding | Clean-Up Actions | Key Activity | Barriers | Next Steps |
|----------|---------|-----------------|-----------|----------------|---------|------------------|--------------|----------|------------|
|----------|---------|-----------------|-----------|----------------|---------|------------------|--------------|----------|------------|

|  | Contaminants  |  |   | Impairments   | Programs and Partners   | Completed  | Needed   |  |   |
|--|---|--|---|---|---|--|--|--|---|
| <b>St. Louis River Minnesota/Wisconsin</b> | <input type="checkbox"/> PAHs<br><input type="checkbox"/> Mercury<br><input type="checkbox"/> Suspended sediment<br><input type="checkbox"/> PCBs<br><input type="checkbox"/> Other metals<br><input type="checkbox"/> Oil and grease<br><input type="checkbox"/> Pathogens<br><input type="checkbox"/> Nutrients | St. Louis Bay, the Nemadji River basin and the St. Louis River basin to Cloquet, Minnesota | <input type="checkbox"/> Contaminated sediments<br><input type="checkbox"/> Abandoned hazardous waste sites<br><input type="checkbox"/> Poorly designed or leaky landfills<br><input type="checkbox"/> Industrial discharges and chemical spills<br><input type="checkbox"/> Infiltration and inflow<br><input type="checkbox"/> Point and nonpoint sources<br><input type="checkbox"/> Sewage overflows and leaking septic systems<br><input type="checkbox"/> Municipal and industrial runoff<br><input type="checkbox"/> Turbidity<br><input type="checkbox"/> Sedimentation | <input type="checkbox"/> Fish and wildlife consumption restrictions<br><input type="checkbox"/> Fish and wildlife degradation<br><input type="checkbox"/> Fish tumors or other deformities<br><input type="checkbox"/> Degradation of benthos<br><input type="checkbox"/> Dredging activities restrictions<br><input type="checkbox"/> Excess loadings of nutrients and sediment to Lake Superior<br><input type="checkbox"/> Beach closings<br><input type="checkbox"/> Aesthetics degradation<br><input type="checkbox"/> Loss of fish and wildlife habitat | <input type="checkbox"/> Superfund<br><input type="checkbox"/> Navigational dredging<br><input type="checkbox"/> GLNPO<br><input type="checkbox"/> States | <input type="checkbox"/> Wastewater treatment<br><input type="checkbox"/> Sediment contamination studies to identify hotspots<br><input type="checkbox"/> Evaluation of cleanup options at two Superfund sites<br><input type="checkbox"/> Prioritization of remaining hotspots per the Stage 2 Sediment Assessment Strategy<br><input type="checkbox"/> Habitat Management Plan<br><br><input type="checkbox"/> Key habitat area acquisition<br><input type="checkbox"/> Newton Creek Cleanup | <input type="checkbox"/> Assessment of fish and wildlife health (body burden and health implications)<br><input type="checkbox"/> Assessment of nonpoint sources of pollution to AOC<br><input type="checkbox"/> AOC specific wetlands protection and restoration program<br><input type="checkbox"/> Selective clean up of contaminated sediments<br><input type="checkbox"/> Cost-benefit analyses of clean up and habitat restoration alternatives<br><input type="checkbox"/> Control of vessel discharges (ballast and bilge water)<br><input type="checkbox"/> Updating of RAP documents | <input type="checkbox"/> Lack of dedicated resources<br><input type="checkbox"/> Lack of funding source to manage sediment contamination on an AOC-wide, bi-state basis<br><input type="checkbox"/> Lack of financial support from the federal government<br><input type="checkbox"/> Lack of cost estimates for protection, restoration, or clean up activities<br><input type="checkbox"/> Lack of long term horizon - policies and funding<br><input type="checkbox"/> Organizations and budgets focused on short term<br><input type="checkbox"/> Difficulty in maintaining public long term support | <input type="checkbox"/> Contaminated site remediation<br><input type="checkbox"/> Mercury reduction<br><input type="checkbox"/> Habitat restoration and protection<br><input type="checkbox"/> Stormwater and infiltration and inflow control<br><input type="checkbox"/> Update AOC-wide contaminated sediment strategy |
| <b>Thunder Bay Ontario</b>                 | <input type="checkbox"/> Pathogens<br><input type="checkbox"/> Mercury<br><input type="checkbox"/> PAHs   | About 28 km along the shoreline and up to 9 km offshore, including the watershed           | <input type="checkbox"/> Contaminated sediments<br><input type="checkbox"/> Agricultural runoff<br><input type="checkbox"/> Industrial and municipal effluent   | <input type="checkbox"/> Fish and wildlife consumption restrictions<br><input type="checkbox"/> Fish and wildlife degradation   | <input type="checkbox"/> Great Lakes Sustainability Fund<br><input type="checkbox"/> Canada Ontario   | <input type="checkbox"/> Secondary treatment installed for a number of pulp and paper  | <input type="checkbox"/> Upgrade STP to secondary treatment (underway)   |  | Complete sediment assessment at north end of harbour  |

|  |  |  |   |  |  |   |   |  |  |
|--|--|--|---|--|--|---|---|--|--|
|  |  |  | <input type="checkbox"/> Industrial development | <input type="checkbox"/> Degradation of benthos<br><input type="checkbox"/> Dredging activities restrictions<br><input type="checkbox"/> Beach closings<br><input type="checkbox"/> Aesthetics degradation<br><input type="checkbox"/> Phytoplankton and zooplankton pops.<br><input type="checkbox"/> Degradation<br><input type="checkbox"/> Loss of fish and wildlife | Infrastructure<br><br>Programs<br><input type="checkbox"/> Canada-Ontario Agreement funds (provincial)<br><input type="checkbox"/> Abitibi Consolidated<br><input type="checkbox"/> Northern Wood Preservers<br><input type="checkbox"/> Canadian National | mills<br><br><input type="checkbox"/> Clean up and rehabilitation of contaminated Northern Wood site<br><input type="checkbox"/> Various habitat creation and enhancement projects<br><input type="checkbox"/> Chippewa Beach | <input type="checkbox"/> Nonpoint pollution |  |  |
|--|--|--|---|--|--|---|---|--|--|

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| Appendix A: Areas of Concern Summary Matrix Lake Superior LaMP 2004 For more information, see <a href="http://www.epa.gov/glnpo/aoc/index.html">http://www.epa.gov/glnpo/aoc/index.html</a><br>AOC Name | Primary  | Geographic Area   | Stressors  | Beneficial Use   | Funding Programs   | Clean-Up Actions  | Key Activity   | Barriers   | Next Steps  |
|---|--|---|--|--|--|---|--|--|---|
|   | Contaminants   |   |  | Impairments  | and Partners   | Completed   | Needed   |  |   |
| <b>Nipigon Bay Ontario</b>  | <input type="checkbox"/> Solids<br><input type="checkbox"/> Pathogens<br><input type="checkbox"/> Biological Oxygen Demand (BOD) | A large portion of Nipigon Bay and the Nipigon River downstream of Alexander Dam. Two communities are located in the vicinity of the Bay: Red Rock (population: 1,300) and Nipigon (population: 1,900). | <input type="checkbox"/> Water level and flow fluctuations<br><input type="checkbox"/> Wastewater discharges<br><input type="checkbox"/> Nonpoint source pollution | <input type="checkbox"/> Fish and wildlife degradation<br><input type="checkbox"/> Degradation of benthos<br><input type="checkbox"/> Eutrophication or undesirable algae<br><input type="checkbox"/> Aesthetics degradation<br><input type="checkbox"/> Loss of fish and wildlife habitat | Railway<br><br><input type="checkbox"/> Great Lakes Sustainability Fund<br><input type="checkbox"/> Canada Ontario Infrastructure Programs<br><input type="checkbox"/> Canada-Ontario Agreement funds (provincial) | <input type="checkbox"/> Created water management plan for Nipigon River to regulate hydroelectric facilities' water use to help restore brook trout<br><input type="checkbox"/> Various habitat restoration projects<br><input type="checkbox"/> Secondary treatment installed at Norampac | <input type="checkbox"/> Upgrade primary STPs in Redrock and Nipigon | <input type="checkbox"/> Lack of dedicated resources | <input type="checkbox"/> Work toward STP upgrades |

|   |  |  |   |  |  |   |  |   |   |
|---|--|--|---|--|--|---|--|---|---|
| <p><b>Jackfish Bay Ontario</b></p>      | <p>☐ Solids (i.e. wood fiber)<br/>☐ AOX ☐ dioxin</p> | <p>The 14 km reach of Blackbird Creek between Kimberly-Clark Canada Inc. pulp mill and Jackfish Bay, including Lake A, Moberly Lake and Jackfish Bay itself.</p> | <p>☐ Industrial discharge ☐ Spills<br/>☐ Contaminated sediments</p> | <p>☐ Fish and wildlife consumption restrictions ☐ Fish and wildlife degradation ☐ Fish tumors or other deformities ☐ Bird or animal deformities or reproductive problems</p> <p>☐ Aesthetics degradation ☐ Loss of fish and wildlife habitat</p> | <p>☐ Great Lakes Sustainability Fund<br/>☐ Canada-Ontario Agreement funds (provincial)<br/>☐ National Sciences and Engineering Research Council of Canada (NSERC)</p>  | <p>☐ Effluent quality from paper mill improved<br/>☐ Chlorine dioxide bleaching plant upgraded resulting in lower AOX levels (not 100% of time)</p> | <p>☐ Eliminate mill discharge from ecosystem cycling<br/>☐ Update sediment monitoring data</p> | <p>☐ Natural recovery takes time<br/>☐ Available technology needs to be utilized at all times</p> | <p>☐ Continued natural recovery and monitoring<br/>☐ establish cause of effluent impact on fish</p> |
| <p><b>Peninsula Harbour Ontario</b></p> | <p>☐ Mercury</p>                                     | <p>Peninsula Harbour proper, and a portion of open Lake Superior immediately south of the peninsula.</p>   | <p>☐ Contaminated sediments</p>                                     | <p>☐ Fish and wildlife consumption restrictions ☐ Fish and wildlife degradation<br/>☐ Degradation of benthos ☐ Dredging activities restrictions</p> <p>☐ Loss of fish and wildlife habitat</p>   | <p>☐ Great Lakes Sustainability Fund<br/>☐ Canada-Ontario Agreement funds (provincial)<br/>☐ Town of Marathon<br/>☐ Federal Economic Development Initiative for northern Ontario (FEDNOR)<br/>☐ Great Lakes Renewal Foundation</p> | <p>☐ Pulp kraft mill installed secondary treatment for effluent, discharge moved out of harbour</p>   | <p>☐ Complete contaminated sediment assessment</p>   |   | <p>☐ Complete feasibility study</p>   |

# Lake Ontario

(Excerpts from 2004 Update to the Lake Ontario Lakewide Management Plan)

## CHAPTER 11 SUMMARY OF AREA OF CONCERN STATUS

### 11.1 Summary

There are nine Areas of Concern (AOCs) identified around Lake Ontario. Two of these AOCs are binational and are located at the inlet (Niagara River) and outlet (St. Lawrence River.) For each AOC, a Remedial Action Plan (RAP) has been developed and is being implemented. The table lists the status of the fourteen use impairment indicators developed by the International Joint Commission (IJC) to assess beneficial uses in the Areas of Concern. This chapter provides a summary of progress as of December 2003.

### 11.2 Background and Current Status

These same fourteen use impairment indicators have been applied in the Lake Ontario Lakewide Management Plan to assess lakewide beneficial uses. In addition to lakewide impairments, the AOCs served to identify problems found in localized nearshore areas, embayments, and tributary watersheds. This is not surprising as industrial and municipal contamination can become concentrated at the mouths of rivers or harbors. Remedial Action Plans (RAPs) serve as the primary mechanism for addressing these localized contaminant problems and other issues unrelated to lakewide impairments. Additional nearshore problems (e.g. temporary beach closings, and eutrophication / algae) beyond the scope of specific AOCs are being addressed through a variety of other environmental management programs. Table 11-1 summarizes the status of these use impairment indicators for the Lake Ontario LaMP and AOCs. Lakewide and nearshore areas, two binational AOCs (the Niagara and St. Lawrence Rivers), and the seven other Areas of Concern for which RAPs have been developed in Lake Ontario are included. Contact information is listed at the end of RAP summary reports for each AOC located on websites by USEPA and Environment Canada.

Each AOC is required to develop and implement a Remedial Action Plans (RAP) as called for in the 1987 amendments to the Great Lakes Water Quality Agreement, signed by the federal governments of the United States and Canada. The federal governments, in cooperation with state and provincial governments, committed to developing and implementing RAPs in 43 Areas of Concern (AOCs). The RAP process strives to identify environmental problems (beneficial use impairments); identify pollutants and other causes of the problems; identify the sources of the pollutants; recommend and implement remedial activities to restore the beneficial uses and document progress towards restoration. The ultimate goal, therefore, is to restore the area's beneficial uses and be able to delist the AOC. Read on to find out about what's happening with all the AOCs associated with the Lake Ontario LaMP. The following Table 11.1 provides useful comparison information from which common beneficial use impairments can be identified.

**Table 11.1 Summary of Beneficial Use Impairments for Lake Ontario Lakewide, Nearshore, and Areas of Concern (Based on the 14 IJC Use Impairment Indicators)**

| Use Impairment Indicator                                     | Lake-wide Lake Ontario | Niagara River (U.S.) | Niagara River (Canada) | Saint Lawrence at Massena + (U.S.) | Saint Lawrence at Cornwall (Canada) | Eighteen-mile Creek | Rochester Embayment | Oswego River | Hamilton Harbour | Toronto and Region | Port Hope Harb. | Bay of Quinte |
|--|------------------------|----------------------|------------------------|------------------------------------|-------------------------------------|---------------------|---------------------|--------------|------------------|--------------------|-----------------|---------------|
| 1. Restrictions on Fish and Wildlife Consumption             |                        |                      | (fish)<br>(wildlife?)  |                                    |                                     |                     |                     | O            |                  |                    |                 |               |
| 2. Tainting of Fish and Wildlife Flavor                      |                        |                      |                        |                                    |                                     |                     | ?                   |              |                  |                    |                 |               |
| 3. Degradation of Fish and Wildlife Populations              | (wildlife)             | ?                    | (fish)<br>(wildlife?)  | ?                                  |                                     | ?                   |                     | O            |                  |                    |                 |               |
| 4. Fish tumors or Other Deformities                          |                        |                      | ?                      | ?                                  | ?                                   | ?                   | ?                   |              |                  | ?                  |                 | ?             |
| 5. Bird/Animal Deformities or Reproductive Problems          |                        | ?                    |                        | ?                                  | ?                                   | ?                   |                     |              |                  | ?                  |                 |               |
| 6. Degradation of Benthos                                    |                        |                      |                        | ?                                  |                                     |                     | -                   |              |                  |                    |                 |               |
| 7. Restrictions on Dredging Activities                       |                        |                      |                        |                                    |                                     |                     | **                  |              |                  |                    |                 |               |
| 8. Eutrophication or Undesirable Algae                       |                        |                      |                        |                                    |                                     |                     |                     | R            |                  |                    |                 |               |
| 9. Drinking Water Restrictions or Taste and Odor Problems    |                        |                      |                        | ?                                  |                                     |                     | *                   |              |                  |                    |                 | *             |
| 10. Beach Closings   |                        |                      |                        |                                    |                                     |                     |                     |              |                  |                    |                 |               |
| 11. Degradation of Aesthetics                                |                        |                      |                        |                                    |                                     |                     |                     |              |                  |                    |                 |               |
| 12. Added Costs to Agriculture or Industry                   |                        |                      |                        |                                    |                                     |                     |                     |              |                  |                    |                 |               |
| 13. Degradation of Phytoplankton and Zooplankton Populations |                        |                      | ?                      | ?                                  | ?                                   |                     | -                   |              |                  | ?                  |                 |               |
| 14. Loss of Fish and Wildlife Habitat                        |                        |                      |                        |                                    |                                     |                     |                     | O            |                  |                    |                 |               |

See key next page

**Key: Use Impairment Status for Table 11.1**

= Impaired R = Beneficial Use Restored O = Resolution by Other Responsibility ? =  
Further Assessment Needed (Blank) = Not Impaired

**Key: Other Notations for Table 11.1**

I\* = Taste and Odor Problems unless otherwise not marked for indicator #9 only I-

= Lower Genesee River Impaired; Rochester Embayment Needs further study

+ = "Transboundary Impacts" is an added indicator in this RAP

I\*\* = Stage 1 impairment identified as an issue of navigational dredging method and to be resolved by agreement to eliminate overflow dredging in the Rochester Harbor

### **11.3 Binational Areas of Concern**

Canada and the United States have agreed to develop Remedial Action Plans for the Binational AOCs independently within a broader context of intergovernmental cooperation. Separate RAP documents have been developed and are being implemented for the two binational AOCs. Joint participation on technical and public participation activities is part of this RAP Process for these shared waterbodies.

#### **11.3.1 Niagara River Area of Concern**

The Niagara River flows 60 kilometres from Lake Erie to Lake Ontario. Downstream from Niagara Falls the river flows for a 15 kilometre stretch through a 100 metres deep and 1 kilometre wide gorge. The binational AOC extends the entire length of the Niagara River and includes the Welland River and other tributary watersheds on the Canadian side. The Niagara River passes through heavily industrialized areas, residential and parkland interspersed with remnant natural areas, and drains extensive farmland on the Canadian side. It borders Erie and Niagara counties in western New York. Here, the AOC extends from Smokes Creek near the southern end of the Buffalo Harbor, north to the mouth of the Niagara River at Lake Ontario.

Past municipal and industrial discharges and waste disposal sites have been a source of contaminants to the Niagara River. A long history of development has also changed the original shoreline along much of the river, affecting fish and wildlife habitat. More than half of the flow of the river is diverted for electric power generation on both sides of the river. The gorge and cliff face are habitat for some of the highest concentrations of rare plant species in Ontario. The Niagara River annually supports one of the largest and most diverse concentrations of gulls in the world.

Joint participation includes the Niagara River Toxics Management Plan (NRTMP), the Important Bird Area Program and the International Board of Control. Environment Canada and MOE, working in partnership with the Niagara Peninsula Conservation Authority (NPCA), are responsible for the delivery of the Canadian RAP. USEPA Region 2 and NYSDEC deliver the US portion of the RAP. Both RAPs were established in 1989. Summaries of the Remedial Actions plans follow.

##### **11.3.1.1 Niagara River (U.S. Side)**

**Background:** A representative group of Niagara River stakeholders was appointed by NYSDEC as an advisory committee to help develop the RAP. The committee persons and NYSDEC direct RAP development. Goals were established, a workplan was developed, responsibilities were defined to complete the RAP document. This RAP document, that effectively combines the Stage 1 and Stage 2 RAP elements, was completed September 1994. A Status Report for the Niagara River RAP that updates remedial actions was published in June 2000. The RAP addresses use impairments, sources, and existing remediation programs, and recommends future remedial strategies. A multiple committee approach was utilized to address the complexities of implementation. A technical subcommittee was formed to develop ways to quantify concerns and to communicate progress to address the impaired uses. A public outreach subcommittee was created to develop a binational strategy to address the many issues involved with achieving sustainable development, and an International Advisory Committee was established to foster binational cooperation.

**Impairments:** The Remedial Action Plan (RAP) identifies five use impairments based on the fourteen possible International Joint Commission (IJC) impairments. Two other use impairments are listed that will require further investigation to determine the extent of their existence. The

major impairment is restrictions on fish and wildlife consumption, primarily due to PCB and dioxin contamination. Mirex and chlordane also are chemicals of concern contributing to the consumption restriction use impairment. These restrictions are part of a lakewide advisory for Lake Ontario. Based on the presence of contaminated sediment pockets at certain tributary mouths and nearshore areas, the sediments were evaluated as contributing to a degradation of benthos use impairment at these areas. Existing restriction on open lake disposal of contaminated sediments from the Niagara River cause the AOC to have a dredging restrictions use. In the upper Niagara River, fish tumors have been reported and the loss of fish and wildlife habitat due to human activities has been dramatic. Degradation of fish and wildlife populations and the presence of bird or animal deformities or reproductive problems will require further investigations.

**RAP Structure:** Most recently the combined committee of the Friends of the Buffalo/ Niagara Rivers (FBNR) advises and assists NYSDEC on the Niagara River RAP implementation. Committee members include local government, academia, public and economic interest groups, and private citizens. The RAP process involves various components: periodic progress status reports with remedial strategy identification; regular Remedial Advisory Committee meetings; project and plan reviews as part of ongoing activities; monitoring and tracking progress; and, public participation coordinated through the RAC. In the Niagara River RAP, priority activities and strategies address: stream water. quality; inactive hazardous waste site remediation; contaminated river sediments; point source control programs; fish and wildlife habitat improvements; and, enhanced environmental monitoring activities.

**RAP Status and Progress:** A Niagara River RAP public information video was completed by the RAC members. This accomplishment of a video by the RAC was based on earlier international cooperation in the development of a slide show. A major recent activity benefiting the RAP is: the Bond Act funding of a \$1 million habitat restoration project for Strawberry Island. The International Joint Commission has completed the RAP Status Assessment for the Niagara River Area of Concern. The findings and recommendations report notes significant progress in documentation for the Niagara River under the Niagara River Toxics Management Plan identifies challenges and opportunities for the binational community to accomplish RAP goals under the Great Lakes Water Quality Agreement.

**RAP Outlook For The U.S. Side:** Implementation of the Niagara River RAP is a continuous improvement process that include periodic updates and improvements as knowledge of the use impairments, sources and the effectiveness of remedial actions increases. Remedial actions will be evaluated and coordinated as to the impacts on restoration of beneficial uses. Within the AOC and watershed, a number of studies and assessments will continue to be priorities. These include fish and wildlife consumption restrictions, habitat evaluation, sediment investigation and contaminant trackdown. Restoring and maintaining an improved quality of life in the ecosystem of the Niagara River and its watershed is the goal.

#### **11.3.1.2 Niagara River (Canada Side)**

**Environmental Issues:** Much of the impact to the river is from the U.S. side, specifically from past industrial management practices. Efforts on the US side are addressing these issues. Most of the environmental issues on the Canadian side of the river are associated with non-point sources within the rural watersheds of the Niagara-Welland basin. Former industrial activities

have resulted in contaminated sediment in the Welland River (remediated) and Lyons Creek (strategy under development). Pesticide use, nutrient runoff, wetland and habitat loss, riparian zone impacts and the health of fisheries all remain concerns

**Impairments:** There are seven impaired beneficial uses in the Canadian portion of the AOC. These include restrictions on fish consumption, degradation of fish populations, bird or animal deformities and reproductive problems, degradation of benthos, eutrophication, beach closings, and loss of fish and wildlife habitat. The status of the following four impairments requires further assessment: restrictions on wildlife consumption, degradation of wildlife populations, fish tumours and deformities, degradation of phyto/zooplankton populations. Taste and odor problems persist in drinking water, however, this impairment is not due to local sources.

**RAP Structure:** Through an agreement signed in 1999, the Niagara Peninsula Conservation Authority (NPCA) has assumed responsibility for coordinating the implementation of the RAP and has developed an Implementation Annex that provides a practical strategy for doing this.

**RAP Status and Progress:** A rural watershed heritage strategy is being implemented for the Welland River. Actions have included the planting of more than 96,000 trees, rehabilitation of 10.5 hectares of wetland habitat, the installation of over 18 kilometres of fencing to protect riparian habitat adjacent to watercourses and the reduction of phosphorus entering local watercourses by more than 1,500 kilograms per year. By 2002, 135 projects were completed. These activities to date have increased forest cover on 90 hectares of land, restored 21 kilometres of riparian habitat and seven hectares of wetlands. The NPCA has also been actively involved with local landowners since 1994 to improve water quality in streams. Nutrient and bacterial loadings have been reduced through livestock fencing and manure storage projects. Through a grant program, the NPCA will provide incentives to local landowners within the Niagara-Welland basin in order to foster best management practices for agriculture, create habitat and protect ecologically sensitive land.

Urban stormwater and combined sewer overflows (CSOs) are also being addressed. In the City of Niagara Falls, 4300 urban homeowners were asked to disconnect their roof downspouts. The City also continues to actively promote water conservation through a newly developed corporate water conservation strategy and is now proceeding with full scale implementation of innovative technology for High Rate Treatment of combined sewer overflows. Another large scale initiative is an ongoing program to separate domestic and storm sewers to reduce combined sewer overflow events. Fort Erie and Welland have also initiated projects intended to reduce combined sewer overflows.

The extensive loss of fish and wildlife habitat in the AOC is being addressed by the NPCA and the Niagara Restoration Council. Habitat restoration is ongoing and significant progress has been made towards meeting delisting criteria. The Niagara River corridor was named as a binationally Important Bird Area (IBA) in 1996. A conservation plan for this IBA is being developed through a coalition of interested groups. The Niagara Restoration Council is undertaking a project to remove all barriers to fish passage in the watersheds within the Niagara AOC. In 2001, all barriers to fish passage were identified, mapped and classified by type and size. It is anticipated that the majority of barriers will be removed or mitigated by 2005, thus making hundreds of kilometres of upstream fish habitat available to spawning fish.

Progress has also been made in addressing contaminated sediments. Based on the

contaminated sediments sites identified in the Stage 2 Niagara River RAP report, the NPCA has submitted a management proposal for all known sites. In 1995, approximately 10,000 cubic metres of contaminated sediments were remediated in a section of the Welland River adjacent to Atlas Specialty Steels. Biological sampling since the sediments were remediated indicates that this section of the river is recovering as anticipated. A sediment management strategy is being developed for Lyons Creek.

Very substantial progress has also been made jointly with the U.S., especially in reducing toxic chemicals. Monitoring results in the Niagara River show that the concentrations for most of the 18 priority toxics targeted by the NRTMP have been significantly reduced, in many cases by more than 50 percent. On the Canadian side, monitoring results for point sources between 1986 and 1995 show loading reductions of 99 percent for the 18 chemicals of concern.

***Delisting Outlook For The Canadian Side:*** Full implementation of remedial actions in the Niagara River AOC will require many years and is contingent on federal, provincial and/or municipal funding availability and in some cases private sector involvement. MOE has lead responsibility for the RAP and Environment Canada and the Niagara Peninsula Conservation Authority will continue to work in partnership as they move towards delisting. Remediation of CSO discharges is essential to complete RAP implementation and several large infrastructure needs have been identified. Infrastructure costs are estimated at \$26M for high rate treatment of combined sewer overflows for the cities of Niagara Falls and Welland. Developing and implementing a contaminated sediment strategy for Lyons Creek will also require significant funding.

### **11.3.2 St. Lawrence River Area of Concern**

The St. Lawrence River drains the Great Lakes and is among the largest rivers in the world. The AOC is an 80 kilometre stretch of the river that extends upstream from the Moses-Saunders power dam in Cornwall, Ontario, downstream to the eastern outlet of Lake St. Francis in Quebec. This AOC is a complex jurisdictional area involving Canada, the United States, Ontario, Quebec, New York State and Mohawks of Akwesasne interests. Separate RAPs were developed for the Canadian (Cornwall) and U.S. (Massena) sides of the St. Lawrence River, however a binational joint Problem Statement document was prepared in 1994.

#### **11.3.2.1 St. Lawrence River at Massena, New York**

***Background:*** NYSDEC began development of the St. Lawrence River at Massena RAP in 1988. This process is assisted by the Massena Remedial Advisory Committee (RAC) which consists of members from industry, local government, environmental groups, sporting interests, academia, and business. The Stage 1 report was completed in 1990 and identifies use impairments, their causes, and sources. The Stage 2 RAP, completed in 1991, includes the development of remedial strategies to restore water quality and beneficial uses of the tributary rivers and the St. Lawrence River and to eliminate adverse impacts to the AOC from sources of pollutants at major local hazardous waste sites as well as from other sources within the Area of Concern watershed. A comprehensive RAP Update document was published in April 1995 which established a format to identify remedial strategies and track progress.

***Impairments:*** The waters and river bottoms of the AOC have been impacted by industrial discharges sources including Lake Ontario, municipal treatment facilities, atmospheric deposition, non-point source discharges and physical disturbances as a result of the power dam and seaway construction. The Stage 1 RAP identified industry as a major source of contaminants

to the AOC. Stage 1 also confirmed two use impairments (fish consumption advisories, and fish habitat) and identified five other use impairments that will require further evaluation. A "transboundary impacts" use impairment indicator was added to the standard fourteen indicators developed by the International Joint Commission's (IJC) listing/delisting guidelines. A transboundary impact assessment is needed for a complete evaluation of this AOC.

**RAP Structure:** Because of the international aspect of this RAP, an evaluation of the possible transboundary effects associated with the downstream interests and jurisdictions (Canadian, Provincial, and Mohawk Nation at Akwesasne) is an important consideration for this binational connecting channel Area of Concern. The St. Regis Mohawk Tribe has received New York State Environmental Bond Act funding to implement an erosion and nonpoint source pollution protection project. As New York State has taken the lead to address the Massena area impairments, Canadian jurisdictions have taken responsibility for RAP implementation concerning the Ontario and Quebec side of the river.

**RAP Status and Progress:** Priority strategies involve completing the land-based and contaminated river sediment remediation, conducting further investigations, and reassessing use impairment status in light of remedial progress and additional study results. The latest RAP Status Report published in May 2000, identifies remedial progress and includes delisting criteria for the AOC. Efforts are underway to produce a Status Report update in 2004. Significant progress has been made with land-based remediation at the ALCOA (west), Reynolds Metals (now ALCOA east), and General Motors industrial sites, as well as with the contaminated sediment removal in the St. Lawrence River at General Motors and Reynolds Metals. Major dredging of the St. Lawrence River at the Reynolds Metals site was conducted in 2001. Cleanup requirements now provide for contaminated dredged materials to be removed from the property instead of receiving on-site treatment and disposal.

**RAP Outlook For The U.S. Side:** In addition to the Stage 1 Binational Summary document, International cooperation has been fostered by producing a joint monitoring statement and the current development of delisting criteria by each RAP's advisory committees. An annual ecosystem conference is conducted each spring to maintain information sharing for this important St. Lawrence River area. Significant funding opportunities are under development for the construction of the St. Lawrence Aquarium and Ecological Center (SLAEC) as well as an accompanying Great Rivers Institute (GRI). Further, the International Joint Commission has completed a RAP Status Assessment of the Area of Concern. The document notes the accomplishments in the AOC and makes recommendations to further address the use impairments including contaminated sediments. The Massena RAC is currently focusing on the identification of endpoints for establishing delisting criteria and goals. Following the completion of remedial activities, a reassessment of the use impairment indicators and the causes and sources is needed.

#### **11.3.2.2 St. Lawrence River at Cornwall, Ontario**

**Environmental Issues:** The Cornwall waterfront has been the site of industrial activities for more than 100 years. Although many of the contaminant sources have been eliminated, historical inputs have continued to impact the aquatic environment as contaminated sediment and organisms transfer and cycle mercury and other metals. Local contaminant sources include industrial and municipal discharges, and diffuse sources such as urban stormwater and agricultural runoff. Contaminants also enter the AOC from upstream and from the Great Lakes via Lake Ontario and from air deposition. Land use practices, shipping and the extensive shoreline and water flow alteration that resulted from the construction of the St. Lawrence

Seaway, continue to alter the natural ecosystem. Major environmental issues of concern in the area include:

- . • mercury, PCBs and other contaminants in water, sediments and fish;
- . • fish and wildlife health effects related to contaminants;
- . • bacterial contamination leading to beach closings;
- . • habitat destruction and degradation;
- . • excessive growth of nuisance aquatic plants;
- . • exotic species.

**Impairments:** The RAP has identified seven impaired beneficial uses in the Canadian portion of the AOC. Three more, fish tumours and other deformities, bird and animal deformities, and degradation of plankton populations require further assessment.

**RAP Structure:** There were 64 RAP recommendations for improving the aquatic environmental conditions in the AOC most of which have been implemented or are in progress. The St. Lawrence River Restoration Council provides the local lead for RAP implementation. The group has representatives from Environment Canada, the Ontario Ministry of the Environment, the Ontario Ministry of Natural Resources, the Mohawk Council of Akwesasne, local municipalities, environmental groups, the Raisin Region Conservation Authority (RRCA) and other groups.

**RAP Status and Progress:** Since 1990, the GLSF has provided over \$2.3 million towards 25 restoration projects in the AOC. Partnerships have achieved over \$5.6 million in direct partner funding including \$3.8 million for urban infrastructure improvements, \$1.8 million in-kind contributions and citizen participation valued at \$900,000.

There have been several notable implementation actions in the St. Lawrence AOC:

- . • The City of Cornwall's Fly Creek Stormwater pond has been retrofitted to reduce contaminant loads to the river.
- . • There are no longer any significant sources of mercury or other heavy metals to the river in the Cornwall area.
- . • The littoral zone habitat strategy has been implemented along an eight kilometre stretch on the Cornwall waterfront. Sixteen projects were completed between 1994 and 2002. Preliminary monitoring indicates a dramatic increase in fish abundance and diversity.
- . • The first phase of the Cooper Marsh Enhancement Project has been completed. The result is an increase the amount of spawning and nursery habitat for fish and breeding habitat for migratory birds.

Outstanding issues in the St. Lawrence AOC include: the development of a sediment management strategy; assessing the status of zooplankton and phytoplankton populations; the restoration and protection of fish and wildlife habitat; a review of sources and levels of bacterial pollution in waters used for body contact recreation.

Cornwall Sediment Strategy - Environment Canada and the Ontario Ministry of the Environment are currently working in partnership with local municipalities, the Mohawks of Akwesasne, industry and environmental groups to develop a strategy for managing contaminated sediment in the AOC.

Fish Habitat Management Plan - Activities under this project will include research and compilation of existing information on fish and wildlife species, habitat types, shoreline alteration, nearshore currents, erosion and water quality into a GIS-based database to identify and prioritize data needs.

Municipal Wastewater Issues - Candidate projects include: 1) facilitating upgrades of smaller, downstream sewage treatment plants by providing technical assistance or assistance in obtaining infrastructure financing; 2) the completion of pollution prevention and control plans to manage stormwater and combined sewer overflows for communities within the AOC; 3) assisting small and rural communities in the AOC address issues of potential water contamination caused by inadequate septic systems.

***Delisting Outlook:*** When a sediment management plan is developed and implemented, the RAP will be well on its way towards meeting its goals. A targeted approach over the next few years to complete all non-point source and habitat projects, and a dedicated effort to put mechanisms in place to maintain environmental quality is critical. Municipal infrastructure upgrades will also be required to address the management of sewage and wastewater in some communities within the AOC. When RAP implementation actions have been successfully completed, it will be imperative to monitor the recovery. This may be one AOC which becomes an Area in Recovery while the environment needs time to respond to the actions that have taken place.

## **11.4 U.S. Areas of Concern**

### **11.4.1 Eighteenmile Creek**

The Eighteenmile Creek Area of Concern (AOC) is located in the town of Newfane, Niagara County, in western New York state. The creek flows from the south and discharges into Lake Ontario, approximately 18 miles east of the mouth of the Niagara River, through Olcott Harbor. The AOC includes Olcott Harbor at the mouth of the creek and extends upstream to the farthest point at which backwater conditions exist during Lake Ontario's highest monthly average lake level. This point is just downstream of the Burt Dam located about two miles from the harbor.

***Background and RAP Structure:*** Development of the Eighteenmile Creek RAP was initiated in March 1994. The Area of Concern includes Olcott Harbor on Lake Ontario and Eighteenmile Creek upstream to a point just below the Burt Dam in the Hamlet of Burt. A combined final Stage 1 and Stage 2 RAP document was completed and published in August 1997 by NYSDEC in cooperation with the Eighteenmile Creek Remedial Advisory Committee. Efforts to complete this publication included conducting two RAP review workshops, public information and comment meetings, field trips, as well as numerous committee meetings

***Impairments:*** Past industrial and municipal waste disposal practices have contributed to the causes of use impairments in Eighteenmile Creek. Fish consumption restrictions exist because of PCBs and dioxins found in fish flesh. This is linked to Lake Ontario. The health of the benthos has been impaired by PCBs and metals in sediments. Bird and animal health is likely impaired by the PCBs, dioxins, DDT and its metabolites, and dieldrin found in fish flesh. PCB and metal contamination prevents open lake disposal of dredged sediment material. Additional investigations need to be conducted concerning fish and wildlife populations and the presence of fish tumors or other deformities.

***RAP Status and Progress:*** A RAP Status Report document was completed in June 2001. An investigative study of the plankton community was conducted by SUNY College at Brockport under an EPA grant. The report was published and distributed. The results of the Plankton Study establish that the plankton use impairment indicator is not impaired. A presentation by the author was provided to the Remedial Advisory Committee in June 2002. The upgrading and addition of

wastewater treatment facilities at Lockport is to be funded by the New York State Environmental Bond Act.

**RAP Outlook:** At an October 2003 RAP Workshop, Remedial Advisory Committee members decided to explore opportunities on how the committee can better address RAP implementation in conjunction with DEC and EPA. Currently, RAP activities are focused on continuing the investigation and assessment of creek sediments; evaluating possible sources of PCBs and other contaminants in the watershed; remediating inactive hazardous waste sites; correcting combined sewer overflows (CSOs); and, continuing surveillance activities. A recent USACE grant award to Niagara County Dept. of Planning, Development, and Tourism focuses various project components on habitat restoration and watershed management to benefit the AOC. The projects provide for streambank stability, sediment assessment, best management practices, and community outreach. A separate New York State Department of State grant will develop and implement a monitoring plan to document restoration activities. Other RAP implementation addresses: continued trackdown sampling for PCBs; assessment and remedial considerations for sediment sites such as the Barge Canal at Lockport and the William Street Island; an evaluation of potential pollutant sources within the sewer system in the City of Lockport; and, continued fish flesh analyses for contamination.

#### **11.4.2 Rochester Embayment**

The Rochester Embayment is an area of Lake Ontario formed by the indentation of the Monroe County (New York) shoreline between Bogus Point in the town of Parma and Nine Mile Point in the town of Webster, both in Monroe County. The northern boundary of the embayment is delineated by the straight line between these two points. The southern boundary includes approximately 9.6 km (6 miles) of the Genesee River that is influenced by lake levels, from the river's mouth to the Lower Falls. The drainage area of the embayment is more than 7,770<sup>2</sup> km<sup>2</sup> (3,000 square miles) in area. This area consists of the entire Genesee River Basin and parts of two other drainage basins; the easternmost area of the Lake Ontario West Basin and the westernmost area of the Lake Ontario Central Basin.

**Background and RAP Structure:** Starting October 2003, the Monroe County Department of Health received EPA funding to provide RAP management. The focus is on research, priority project implementation, and delisting considerations. A number of initiatives need RAP reporting and coordination including Monroe County's source trackdown and CSO abatement, and the funded studies of local aquatic conditions. Monroe County is to develop RAP related programs and seek funding for RAP gaps and needs to address watershed improvements including nonpoint sources, habitat restoration and watershed openspace. The Monroe County Water Quality Management Advisory Committee (WQMAC) and its subcommittees provide advice and oversight on general water quality, public participation, and RAP implementation activities. Further, the Monroe County Water Quality Coordinating Committee (WQCC), continues to provide guidance contributing to RAP progress. The Stage 1 document was completed in August 1993.

**Impairments:** Twelve of the fourteen IJC use impairments were identified as existing in the Area of Concern. The development of the Stage 2 RAP was completed and published in September 1997. The Area of Concern includes a 35 sq.mi. portion of Lake Ontario and a six mile reach of the lower Genesee River. RAP remedial measures address lawn care practices, wetland education, pollution prevention for auto recyclers and dentists, volunteer stream and wetland monitoring programs, advancement of phosphorus removal at small wastewater

treatment facilities, and a streambank erosion assessment program.

**RAP Status and Progress:** Watershed planning projects are in various phases of implementation. A Stormwater Coalition was formed to plan for compliance with new stormwater regulations. Completed projects include several point and nonpoint source pollution abatement projects, extensive combined sewer overflow abatement, and a mercury pollution prevention project. Publications include manuals for hospital mercury pollution prevention, auto recyclers, volunteer stream monitoring, and volunteer wetland monitoring; biannual newsletter; two watershed plans; a watershed developers packet; and a report on a water quality opinion survey.

**RAP Outlook:** Delisting criteria and monitoring methods for use impairments have been developed. Grants have been received for hyperspectral imaging of algae beds along the Lake Ontario shoreline, a study of the benthic health of the Rochester Embayment, and further development of monitoring methods for toxic-related use impairments. The RAP reporting was updated by a Status Report update in March 2001 and a RAP Addendum at the end of 2002. To address algae and nutrients, Monroe County sponsored a "Lake Ontario Algae Cause and Solution Workshop" in 2002 and later participated in a conference entitled "New York's North Coast: A Troubled Coastline". Reorganization of RAP oversight and sub-committees by Monroe County is likely now that the EPA grant has been received for RAP coordination in 2003. A Water Education Collaborative exists to coordinate all public participation activities regarding water quality in the County. The US Army Corps of Engineers has been proposed to assist funding a sediment transport study led by SUNY at Geneseo.

#### 11.4.3 Oswego River

The Oswego River/Harbor Area of Concern (AOC) is located on the southeastern shore of Lake Ontario and is centered in the City of Oswego, New York. The AOC includes the harbor area and the lower segment of the Oswego River up to the Varick power dam. The harbor itself is characterized as a multiple-use resource and over 1.2 million people live in the drainage basin. The Oswego River watershed includes the Finger Lakes, industries, municipalities, and extensive areas of farmland and forest that expand an area of over 5,000 square miles. The Oswego River is second only to the Niagara River in size as a tributary to Lake Ontario. Upstream pollutants are known to have traveled through the river and harbor, and impacted the Lake Ontario ecosystem, thereby forming the basis for the Area of Concern designation.

**Background and RAP Structure:** The Oswego River RAP process began in 1987 and the Stage 1 RAP was completed in 1990. Use impairments that were observed involved fish habitat and population loss, fish consumption restrictions, and undesirable algae. The impairments were linked to Lake Ontario and upstream sources. The Stage 2 RAP, completed in 1991, identified remedial strategy activities necessary to restore water quality in the lower river and harbor and to eliminate adverse impacts to Lake Ontario from sources of pollutants carried by the Oswego River. The advisory committee consisted of a multi-stakeholder group included persons from industry, environmental organizations, government agencies, academia, and private interests.

**RAP Status and Progress:** A comprehensive RAP Update document was published in December 1996 that established a format to identify remedial strategies and track progress. Because of the RAP, additional water quality and sediment investigations, as well as a fish pathology study, were performed in the Oswego River AOC. Significant upstream hazardous waste site remediation and point source pollution control measures have been accomplished. New York State Environmental Bond Act funding has assisted the City of Oswego in addressing

sewer infiltration and overflows. A two-day technical workshop was conducted in June 1998 to evaluate study results and assess use impairment impacts and needs. A Workshop Summary and RAP Update report was published in May 1999 that documents workshop proceedings, study results, and RAP implementation strategies. AOC delisting criteria were developed based on IJC and EPA guidance. In May 2002, a draft Stage 3- Delisting Proposal was completed by NYSDEC and the Remedial Advisory Committee (RAC). A “power point” presentation (also developed by NYSDEC and the RAC) on the delisting of the AOC was delivered four times in the local area. Group meetings (some open to the public) addressed by the presentations included: the RAP Remedial Advisory Committee, the Great Lakes Basin Advisory Council, the Oswego County Water Quality Coordinating Committee, the Oswego County Environmental Management Council, and the Oswego County Soil and Water Conservation District.

***Beneficial Use Status and RAP Outlook:*** Resolution of the Oswego RAP use impairments is based on no contamination source specific to the AOC and a 40 year Federal Energy Regulatory Commission (FERC) power dam license. The delisting strategy relies on handing off the responsibility for resolving the larger (non-AOC) concerns to the appropriate oversight agency programs. Because the fish consumption advisory is lakewide and not specific to the AOC, it is to be addressed by the Lake Ontario Lakewide Management Plan. The fish habitat and population concerns are to be addressed by the FERC license. This is consistent with federal delisting criteria and supported by NYSDEC’s Priority Waterbody Listing (PWL) in conjunction with the 303(d) listing, the new Watershed Restoration and Protection Strategies (WRAPS) initiative, and the Fish Health Advisory. Together, these responsible and appropriate agency programs will address the non-AOC sources and larger watershed concerns that are beyond the RAP scope. The Stage 3- Delisting Proposal has completed internal NYSDEC and other state agency review is now under further review by IJC, USEPA Region 2, and the Great Lakes National Program Office (GLNPO). A formal public comment period is planned. Delisting comments are to be incorporated with a responsiveness summary in a final delisting document. NYSDEC will then seek formal delisting action with EPA Region 2 through the United States Department of State. With the delisting proposal and limited resources for further activity, members of the Oswego RAC decided to discontinue regular meetings and the committee effective September 6, 2002. Certificates of Appreciation have been awarded to the RAC members, two of which are original members participating in the process since 1987. Committee members remain available for future consultation and necessary action to complete formal delisting.

## **11.5 Canada Areas of Concern**

### **11.5.1 Hamilton Harbour**

Hamilton Harbour is a 2,150 hectare embayment located at the western tip of Lake Ontario. The Area of Concern includes the harbour, Cootes Paradise wetland and open water, and the surrounding watershed drained by three main tributaries: Grindstone Creek; Red Hill Creek; and Spencer Creek, covering a total of 50,000 hectares. The urban population, which includes Hamilton, Burlington, Stoney Creek, Dundas and Ancaster, is growing rapidly and now is approaching 700,000.

***Environmental Issues:*** The ecosystem of the harbour reflects its natural conditions (a small water body with a long retention time), a high volume of sewage treatment plant discharges, large scale industrial activities and extensive land use changes. The water and sediments are contaminated by metals, pesticides, PCBs, and PAHs. The sediments of Randle Reef and industrial boat slips are highly contaminated with PAHs and have an adverse effect on the local ecosystem. In addition, the shoreline has been radically transformed with 75 percent of wetlands

eliminated and 25 percent of the harbour filled in. Habitat for fish and wildlife is greatly reduced and resident species are exposed to toxic contaminants. The water quality of the harbour continues to be characterized by poor water clarity, low oxygen levels, high nutrient levels and high bacterial levels.

**Impairments:** Hamilton Harbour AOC has twelve beneficial use impairments: restrictions on fish consumption; degradation of fish and wildlife populations; fish tumours; animal (snapping turtle) deformities; degradation of benthos; restrictions on dredging activities; eutrophication and undesirable algae; beach closures; degradation of aesthetics; added costs to agriculture and industry; degradation of phyto/zooplankton populations; and the loss of fish and wildlife habitat.

**RAP Structure:** In 1991, stakeholders organized into two distinct groups: the Bay Area Restoration Council (BARC) and the Bay Area Implementation Team (BAIT). BARC maintains a balanced voice for all stakeholders of the harbour, performs a watchdog role by monitoring RAP progress, and keeps the public informed. The BAIT is composed of the major implementors of the RAP. The RAP Office has recently completed a RAP Stage 2 Update that provides the current status of the RAP and identifies recommendations from the public. The Update was reviewed by the public, approved by the governments and sent to the IJC in 2003.

**RAP Status and Progress:** Very positive, visible progress has been made in restoring fish and wildlife habitat. Work at six sites has resulted in: restoration of 340 hectares of habitat; secured habitat for 670 nesting pairs of Caspian and common terns; considerable shoreline rehabilitation; the return of amphibians and reptiles at Cootes Paradise, and increased diversity of native plants and waterfowl partially due to a successful program of carp exclusion. Furthermore, as a result of the Hamilton Harbour Watershed Stewardship Project, over 6500 hectares of land have been protected since 1994 through verbal stewardship agreements in the Spencer and Grindstone Creek watersheds including 120 kilometres of riparian habitat and 2900 hectares of significant wetland and upland habitat.

Sediment remediation remains one of the priorities for Environment Canada in this AOC. Efforts will continue on Randle Reef and the Dofasco boat slip to clean up known sediment hotspots. Environment Canada is working with its government and industrial partners on the Randle Reef Sediment Remediation Project to dredge and contain approximately 500,000 cubic metres of contaminated sediment from Hamilton Harbour.

Progress has also been made on improving water quality by reducing the phosphorus, chlorophyll and bacteria levels in the harbour. Reduction of bacterial contamination was achieved by the installation of CSO tanks which store and channel excess storm and sanitary sewage to the Woodward Wastewater Treatment Plant. Further reductions have resulted from low-cost optimization techniques introduced at Halton's Skyway Wastewater Treatment Plant. As a result of these improvements, two beaches were opened in 1993 after a 50-year long swimming prohibition in Hamilton Harbour.

Another notable achievement of the RAP has been the substantial increase in public access to the shoreline and watershed. The Hamilton Harbour Waterfront Trail was opened in 2000 and has increased access to the shoreline to 21 percent. This is a considerable achievement considering that there was essentially no public access to the harbour when the RAP began.

**Delisting Outlook:** The Hamilton Harbour AOC cannot be delisted in the short-term since many

of the issues affecting the harbour require significant capital costs and 10-15 years or longer to complete. The total funding required between now and 2015 to achieve delisting of the AOC has been estimated at \$650M. This includes \$543M for upgrades to Hamilton and Halton's Waste Water Treatment Plants and the Hamilton CSOs to meet RAP water quality targets. The other major capital cost is to remediate PAH contaminated sediments in the area of Randle Reef estimated at \$31M. Smaller capital costs are: \$9M for City of Hamilton water metering; \$9M for further creation and maintenance of fish and wildlife habitat; and an additional \$10M for recreational trail development of and enhancement of lands recently transferred from the Port Authority to the City of Hamilton.

### **11.5.2 Toronto and Region**

The Toronto and Region AOC extends from the Rouge River in the east to the Etobicoke Creek in the west and includes six tributary watersheds which drain into Lake Ontario: Etobicoke Creek, Mimico Creek, Humber River, Don River, Highland Creek and Rouge River. The drainage basin of these watersheds covers 2 000 square kilometres, and over 40 percent of the AOC is still classified as rural. The AOC includes the City of Toronto and encompasses 11 other municipal jurisdictions within the neighbouring Regions of Peel and York. More than four million people reside in the Greater Toronto Area.

***Environmental Issues:*** Over the years, urban growth in the AOC has resulted in extensive physical restructuring of the shorelines, watersheds and landscapes. In the process, wetlands, forests, fish and wildlife habitat in the urbanized portion of the AOC were lost. Most of the stormwater in the city is discharged into rivers, creeks and Lake Ontario. The discharge contains high levels of bacteria and nutrients, heavy metal and organic chemical contamination, and this remains the single biggest cause of a degraded aquatic environment. In addition, the many industries of the region discharge into municipal sewage systems which are not designed to removed chemical contaminants. Agricultural non-point sources of sediments, nutrients and pesticides contribute to the loads measured at the river mouths.

***Impairments:*** The RAP has designated the following eight beneficial uses of the waters of the AOC as impaired: fish consumption restrictions, degraded fish and wildlife populations, degradation of benthos, restrictions on dredging, elevated nutrient levels, beach closures, degradation of aesthetics, and habitat loss. It has also designated the following three as requiring further assessment: fish tumours or other deformities, bird or animal deformities or reproductive problems, degradation of phyto/zooplankton populations.

***RAP Structure:*** A five year Memorandum of Understanding (MOU) between Environment Canada, the Ontario Ministry of the Environment, and the Toronto and Region Conservation Authority (TRCA) was signed in 2002. The TRCA is now taking the lead in the implementation of the RAP and will develop a five year plan. Through the MOU, the RAP is continuing to support the various watershed alliances and councils that are working to improve key watersheds.

***RAP Status and Progress:*** There have been notable successes in the Toronto and Region AOC. Bacterial conditions have improved in the Eastern Beaches with the installation of two stormwater detention tanks that hold the water until it can be treated at the Ashbridge's Bay STP. Construction of a detention tunnel and treatment facility for combined sewer/stormwater has partly relieved the bacterial problems at the Western Beaches. In addition, various innovative and cost effective stormwater treatment systems such as exfiltration and flow balancing systems, were installed in the City of Toronto.

Other promising signs of progress include: removal of stream barriers returning historical access for salmon to the upper reaches of the Don River; the creation of 20 hectares of new waterfront fish and wildlife habitats during the 1990s; the presence of rainbow trout in the East Humber; and the first Ontario nesting of Canvasback Ducks.

Most of the causes of environmental degradation, however, remain in place--the Toronto Region loses 24 hectares of land to development every day. Urbanization and the large population base of the AOC are the largest challenge to restore the beneficial uses which are impaired.

Implementation of the RAP requires a long-term commitment, and one important component of this commitment will be the City of Toronto's Wet Weather Flow Management Master Plan (WWFMMP). This plan is based on the hierarchy of source control, pollution prevention and infrastructure improvement, and its implementation will require a paradigm shift in wastewater management. The Master Plan will identify the most effective means to introduce controls into the stormwater regime (both remedial and preventative) and will take advantage of new technologies for sewage/stormwater treatment. It focuses on swimmable waterfront beaches; eliminating discharges of CSOs; protection against basement flooding and meeting the province's CSO policy; protection of the City's infrastructure from stream erosion; restoration of degraded local streams and improvement of stream water quality; reducing the extent of algal growth along the waterfront and in streams; and the restoration of aquatic habitat.

Another important component is the revitalization of the Toronto Waterfront. This will significantly rehabilitate fish and wildlife habitats and populations if it is undertaken in the context of ecological sustainability. The Toronto Waterfront Revitalization Corporation has made a commitment to sustainability. The RAP hopes to work with the Corporation and other partners to further incorporate the benefits of aquatic and terrestrial ecosystem restoration in the overall revitalization plan.

**Delisting Outlook:** Implementation of the Toronto and Region RAP will be a decades-long undertaking. The City of Toronto is now considering a 100 year plan for the control of water pollution sources. The preliminary projection of capital costs for implementation of the wet weather flow recommendations of the Toronto RAP (excluding industry) is \$1 billion over a 25 year period.

The RAP program is only one participant in a complex of agencies, large scale plans and external forces affecting Canada's largest city. The challenge facing the RAP and its management is to coordinate participation from others in achieving RAP goals while not being subsumed by larger scale economic activities and social trends.

### **11.5.3 Port Hope Harbour**

Port Hope Harbour is located at the mouth of the Ganaraska River on the north shore of Lake Ontario, and 100 kilometres east of Toronto. The Town of Port Hope is located north of the Harbour. The AOC includes the harbour area and extends 300 metres from the lower Ganaraska River to the confluence area bounded by breakwalls.

**Environmental Issues:** Radioactive wastes were generated at a refinery (Eldorado Nuclear Limited) in Port Hope beginning in 1933. Low level radioactive wastes were initially stockpiled or disposed of in ravines and vacant lots in Port Hope during the 1930s. During the 1940s and

50s low level radioactive wastes were also placed in waste management facilities in two municipalities just outside of Port Hope. There is an estimated total of 1 to 1.5 million cubic metres of low-level radioactive waste and contaminated soils in the Port Hope area. The immediate health and safety risks have been assessed as minimal.

Within the harbour, most of the contaminant input occurred between 1933 and 1953 resulting from operations and waste management practices of the Eldorado refinery Process wastes were stored at the site and it is likely that surface runoff was the route of contamination for the harbour. An estimated 85,000-90,000 cubic metres of sediment containing low-level radioactive material is located within the turning basin and west slip of the harbour. Contaminants include uranium and thorium series radionuclides, heavy metals and PCBs.

In recent years, leaching of radioactive wastes and overflows at drainage ponds has occurred during heaving rains and has resulted in contamination entering the groundwater and Lake Ontario.

**Impairments:** Port Hope was initially designated as an AOC due to restrictions placed on dredging activities. There have been no other impaired beneficial uses identified.

**Implementation Structure:** Previously, Environment Canada was responsible for coordination of the Port Hope RAP. However, remediation of Port Hope Harbour is now following a different process, with progress dependant upon the selection and approval of an appropriate waste facility. Natural Resources Canada is working in cooperation with Environment Canada to develop the remediation of the Port Hope AOC within the larger low-level radioactive waste clean up in the Port Hope area.

In 1982 the federal government created the Low-Level Radioactive Waste Management Office (LLRWMO) to assume the responsibility of managing historic wastes in Port Hope and elsewhere in Canada. The office in Port Hope has assisted the RAP in developing costs estimates for cleanup, handles public information requests and offers assistance to residents to assess and remediate their properties. The LLRWMO has been designated by Natural Resources Canada as the proponent of the Port Hope Area Initiative.

**Implementation Status and Progress:** In March 2001, the Government of Canada (represented by Natural Resources Canada) and the three communities of the Town of Port Hope, the Township of Port Hope and the Municipality of Clarington, entered into a legal agreement for the clean up and long term management of local historic low-level radioactive wastes, including wastes found within Port Hope Harbour. The legal agreement is based on community-developed concepts for the local, long-term management of the wastes.

With the signing of the legal agreement, the Government of Canada began a 10 year, \$260 million dollar plan called The Port Hope Area Initiative, to develop and implement a long term solution. Since that time, the Town of Port Hope and the Township of Port Hope have been amalgamated into one community, the Municipality of Port Hope.

Implementation of the legal agreement for the Port Hope clean up is now underway. The Low-Level Radioactive Waste Management Office (LLRWMO) is seeking the necessary approvals for development of management facilities for the long-term management of the wastes from the

Port Hope area, including those found within Port Hope Harbour..

**Delisting Outlook:** Natural Resources Canada is the lead for the clean up of all historic radioactive wastes found within the local municipalities, including those within Port Hope Harbour, and will work with Environment Canada to ensure that the requirements of the RAP are met. The development of low-level radioactive waste facilities will require licenses from the Canadian Nuclear Safety Commission and are subject to the Canadian Environmental Assessment Act. It is expected that the regulatory review process will be completed by 2006. An additional five years will be required for the physical clean up and emplacement of wastes in the newly constructed long-term management facilities.

#### **11.5.4 Bay of Quinte**

The Bay of Quinte is a narrow z-shaped inlet, 100 kilometres in length, located on the north shore of Lake Ontario's eastern basin. The Area of Concern contains the Bay and its tributaries and the drainage basin is the largest in Southern Ontario (17,520 square kilometers). The Trent River is the largest tributary entering the Bay of Quinte, influencing its water quality and water flow regimes. Parks Canada manages the Trent-Severn Waterway, of which the Trent River is a part.

**Environmental Issues:** The Bay of Quinte is a unique ecosystem within the Lake Ontario basin. Shallow, and flushed up to 10 times per year, in some respects the Bay behaves like a riverine estuary. The Bay has historically supported a large sportfishery based primarily on walleye and valued at over \$3 million dollars annually. In recent years the ecosystem of the Bay has been greatly influenced by invasive species, such as the zebra mussel, which, by ingesting plankton, have diverted this food source from fish species. Further, the aquatic environment has been altered decreased nutrient loadings, all of which has impacted the sustainability of the walleye.

The shoreline of the Bay contains 22 provincially significant wetlands, some of which are under pressure from urban development in the cities of Belleville, Trenton and the Towns of Napanee, Picton and Deseronto. Four First Nations are also located within the drainage basin.

**Impairments:** Nutrient loadings from sewage treatment plants and surface water runoff from agricultural and rural lands lead to cultural eutrophication, which was one of the main reasons why the Bay was listed as an Area of Concern. The Remedial Action Plan for the Bay identifies 10 Impaired Beneficial Uses that result from 4 main issues: i) excessive nutrients, ii) habitat loss (particularly coastal wetlands), iii) contaminated sediment from historical mining and industrial activities, and, iv) bacterial contamination from sewage treatment plants, stormwater discharge and agricultural runoff (which lead to beach closures). In addition, the incidence of fish tumours and other deformities is an issue which requires further assessment

**RAP Structure:** In 1997, a Restoration Council, with membership from Federal and Provincial Government agencies (EC, MOE, DFO, MNR, OMAF), local conservation authorities and Quinte Watershed Cleanup was formed to oversee the implementation of the 80 recommendations from the Remedial Action Plan (RAP). The Department of National Defense and the Mohawks of the Bay of Quinte have joined the Restoration Council since that time. In addition, Quinte Watershed Cleanup originated from a public advisory group set up to advise the Provincial and Federal Government during the development of the RAP. The Quinte Watershed Cleanup is a local community based group that works to promote the restoration and protection of the Bay of Quinte.

In 2000, a major public consultation was undertaken to establish restoration targets for the Bay of

Quinte. The public was supportive of the proposed delisting targets which formed the basis for a Five Year Action Plan and 24 recommended environmental actions which when completed, should lead to delisting.

**RAP Status and Progress:** Substantial progress toward delisting the Bay of Quinte Area of Concern has been made. Over 27,000 hectares of farmland have been converted from conventional to conservation tillage, and phosphorous inputs from rural sources have been lowered at source by more than 16,000 kilograms annually. At sewage treatment plants bordering directly on the Bay of Quinte, phosphorous loads have been reduced from 50 kg/day in 1986 to less than 25 kg/day in 1997 with cost savings of \$1.75 million resulting from sewage treatment plant optimization for four facilities within the watershed. Within the Bay of Quinte, phosphorous concentrations are approaching the Bay of Quinte RAP target of 30-40 g/L. Water clarity is improving and the algal blooms are less severe. Direct discharges of industrial wastes have been substantially lowered. Beach closings occur less frequently. Over 50 kilometres of shoreline have been planted with native trees, shrubs and grasses to reduce erosion and improve habitats. Three hundred and fifty-four hectares of wetlands has been rehabilitated and protection of an additional 482 hectares of wetland.

**Delisting Outlook:** A Phosphorus loading model is under development that will assist the Restoration Council in determining and implementing a phosphorus management strategy for the Bay which could include changes to municipal phosphorus loading “caps”. Detailed delisting criteria for fish and wildlife communities and habitats are still to be developed. Also, based on existing natural heritage strategies and a fish habitat management plan (under development), additional habitat conservation and protection measures may be required.

### **11.6 Actions and Progress**

The information contained in this chapter has been compiled based on past documents and was updated as of December 2003. The RAP process is a dynamic one and therefore the status will change as progress is made. This chapter will be updated in future LaMP reports as appropriate.

### **11.7 References**

Environment Canada, Remedial Action Plan Web site:

<http://www.on.ec.gc.ca/water/raps/> Government of Canada, *Canada's RAP Progress Report 2003*, Restoration Programs Division,

Environmental Conservation Branch, Environment Canada-Ontario Region, 2003. Great Lakes National Program Office (GLNPO) Web site:  
<http://www.epa.gov/glnpo/aoc/>

# Lake Erie

(Excerpts from 2004 Update to the Lake Erie Lakewide Management Plan)

## **SECTION 9: Remedial Action Plans and Watershed Implementation**

### **9.1 Introduction**

In addition to the development of LaMPs, Annex 2 of the Great Lakes Water Quality Agreement called for the development of Remedial Action Plans (RAPs) for the most environmentally degraded Areas of Concern around the Great Lakes. There are 12 Areas of Concern in the Lake Erie basin: two binational, one Canadian and nine U.S. The RAPs have a smaller geographic focus than the LaMP, often encompassing only part of a watershed, and focus on restoring locally impaired beneficial uses. Implementation of remedial actions has been underway in most RAPs for over twelve years, using a combination of federal, state, provincial and local resources. The restoration of the AOCs will help to improve Lake Erie, and actions to restore Lake Erie will often benefit the AOCs. It is essential for the Lake Erie LaMP to continue to cultivate communication with the RAPs and to benefit from the successful partnerships and programs that the RAPs have already created. In many ways the success of the LaMP depends on the success of the RAPs.

Source track-down for many of the stressors affecting Lake Erie identified the AOCs, as well as certain other watersheds draining into the lake, as key areas for remediation. Land use management practices in particular have a significant impact on tributary loading to the lake. Therefore, the LaMP will focus on implementing management actions at the watershed level as a primary step towards restoring beneficial uses to the lake.

The watershed is widely regarded as an appropriate unit to manage natural resources. As part of the Lake Erie LaMP process, the Fuzzy Logic model developed by and for the Lake Erie LaMP identified land uses as the single biggest driver of in-lake conditions. Watershed management focuses on these uses and the sources of contaminants that are associated with land based activities. On a broader scale, Justice Dennis O'Connor's reports stemming from the Walkerton, Ontario tragedy reaffirmed the importance of watershed management. He focused many of his recommendations on mechanisms to strengthen and institutionalize watershed management through Source Protection Plans in Ontario as a means to protect human health and the environment.

There are many watershed based projects underway around the Lake Erie basin, however, as with the RAPs, most of them are designed to address problems in that watershed and do not address potential impacts to Lake Erie. As the Lake Erie LaMP progresses, the LaMP partners will continue to assess these existing watershed projects encouraging better connections between the watersheds and the overall state of the lake. Watershed action plans and TMDLs underway in the U.S. will be important to tap. In Ontario, the nine Conservation Authorities in the Lake Erie basin are formed on a watershed basis. The Province of Ontario's initiatives in support of watershed-based source water protection will provide enhanced tools to address the stresses imposed on Lake Erie by adverse conditions in key tributaries.

The following sections highlight the major activities completed or underway in the Lake Erie RAPs and several selected watershed initiatives. Note that these activities are only a small representation of the ongoing watershed work throughout the basin. For the most part, these updates cover only those actions implemented or initiated since the Lake Erie LaMP 2002 Report was published. In the future, this section will highlight accomplishments in other watersheds as they become more focused on implementation of management efforts to assist in achieving the goals of the Lake Erie LaMP.

## 9.2 Remedial Action Plan Updates

### Buffalo River RAP, New York

<http://www.epa.gov/glnpo/aoc/buffalo.html>

The Buffalo River empties into the far eastern end of Lake Erie and most of its flow moves directly into the Niagara River. Technically, it is considered a source to Lake Ontario rather than to Lake Erie. The AOC extends from the mouth of the river upstream approximately 10 km.

The Buffalo River RAP process was originally developed as a partnership between the NYSDEC staff and the Buffalo River Citizens' Committee. This committee was established by NYSDEC in 1987 and is still made up of representatives from community, environmental, academic, sporting, and local government interests. The combined Stage 1 and Stage 2 Remedial Action Plan was completed in November 1989 as a working document. RAP Status Reports have been published since 1991 to update commitments, track implementation, and celebrate accomplishments. Remedial activity efforts have been focused in six major areas: water quality monitoring; river bottom sediments; inactive hazardous waste sites; municipal and industrial wastewater treatment facilities; combined sewer overflows; and fish and wildlife habitat. RAP strategies and progress are updated in the most current Buffalo River RAP Status Report dated July 2002.

Implementation projects include:

- Starting October 2003, the Friends of the Buffalo Niagara Rivers (FBNR) received U.S. EPA funding to provide RAP management. The focus is on research, priority project implementation, and delisting considerations.
- The FBNR will develop programs and seek funding for RAP gaps and needs to address nonpoint sources, habitat restoration and watershed open space improvements.
- The FBNR will form working groups to review the status of the Beneficial Use Impairments. The first steps will include establishing delisting criteria for the impairments. The groups are also to identify information gaps and remedial actions necessary for restoration and protection.
- The FBNR are to estimate implementation costs for project considerations. A Report Card is to be established which will clearly define the RAP process and report on the progress, status of use impairments, and ongoing/proposed remedial measures to the public.
- The FBNR will address project tracking and RAP coordination including: the City of Buffalo's waterfront revitalization; the Buffalo Sewer Authority's CSO correction; and the U.S. Army Corp of Engineers (USACE) funded study of aquatic conditions.
- Three habitat improvement projects have been constructed to address habitat impairments with funding provided through U.S. EPA. These habitat project plans were developed by Erie County with the City of Buffalo, U.S. Fish and Wildlife Service, USACE, and NYDEC.
- The Buffalo Sewer Authority has received Bond Act funding to address sewer overflows.
- The SUNY Buffalo State College Research Foundation, in conjunction with the FBNR, is conducting a study funded by the USACE to assess river sediments and remedial needs. This study will evaluate the Hamburg Drain CSO, update land use, inventory land cover, assess surface sediments for bioaccumulation, define bed sediment characteristics and watershed sediment transport, and assess the impact of abandoned shoreline structures.

## Presque Isle Bay RAP, Pennsylvania

<http://www.epa.gov/glnpo/aoc/presque.html>

Located in the northwestern corner of Pennsylvania on the southern shore of Lake Erie, Presque Isle Bay is a 3718 acre (1505 hectare) natural embayment formed by a 4.5 mile long (7.24 km) recurved sand spit. Over 80% of the bay's watershed is comprised of urban and industrial land uses in the City of Erie and its outlying townships. As a relatively closed system with a hydraulic detention time of almost 2.5 years, Presque Isle Bay tends to act as a natural "settling basin" for sediment entering its waters. Given the urban nature of the majority of the watershed, much of this sediment is contaminated with heavy metals and various organic compounds. Program highlights include:

- Presque Isle Bay was designated as the 43<sup>rd</sup> Great Lakes Area of Concern by the U.S. Department of State in 1991. An Ecosystem Study and Background Report was issued.
- Pennsylvania Department of Environmental Protection (PADEP) examined over 3100 brown bullhead catfish from the bay. Histopathologically confirmed external tumor rate of 64% and liver tumor rate of 22% documented in 1992.
- Stage 1 RAP submitted to the International Joint Commission (IJC) in 1993.
- RAP Update submitted to IJC in 1995 describing new work completed and amending the 1991 RAP.
- Battelle Sediment Study completed in 1997 suggesting that the implementation of source control measures in the watershed may be sufficient to allow for natural recovery of bay sediments.
- Ongoing brown bullhead study reveals distinct trend of decreasing tumor rates. Histopathologically verified rates 17.4% for external tumors and 0% for liver tumors as of 1999.
- Based on preliminary findings of elevated sediment dioxin and furan levels, PADEP collected fish tissue from six resident bay species in 1991. Dioxin/furan tissue burden was well below advisory levels in all species examined.
- Gannon University provided results of a sediment investigation conducted jointly with U.S.EPA in 2000. Study utilized a "triad" sampling approach entailing sediment chemical sampling for metals and PAHs, benthic macroinvertebrate assemblage analysis, and sediment toxicity testing. Sediment dioxin/furan levels also investigated at request of PAC. Metals and PAH results generally support earlier Battelle findings of widespread, low-level contamination without identifiable hot spots. Due to lack of screening criteria in Pennsylvania, dioxin/furan results were compared to New York state sediment screening criteria. Concentrations of these compounds were below human health screening levels but exceed wildlife screening criteria, prompting Department fish tissue study described above.
- In 2002, the PAC voted to re-designate Presque Isle Bay as an Area of Concern in Recovery Stage and submitted a request to U.S.EPA.
- In 2002, U.S.EPA approved re-designation request and Presque Isle Bay became the first AOC in Recovery Stage in the U.S.

The designation of Presque Isle Bay as an Area of Concern in Recovery Stage means that monitoring rather than further remedial action is necessary to verify the restoration of BUIs in the bay. The PAC has also formed a watershed monitoring task force to focus monitoring and pollution prevention efforts at the source. In furtherance of these goals:

- PAC has developed a 10-year monitoring strategy to track the recovery of the AOC. Draft monitoring plans are being developed for the bay's *restriction on dredging* and *fish tumors or other deformities* beneficial use impairments.
- PAC has also formed a watershed monitoring task force to focus monitoring and pollution prevention efforts at the source.

- Brown bullhead monitoring began in 2002. In accordance with the monitoring framework outlined in the 2002 RAP Update, bullheads will be examined annually for the presence of grossly observable external tumors. Histopathological analysis of orocutaneous and liver tumors will also be conducted in 2002, 2003, 2004, 2007, and 2010. Results will be compared to tumor rates at various reference sites and appropriate list/delist criteria. Preliminary results to date indicate that orocutaneous tumor rates are roughly comparable to levels in 1999, although these data have not been subjected to statistical analysis. One individual (2.1%) in 2002 had a histologically verified liver tumor.
- A series of workshops have been held to address the fish tumor BUI in Great Lakes AOCs. Several important outcomes are expected, including recommendations for standardized sampling and histological protocols and updated AOC list/delist criteria for the *fish tumor* BUI.
- In addition to co-sponsoring the fish tumor BUI workshops, Pennsylvania Sea Grant has hosted several regional workshops on Type E (“Avian”) botulism, the Great Lakes Fisheries Leadership Institute, Aquatic Nuisance Species Hazard Analysis Critical Control Point (ANS HACCP) workshops, and a new Non-Point Education Program for Municipal Officials (NEMO).
- Over 600 volunteers participated in Pennsylvania’s portion of the International Coastal Cleanup in September 2003. 42,363 pounds of discarded trash were collected along 37 miles of Lake Erie coastline and tributary streams.
- The County of Erie sponsored a household hazardous waste collection day in September 2002, netting over 100 tons hazardous waste.
- Since 1999, the Pennsylvania Department of Environmental Protection has awarded over \$1.6 million in Growing Greener grants to fund various environmental projects in the Pennsylvania portions of the Lake Erie watershed. Highlights of these projects include the establishment of a PA Lake Erie Watershed Association and several smaller sub-basin associations, several wetland restoration projects, comprehensive biological stream assessments of Lake Erie tributary streams, stream bank stabilization/erosion control projects, and numerous environmental education initiatives.

### **Ashtabula River RAP, Ohio**

<http://www.epa.gov/glnpo/aoc/ashtabula.html>

The Ashtabula River RAP process began in 1988 with the establishment of the Ashtabula River RAP Advisory Council. Years of unregulated discharge and mismanagement of hazardous wastes along the river and Fields Brook (a superfund site) seriously contaminated sediments and degraded biological communities. The lower two miles of the river encompasses the area of concern. The 1991 Stage 1 Report documented at least 6 of 14 beneficial uses impaired, all related to contaminated sediments. Both the commercial and recreational uses of the river were in danger of being shut down because there was no disposal site for contaminated sediments if they were dredged. An interim dredging project in 1993 removed several feet of relatively uncontaminated surface sediments to keep the recreational harbor open.

The Ashtabula River Partnership (ARP) was created in 1994 as a comprehensive, structured, concentrated effort to get the river dredged, and as an alternative to the impending designation of the river as an extension of the Fields Brook superfund site. An oversight coordinating committee was established as well as several technical committees, and a local coordinator was hired. The non-profit Ashtabula River Foundation was incorporated in 1997 to manage financing for the river cleanup. Since 1990, extensive sediment characterization studies have been done, including: mapping of pollutant concentrations (particularly PCBs); estimation of sediment volume to be removed; delineation of PAH distribution; TCLP testing to ensure sediments did not qualify as hazardous waste; screening for low level radioactive waste; modeling sediment transport, scouring and deposition rates. A creative mix of funding from local partners, U.S. EPA, U.S. Army Corps of Engineers, U.S. EPA-GLNPO and Ohio EPA provided seed funding for initial ARP formation, preliminary comprehensive management plan and environmental impact statement

preparation (CMP/EIS), preliminary engineering design and location of the disposal facility, and the aforementioned studies. Extensive reviews of all agencies' authorities were conducted to determine the critical decision points and whose responsibility they would be. Extensive internal communication and cross program coordination has been employed. Updated program highlights include:

- Final Comprehensive Management Plan/Environmental Impact Statement completed in 2002.
- Conducted sediment dewatering bench scale/pilot studies to determine if and how the river sediment dewatering facility discharge may be able to meet Ohio water quality standards.
- Collected samples of sediments associated with river bulkhead structures to answer serious concerns that remedial dredging may cause bulkhead failure and the need for repair/replacement.
- Consolidated landfill design criteria for preliminary design to satisfy State permitting requirements for disposal facility
- Conducted hydro-geological and geo-technical studies of two separate properties for the sediment dewatering facility operation and the dredging disposal facility.
- Organized Design Coordination Team (DCT). Completed preliminary engineering design. Began detailed design work for dredging, dewatering and disposal facilities. Major role of DCT is to oversee issues related to design, including scheduling of report and work products; develop plans and specifications for all facilities and operations, anticipated real property and relocation requirements for project construction; contract awards; contract costs; anticipated requirements for performance of operation, maintenance, repair, replacement and rehabilitation of the river project, and other related matters.
- Purchased 50-acre property for proposed river sediment landfill at former RMI property adjacent to Fields Brook Superfund site landfill.
- In 2003, after nearly two decades, U.S.EPA completed remediation of the 3-mile Fields Brook Superfund site - a necessary prerequisite to the Ashtabula River remedy.
- Developing a Project Cooperation Agreement (PCA) that will identify partners for project implementation and costs. Also working on a decision document to contain covenants not to sue.
- Federal and state trustees commenced work for a formal Part B assessment on behalf of an Ashtabula River natural resource damage assessment (NRDA) claim under CERCLA authority sampling water column, fish, sediments - all of which is being coordinated with the Ashtabula River remediation project.
- 2003 local river partnership office funding support confirmed from Ashtabula City Council, Ashtabula Township, and Ashtabula County. This is the first time that such support has been provided exclusively by the local community.
- Numerous broadcasts on community cable, local radio, and monthly meetings with city, county, and township officials to provide an update on Ashtabula River remedial project, generate cooperation and understanding on requirements for local (nonfederal) sponsorship, describe requirements for the project Design Agreement and explain how local office funding support had been applied toward the project.
- Numerous presentations with local schools, Ashtabula County Builders Association, Clean Water Campaign Council, Northeast Ohio Watershed Council, League of Women Voters, USACE Buffalo District incoming commander(s), state and congressional reps.
- Advertising over 140 spots about Ashtabula River remedy for one month on CNN, Discovery, and Lifetime channels.
- \$54,966 in grants from the Ohio Environmental Education Fund continued the Ashtabula After School Discovery program called "Waterways Adventure" and expanded the science curriculum and hands-on experience of three school districts for 2000 school kids in grades 4,5,6,8, and 12 to conduct field monitoring at selected lake, river, and pond sites.

- Convened meetings with river marina owners/operators to discuss: 1) the potential of another interim dredging to improve navigation prior to environmental dredging, 2) solicit local marinas willingness to pay for same, 3) review potential interim disposal sites for dredged sediments, and 4) query them about historic information relative to the integrity of river bulkhead structures installed before 1945/onset of Fields Brook firms operations.
- Participated with local community groups, including litter prevention and recycling office, on three separate cleanup events in area neighborhoods.
- Sponsored Earth Day essay contests among Ashtabula County elementary and high schools.

### **Cuyahoga River RAP, Ohio**

<http://www.cuyahogariverrap.org>

The 1992 Stage 1 Report identified 10 of 14 beneficial use impairments in the Cuyahoga AOC. The AOC covers the watershed of the lower 45 miles of the river and the shoreline east and west of the mouth of the Cuyahoga River. The Stage 1 Report was updated in 1995 followed by the *Early Implementation Report* in 1996 that documented activities underway that addressed the identified use impairments.

The Cuyahoga River RAP Coordinating Committee works in coordination with the Cuyahoga River Community Planning Organization (CRCPO), a non-profit organization, to identify and implement educational programs and remedial actions with a variety of local stakeholders. The priorities in the Cuyahoga River AOC over the past two years have been to participate in the development of the Ohio EPA Total Maximum Daily Load (TMDL) Report, support and implement habitat restoration projects, complete a wetland inventory of the entire area of concern, work with the U.S. Army Corps of Engineers on navigation channel studies, develop state-of-the-art GIS based tributary watershed maps, foster the development of tributary watershed groups, and serve as the point of contact (River Navigator) for the American Heritage River program for the Cuyahoga River. Recent accomplishments include:

- Completion and dissemination of “A RAP Guide to Understanding TMDL” for local citizens and elected officials.
- Development and support of tributary watershed groups in Yellow Creek, West Creek (West Creek Preservation Committee), Tinkers Creek (Pond Brook Initiative), Mud Brook (Mud Brook Consortium) and Chippewa Creek; with a goal of establishing tributary watershed councils or groups with effective local environmental protection ordinances, storm water management strategies, educational programs and greenspace/riparian preservation mechanisms.
- The RAP and its partners implemented several habitat projects including: stream restoration using soil bioengineering techniques in Mill Creek in Highland Hills; completion of wetland restoration along West Creek; Pond Brook Streamside Vegetation Project; the Stearns Farm stream and wetland restoration project; and additional stream restoration work in the Chevy Branch of Big Creek.
- In 2003 the RAP and American Heritage River program partnered with NASA, Ohio View, and Kent State University to sponsor the Scientific Outreach and Application using Remote Sensing (SOARS) program that utilized NASA satellite imagery, digital elevation models, and GIS to focus on the entire Cuyahoga River watershed. This project studied urban sprawl over a 25-year period and its relationship to loss of forest and farmland, effects on river and lake temperatures, impact on water clarity and the acceleration of impervious surfaces and resultant runoff. The results of the SOARS program will enhance community awareness of potential environmental threats and assist in the local decision-making process for watershed stewardship. The RAP is developing a series of workshops, using SOARS data maps, aimed at assisting community officials in determining appropriate local BMPs to reduce runoff and nonpoint pollution.

- Conservation easements are being obtained and held by both Cuyahoga and Summit County Soil and Water Conservation Districts, various park systems and conservancy organizations. These have resulted in over 1600 acres of land in the AOC held in easements in addition to over 33,000 acres protected within the Cuyahoga Valley National Park, county metroparks and other public lands.
- In 2003 the USACE initiated collection of data from RAP stakeholders to develop a comprehensive sediment transport model for the Cuyahoga River watershed, leading to better decisions on sediment and storm water issues and best management practices.
- In 2003 the RAP and USACE initiated a Navigation Channel Habitat Feasibility study to identify habitat restoration techniques and opportunities with the navigation channel.
- The Cuyahoga County Planning Commission has completed the Cuyahoga County Greenspace Plan and is in the process of promoting greenspace preservation and restoration efforts to local governments and area stakeholders. The Planning Commission is also developing the Cuyahoga Valley Initiative with local stakeholders to identify zoning and ordinance modifications for future development and preservation efforts.
- RAP consultants completed a wetland survey in 2003 that identifies wetlands and potential restoration and preservation opportunities in the Cuyahoga County portion of the watershed. This survey complements similar studies completed for the Cuyahoga Valley National Park and Metroparks Serving Summit County resulting in comprehensive wetland identification maps for the AOC.
- The RAP is currently coordinating a project to develop a decision support system to integrate environmental issues and concerns with transportation planning, utilizing grants from U.S. EPA and the Lake Erie Protection Fund.
- The RAP assisted in coordinating development of the 2003 TMDL report by Ohio EPA for the lower Cuyahoga River and will continue its TMDL support by assisting with the Tinkers Creek Stressor Identification Study required by the report.
- Conducted an assessment of contaminated sediments on the Old Channel of the Cuyahoga River in 2002 and 2003. PAHs were found to be the primary critical pollutant and next steps will be to consider options for remediation.

### **Black River RAP, Ohio**

[http://www.epa.state.oh.us/dsw/rap/blk\\_home.html](http://www.epa.state.oh.us/dsw/rap/blk_home.html)

The Black River RAP process began in 1991 with the establishment of the Black River RAP Coordinating Committee. Several major remedial actions had occurred on the river prior to the initiation of the RAP process, particularly in regard to point source dischargers. The entire watershed was designated as the area of concern largely due to nonpoint sources. The 1994 Stage 1 Report documented 10 of 14 beneficial uses as impaired, with nonpoint source runoff identified as the main cause of impairments in all but the lower section of the mainstem, where point sources also still significantly impact the river. The 1999 Ohio EPA basin survey report revealed environmental improvement compared to 1994 report, but the improvements were not as dramatic as those seen between the 1994 and 1987 reports. This is most likely a reflection of when point source controls were implemented. USX/Kobe dredging of PAH-contaminated sediments, implemented under an enforcement action, resulted in dramatic lowering of the incidence of tumors in brown bullhead by 1998. The RAP adopted a Riparian Corridor Resolution in 1996 that outlined the need for riparian corridor establishment & protection. A Strategic Long Range Plan completed in 1997 outlined RAP direction for the next several years. A symposium titled "Protecting What's Been Gained in the Black River" held with IJC Water Quality Board in 1998 celebrated accomplishments and hardened the resolve to do more.

The Black River has been scheduled for a TMDL study, but the start of this important watershed assessment is being delayed, in part, until a final report is released on a RAP-backed dissolved oxygen study. The report on the dissolved oxygen study, which was initiated in 2001, is expected

in February 2004. Drought-like conditions during the originally designed sampling year of 2001 necessitated an extension of the study into 2002. The Black River RAP has been reviewing studies and implementing environmental surveys in an effort to assess the AOC on a sub-watershed by sub-watershed basis in an effort to re-designate the beneficial use impairments of specific stream segments or sub-watersheds. Accomplishments include:

- The Black River received national attention with the construction of a fish habitat shelf at the Black River Landing brownfield development site. The fish habitat shelf is a shallow underwater ledge specifically constructed as a spawning area, nursery and general aquatic habitat site in the main stem of the Black River. Since its construction, the fish habitat shelf has attracted large numbers of fish and shown dramatic improvement in the fish community structure.
- The Lorain County General Health District has developed a Pilot Program for the Operations and Maintenance of Home Sewage Treatment Systems (HSTS). Older and failed or failing HSTS systems have plagued the water quality of the Black River basin. Once developed, this pilot program will be exported to the remainder of Lorain County and could be used for other counties in the Lake Erie basin.
- The Black River RAP capped the completion of a 319 Grant with a Ten Event outreach effort. The events included development of a "Virtual Tour of the Black River Watershed" website, a continuing education class for local Realtors on HSTS and a mini-seminar for builders and developers on construction site best management practices.
- With RAP assistance, extensive restoration projects were completed on the East and West Forks of the East Branch of the Black River. These two highly channelized streams suffered from loss of riparian protection, stream bank erosion, and wetland destruction.
- Recent improvements to sediment quality in the main stem of the Black River led the Ohio Department of Health to conduct a risk assessment related to the Contact Advisory in place since 1983. The contact advisory was lifted in 2004.
- As urban and suburban sprawl continues to impact the Black River, Lorain County has started work on developing an Environmental Strategic Plan that will guide future development of the county in an environmentally protective manner.
- In April 2004, U.S.EPA approved the RAP's application to upgrade the fish tumor use designation from impaired to "in recovery".
- Ohio Governor Bob Taft recognized improvements to the Black River AOC at an earth day event in April 2004.

### **Maumee River RAP, Ohio**

<http://www.maumeerap.org>

The RAP process began in 1987 and was organized under the Toledo Metropolitan Area Council of Governments with oversight by Ohio EPA. The boundaries of the Maumee AOC were initially defined as the area from the Bowling Green water intake (River Mile 22.8) downstream to the Maumee Bay and Lake Erie, including Duck Creek, Otter Creek, Cedar Creek, Grassy Creek, Crane Creek, Swan Creek and the Ottawa River. In 1992, the AOC was expanded to include Packer Creek, Turtle Creek, Rusha Creek and the Toussaint River. Over 100 stakeholders participated in preparation of the Stage 1 Report, which was completed in 1990. 10 of 14 beneficial uses were documented as impaired. A *Recommendations for Implementation Report* was completed in 1991 and identified five high priority areas: agricultural runoff; landfills and dumps; wetlands and open space; urban stormwater runoff; and community involvement.

Action groups were formed to focus on each of these issues as well as overall support. Two action groups were formed to specifically focus on the myriad problems of the Ottawa River and Swan Creek. A \$3.5 million study (special line item federal budget appropriation) was completed to assess current conditions in the AOC and link waste sites to contamination in streams. Many programs have been initiated or supported to reduce agricultural runoff. Remedial actions at the Dura, Stickney, Tyler and King Road landfills have reduced significant loads of PCBs to the

Ottawa River. Soil and sediment remediation at the Textileather and Fraleigh Creek (formerly unnamed tributary) sites removed more than 57,000 lbs of PCBs from the Ottawa River. Many educational workshops have been conducted covering such topics as: agricultural runoff; urban runoff; pollution prevention; drinking water and pesticides; watershed planning; environmental risk, etc. A RAP Strategic Plan was completed in 1997.

The Maumee RAP continues a very active public outreach and education program. The priorities the last two years have focused on keeping the public informed and getting them more involved, as well as continuing to address nonpoint sources of pollution. Some of the major accomplishments over the last two years are listed below.

- Completed a 10-Year Activities and Accomplishments Report.
- Hosted a review/site visit by the IJC Science Advisory Board that garnered high praise.
- Received a 319 grant to fund a watershed coordinator to work in sync with the RAP coordinator to develop and implement a Stage 2/Watershed Action Plan.
- Initiated a large public education campaign called "Give Water a Hand" designed to meet some of the education requirements of the Phase 2 Storm Water Regulations and to alert folks to the importance of conservation, septic system maintenance and storm water management.
- Completed a documentary entitled: *Fate of a River, Revisited*, contrasting the deplorable state of the river in the 1960s to today's situation. Shown on PBS and presented at numerous meetings locally.
- Developed a Partnering for Clean Streams Patch Program for Scouts.
- Developed Storm Water Management Standards Manual.
- Continued to implement Toussaint River Improvement Incentive Project enrolling 44 miles of stream bank and 300 acres in filter strips/set asides. Also included a component on home septic system education.
- Grant from GLNPO to prioritize Ottawa River sediment remediation projects.
- Conducted annual Clean Your Stream Events.
- Updated a GIS based wetlands map for the AOC.

### **River Raisin RAP, Michigan**

<http://www.riverraisin.org/index.html> or <http://www.epa.gov/glnpo/aoc/rvraisin.html>

The River Raisin AOC is located in Monroe County, Michigan. The AOC includes the lower 2.6 miles of the River Raisin from the low head dam (Dam #6) and extends 0.5 miles out into Lake Erie, following the federal navigation channel. It also includes the nearshore zone of Lake Erie one mile north and south from the river mouth. The River Raisin Public Advisory Council is a subcommittee of the River Raisin Watershed Council. The Watershed Council, a recognized 501c(3) entity, is composed of municipal representatives and individual local stakeholders, and services 1069 sq. miles.

Recent and ongoing projects include:

- In 2003, The River Raisin Watershed Council was awarded \$12,800 in State grant funds to assess the benthic macroinvertebrate community and stream habitat in the River Raisin Watershed.
- The River Raisin PAC drafted an update of the Remedial Action Plan in 2002.
- The remediation of PCBs from the Consolidated Paper Co. is proceeding with funding from the Clean Michigan Initiative – Brownfield Redevelopment Fund.
- The U.S. EPA-GLNPO, with assistance from the Michigan Department of Environmental Quality (MDEQ), continued assessing and delineating the remaining sediment contamination in the lower portion of the AOC. Reports are available that indicate toxicity and bioaccumulation of PCBs continue to be highest in the formerly remediated area below the turning basin, with additional hotspots downstream. Meetings and

presentations have been held with the PAC to keep them informed. The MDEQ is planning to nominate the River Raisin AOC for project consideration under the Great Lakes Legacy Act.

### **Rouge River RAP, Michigan**

<http://www.rougeriver.com/>

The oldest and most heavily populated and industrialized area in southeast Michigan is located within the Rouge River watershed that covers 12,010 km<sup>2</sup>. The river has four main branches totalling 125 miles of waterways, 400 lakes and ponds and provides recreational opportunities to more than 1.5 million people. In 2003, several newspaper articles highlighted the Rouge River's recovery, citing tangible markers of progress in a decades-long battle to restore the Rouge. Quality indicators including dissolved oxygen, numbers of aquatic insects and water clarity have steadily improved in recent years. Recent Rouge River AOC highlights include:

- A Final Draft Update of the Remedial Action Plan was developed in 2003, which includes an updated assessment of beneficial use impairments and delisting criteria for the AOC. Publication is scheduled for December 2003.
- The local municipal governments of the watershed joined together to form the Rouge River Assembly, comprised of representatives appointed by the appropriate governing body in each township, city, and county. The purpose of the assembly is to provide mutual assistance in meeting the storm water permit requirements under the MDEQ watershed-based, general storm water discharge permit, and other environmental issues that may arise.
- Watershed management plans and storm water pollution prevention initiatives have been completed and submitted to MDEQ for comment. Both identified excessive flow variation, high bacteria counts, low dissolved oxygen and high nutrient concentrations as the major factors degrading the Rouge River.
- The Rouge Gateway Project continues to focus on the environmental restoration of the lower several miles of the river. Phase I of the Rouge Oxbow Restoration is complete. Phase II includes CSO modification and Phase III will provide open connection to the Rouge River. Estimated completion is 2006. This project is funded by grants from the State of Michigan Clean Michigan Initiative (CMI) and the Rouge River National Wet Weather Demonstration Project. These projects have been effective in eliminating or controlling the discharge of untreated sewage from approximately half of the watershed's CSOs.
- The Friends of the Rouge (FOTR) involved volunteers in programs such as Storm Drain Stencilling, Frog and Toad Survey, the Rouge Education Program, Rouge Rescue/River Day, and other community pollution prevention initiatives. The Rouge River Advisory Council was incorporated as a committee of the FOTR.
- Results from the resident and caged fish sampling in Newburg Lake indicate that the contaminated sediment cleanup conducted in 2001 was successful in significantly lowering PCB concentrations in the fish. The total consumption ban was replaced with a less-restrictive consumption advisory.

### **Detroit River RAP**

The Detroit River is a 51 km connecting channel between Lake St. Clair and Lake Erie. The binational AOC includes the Detroit River and its watersheds, covering an area of over 2000 km<sup>2</sup>. Over 75% of the total land area is in Michigan. Some 100 communities rely on the river for drinking water with most of the population concentrated in the cities of Detroit, MI and Windsor, ON.

The RAP identified 11 beneficial use impairments of a possible 14. Causes of impairments are historical and current industrial activity, agricultural practices, and urban development in the watershed. Major sources of impairment to the AOC are from CSOs, sanitary sewer overflows, municipal and industrial discharges, and storm water runoff. Due to high volumes of water entering the river, upstream sources contribute considerable contaminant loads. The river is the single largest source of contaminants to Lake Erie.

Distinct RAP implementation frameworks have been developed for the Canadian and Michigan sides of the AOC, under the guidance of the 1998 Four Agency Letter of Commitment signed by: Environment Canada, U.S. EPA, Ontario Ministry of the Environment, and Michigan Department of Environmental Quality. The Detroit River RAP Team guides the U.S. implementation. The Detroit River Canadian Cleanup (DRCC) process guides Canadian implementation efforts. The DRCC is organized into: the Detroit River Canadian Steering Committee comprised of senior managers; the Detroit River Canadian Implementation Committee comprised of technical Agency representatives; Detroit River Canadian Public Advisory Committee; and the Detroit River Outreach and Communication Committee.

Jointly, the Detroit River RAP Team and the DRCC are working toward fostering actions that will improve the conditions of impaired beneficial uses.

#### U.S.

<http://www.epa.gov/glnpo/aoc/detroit.html>

Achievements to date for the U.S. AOC include:

- US EPA has been facilitating, a workgroup comprised of USACE, American Heritage Rivers, MDEQ, and City of Trenton, to undertake the dredging of Black Lagoon in the Detroit River. This project was identified in the 1996 Detroit River Remedial Action Plan as one of the priority contaminated sediment cleanup sites in the River. If funded under the Great Lakes Legacy Act, dredging of 27,000 cubic yards of contaminated sediment is expected to begin in 2004.
- In 2004, the Detroit Recreation Department will begin a \$250,000 ecological restoration at the 41-acre Blue Heron Lagoon located on Belle Isle.
- The City of Detroit also plans to spend \$545,000 to provide improvements to the Detroit Riverside Park promenade and to develop an on-site fisheries education program.
- Detroit Recreation Department received \$500,000 in 2003 to construct a habitat for a lake sturgeon-spawning reef in the Detroit River off of Belle Isle.
- In 2003, Detroit Water and Sewage Department completed a \$187 million CSO disinfection basin project at the head of Conners Creek capable of storing 30 million gallons of wastewater.
- In 2003, US FWS hired a full time project manager for the Grassy Island remediation site. In 2001, U.S. Congress authorized funding to address the contaminant problems on Grassy Island to eventually turn the island back into productive use for wildlife. The Service is currently moving forward on plans to more fully characterize the risks from the identified contaminants and evaluate the feasibility of several approaches to reduce contaminant risks and enhance long-term benefits of the area for fish and wildlife.
- In October 2003, Friends of the Detroit River began a \$35,000 project to work toward locating and mapping outfalls along the Detroit River; determining the type, source, ownership and composition of each discharge; creating a single source database of outfall information which will be available to the public; and, providing training and training materials for the development of a "citizens' volunteer group" to assist in monitoring outfalls along the river.
- Four hundred and ten acres of Humbug Marsh, which represents the last mile of natural shoreline on the U.S. mainland of the Detroit River, was acquired in September 2003. The Humbug Complex, in Gibraltar and Trenton, Michigan, is made up of Humbug Island,

Humbug Marsh and adjacent undeveloped upland habitats. Because they are home to such a high diversity of fish and wildlife, the marshes have been identified as globally unique and significant in biological diversity.

- The Grosse Ile Land and Nature Conservancy rehabilitated two hundred and eighty feet of shoreline along Gibraltar Bay at the southern end of Grosse Ile in June 2003, through a \$28,000 grant.
- In March 2003, USACE donated 168 acres of wetlands, south of Pt. Mouille State Game Area, along the Detroit River, to US Fish and Wildlife Service for inclusion into the Detroit River International Wildlife refuge.
- In March 2003, USGS completed an \$80,000 project to identify candidate sites for habitat protection and remediation in Michigan waters of the Detroit River. This was one of the highest priority recommendations in the Detroit RAP Report. The inventory complements a previous survey of habitat in Ontario waters of the Detroit River. The objectives of the inventory were to: 1) locate candidate sites for protection and restoration of fish and wildlife habitat in Michigan waters of the Detroit River; 2) describe the ownership and size of each site, as well as its potential for habitat protection and restoration; and 3) subjectively assess the extent to which existing habitat along the river is productive of fish and wildlife and protected from land uses that have degraded or destroyed such habitat. The report can be found at <http://www.glsc.usgs.gov/research/detroitriver.asp>.
- In December 2002, U.S. President Bush signed a bill to officially create the Detroit River International Wildlife Refuge. The refuge includes islands, coastal wetlands, marshes, shoals, and riverfront land along 18 miles of the Lower Detroit River from Zug Island to Sterling State Park. The refuge also includes Mud Island, Grassy Island, and the 330-acre Wyandotte refuge.
- A plan to create a pedestrian walkway and series of parks along the Detroit riverfront was announced December 2002 by Detroit Mayor Kwame Kilpatrick and several business and civic leaders. The Detroit Riverfront Conservancy has secured grants in excess of \$10 million to develop a 62-foot-wide, three-mile long riverfront park and walkway along the Detroit River in downtown Detroit. In all, the city expects as much as \$500 million to be spent in developing the riverfront.
- In October 2002, the Friends of the Detroit River was awarded \$88,000 to design, fabricate, and evaluate an innovative mobile dredging unit with the potential for reducing sediment re-suspension and offsite migration of contaminants during dredging. The objective of the project is to demonstrate a method to control sediment re-suspension during environmental dredging in an effort to protect and maintain the chemical, physical and biological integrity of the waters of the Great Lakes basin ecosystem.
- In August 2002, \$1 million in federal funds was secured by Wayne County to buy the 44-acre Chrysler Paint Plant site. The site had been vacant since the 1980s. Restoration plans for the site include creating a headquarters for the Detroit International Wildlife Refuge.
- In 2002, U.S.EPA launched a multi-agency cooperative initiative to address facilities in the Detroit watershed and flyway that have the potential to mismanage or discharge oil and other constituents to the river. Others involved are the MDEQ, Wayne Co. Dept. of Environment and City of Detroit Dept. of Environment.

### **Detroit River RAP: Canada**

[http://www.on.ec.gc.ca/water/raps/detroit/intro\\_e.html](http://www.on.ec.gc.ca/water/raps/detroit/intro_e.html)

Thirty-one priority recommendations were identified in 1996 for the Canadian portions of the AOC. Programs and projects have been undertaken or completed in at least 21 of the 31 priorities, and DRCC stakeholders and partners have undertaken over 70 restoration projects.

Achievements to date for the Canadian AOC include:

- The Windsor Riverfront Pollution Control Planning Study was completed and adopted by the city. It developed a strategy that would satisfy regulatory guidelines for combined sewer overflow control, and would reduce pollutant loadings to the river to levels consistent with RAP objectives.
- Cost savings were identified toward the upgrade of Windsor's primary sewage treatment plant to secondary standards as a result of innovative treatment technologies.
- The effort to upgrade Windsor's Lou Romano Water Reclamation Plant is planned for completion date in 2006.
- Upgrading the Amherstburg Sewage Treatment Plant is in the planning stage.
- Since 1990 over 366 hectares of wetland in the Canadian AOC have been restored or protected.
- The Essex Region Conservation Strategy and Essex County Stewardship Network have implemented rural Nonpoint Source Remediation Program and Biodiversity Conservation Strategy projects.
- A number of habitat enhancement projects were completed in 2003, which helped to address the chronic problems of loss of fish and wildlife habitat in the Detroit River AOC. These projects were planned and sponsored by the DRCC and DRCC members.
- Public education has also been a priority through efforts to expand the DRCC web site, sponsor watershed hiking and biking tours, and participate in other outreach events.

In July 2003 DRCC implementation efforts were strengthened by addition of a community-based implementation specialist. Working closely with federal, provincial, and local agencies the implementation specialist enhances stakeholders' ability to communicate and work cooperatively on issues such as project implementation, monitoring, progress reporting, and public involvement. This position was part of a restructuring effort intended to coordinate and improve DRCC and implementation activities

One of the projects planned for 2004 is a Household Mercury Collection Project, which is being implemented by the DRCC along with its partners - the City of Windsor, the Essex-Windsor Solid Waste Authority, Environment Canada, and the Ontario Ministry of the Environment. The project will take place during the month of April, throughout which the public will be urged to bring household items containing mercury to the Household Chemical Waste Depot in exchange for an incentive. This project has considerable support, and aims not only to remove mercury items from the waste stream, but also, through the associated educational efforts, to raise awareness of mercury problems in the AOC.

### **Wheatley Harbour RAP, Ontario**

[http://www.on.ec.gc.ca/water/raps/wheatley/intro\\_e.html](http://www.on.ec.gc.ca/water/raps/wheatley/intro_e.html)

Wheatley Harbour AOC is a small, confined shipping harbour on the north shore of Lake Erie. The AOC encompasses the harbour proper, and the wetlands in lower Muddy Creek. The Muddy Creek watershed, which feeds into the AOC, is some 10 km<sup>2</sup> of clay-veneer till plain. Topographic relief is gentle, and land use is predominately agricultural. Overall, poor water quality has impacted the harbour's resources. The four BUIs currently identified as impaired are: degradation of fish and wildlife populations; restrictions on dredging activities; eutrophication or undesirable algae; and loss of fish and wildlife habitat.

Contaminant levels of some metals and PCBs exceed the provincial guidelines. The source of PCBs in the sediments has been tracked to a concentrating effect from historic fish processing operations. The metal concentrations are attributed to nonpoint sources including agriculture and leaking septic systems in the area. The total phosphorus concentrations in sediments and waters of most of the AOC exceed provincial guidelines. Present sources include fish processing at Omstead Foods Ltd., agricultural runoff and leaking septic tanks. Upgrades to the Omstead wastewater treatment facility over the last 20 years have reduced its contribution to phosphorus

loads, and agricultural runoff to Muddy Creek is now the main source. The construction of a secondary sewage treatment plant to service part of the AOC has reduced inputs of nutrients and bacteria from the local community and from smaller fish processing plants such as McLean Brothers Fisheries. The completion of 41 septic system upgrades since 2000 is also reducing nutrient and bacteria inputs.

Habitat loss has resulted from the construction of the original harbour, and each subsequent expansion. Hardening of the shoreline and filling in of wetlands to create land for industrial, residential and farm land have altered many components of the natural ecosystem in the AOC and Muddy Creek watershed. The wetland is often nearly dry during summer from lack of stream flow as well as lake level variations. However, the wetland remains a feeding area to significant fish and wildlife species, and a popular bird watching venue. The public has identified wildlife as a feature worthy of protection. Since 2000, over 62 hectares (154 acres) of natural habitat have been restored in the AOC.

Additional measures are addressing public education about recreational uses and resource harvest. The Essex Region Conservation Authority and Essex County Stewardship Network are working with landowners to implement projects to reduce agricultural and septic contributions, and to increase habitat in the AOC.

An update of the combined Stage 1 and 2 RAP document is underway. A Wheatley Harbour Implementation Team (WHIT) has been established to direct further research, identify and undertake remediation measures, and evaluate progress.

### **Clinton River RAP, Michigan**

<http://www.crwc.org/>

The AOC includes the entire Clinton River watershed (1,968 km<sup>2</sup> or 760 mi<sup>2</sup>), located just north of Detroit, and flowing 80 miles (128 km) from its headwaters to Lake St. Clair near the city of Mount Clemens. About half of the river's flow is treated wastewater from six municipal wastewater treatment plants. The RAP has identified eight of a possible fourteen beneficial uses as impaired.

Through the Clinton River Watershed Council (CRWC) the Clinton River Public Advisory Council provides the state and federal government agencies with information on actions recommended in the RAP, reviews new technologies for monitoring and mitigation, and updates and promotes critical recommended actions.

Recent public participation activities in the watershed have included:

- River Day, Adopt-A-Stream, Student Monitoring Program, Storm Drain Stencilling.
- CRWC in partnership with Trout Unlimited seeks to explore the potential for the Clinton River and Galloway Creek to be an urban cold-water trout stream.
- The Annual Clinton River Cleanup has expanded to twelve sites across the watershed, and in 2002 included household hazardous waste drop-off points, a wetland Preserve Stewardship workshop, a wastewater treatment plant tour and beautification projects.
- School involvement in the watershed includes Student Monitoring Days in the fall and spring of each year, with a review of the data at an annual Student Congress.
- Storm water management projects are underway in the Stony Creek and Bear Creek tributaries to the Clinton River.
- In 2003, General Motors initiated its plans to dredge Harris Lake to remove oil residues present in the shallow sediments. The dredging activity is being conducted as part of a Corrective Action Agreement with the U.S. EPA and will take place under permits issued by the MDEQ.

### **St. Clair River RAP (U.S. and Canada)**

<http://www.epa.gov/glnpo/aoc/st-clair.html> [http://www.on.ec.gc.ca/water/raps/stclair/intro\\_e.html](http://www.on.ec.gc.ca/water/raps/stclair/intro_e.html)

This binational AOC extends 64 km from Lake Huron to Lake St. Clair. Contaminated sediments have been identified as a key source of contaminants to the aquatic environment. Problem definition in the 1991 Stage 1 report included six beneficial use impairments that are still remaining, although conditions have improved. These are degradation of benthos, restrictions on fish consumption, degradation of aesthetics, loss of fish and wildlife habitat, restrictions on dredging activities, and beach closings. Stage 1 also identified three beneficial use impairments which are no longer considered impaired: bird or animal deformities or reproductive problems, restrictions on drinking water consumption or taste and odour problems, and added cost to agriculture and industry. Forty-five remedial actions were recommended to restore the environmental conditions and beneficial uses in the Stage 2 report in 1995. Many of these actions have been implemented.

Three distinct zones of contaminated sediments have been identified, and Dow Chemical Inc. has made a public commitment to remediate Zone 1 sediments adjacent to its property over 2002-2004. Some 7000 cubic metres of contaminated sediment were removed, completing the first two phases of cleanup. In fall of 2004 the third phase, dredging, should be complete. MOE and Environment Canada are developing an ecologically based risk assessment approach to address the remaining contaminated sediments, Zones 2 and 3, and will discuss options with industrial and other RAP participants.

RAP accomplishments include upland and riparian habitat restoration, upgrading the Sarnia sewage treatment plant, reducing phosphorus, nitrogen, sediment and bacteria loading to local watercourses, removal of Zone 1 contaminated sediments, and implementing the binational habitat strategy. The Binational Public Advisory Committee and RAP Implementation Committee produced an "electronic RAP" on CD-ROM, the first of its kind in the Great Lakes basin, funded by Environment Canada and MOE. Funding from Environment Canada and Lambton Industrial Society converted the electronic RAP to HTML format and it is now available on the "Friends of the St. Clair River" website. Major industrial and municipal point sources of chemical and bacterial contaminants have been controlled and reduced in virtually all the major facilities in both Ontario and Michigan. Frequency and size of spills have been dramatically reduced. Over 60% of nonpoint source recommendations have been acted on, and Lambton County and Sombra Township Official Plans address urban runoff and erosion controls. All the habitat recommendations have been addressed in some manner. A "St. Clair River RAP 2000 Progress Report. Volume 1, Synthesis Report, and Volume 2, Technical Addendum" provide updated data and report on progress toward delisting the AOC.

### **9.3 Watershed Projects**

#### **Black River Watershed Project, Ohio**

<http://www.erieforum.org/watershedprojects.php>

Working in partnership with multiple stakeholders in the Black River watershed in Ohio, the Lake Erie Public Forum will develop and implement a watershed strategy process. Through a series of public meetings, focus groups, and consultations, supported by local research, the objectives of the watershed strategy process are to:

- prioritize community environmental concerns
- identify activities to address Land Use Management, Emerging Issues, and Chemical Use Reduction
- identify resources to implement those activities

Commitments from local stakeholders to serve on the advisory committee have been obtained and the committee met in early January 2004. The project will take place in a sub-watershed situated along the West Branch of the Black River that includes the cities of Oberlin, Rochester, and Wellington. The majority of the sub-watershed is situated in Lorain County; however, a portion of the watershed is located in Huron County and Ashland County. The project will be conducted within the boundaries of the sub-watershed and project activities, therefore, will potentially take place in Lorain, Huron, and Ashland counties.

### **Southern Grand River Ontario Aquatic Ecosystem Rehabilitation Initiative**

The Grand River, Ontario is located in the eastern basin of Lake Erie. It is the home of 800,000 citizens and drains 6800 km<sup>2</sup>. It is the largest watershed draining into the eastern basin of Lake Erie and comprises 30% of the Canadian portion of the Lake Erie watershed. The river flows through a number of physiographic settings that control its channel morphology and the characteristics of the river waters. Water quality and aquatic habitats have been significantly modified by land use activities in the watershed. Large storage reservoirs in the upper reaches of the watershed regulate the flow regime of the river. Through the years, many ecological improvements have been realized in the upstream reaches of the Grand River. However, water quality, habitat, and fish and wildlife populations in the southern reaches of this watershed remain impaired.

The principle causes of the above impairments are high sediment and nutrient loadings, especially from nonpoint sources, high biological oxygen demand, habitat fragmentation and degradation caused by land use activities and dams. Restoring and protecting water quality and diversity of habitats in the Grand River is critically important to achieving the Lake Erie LaMP restoration goals for the eastern basin of Lake Erie.

In the spring of 2001 a partnership of federal and provincial agencies, Six Nations, the Grand River Conservation Authority and local stakeholders was formed with the common objective of restoring the aquatic ecosystem in the Southern Grand River. The partnership builds upon other planning initiatives in the watershed. The focus of the initiative to date has been to assess the status of water quality, benthos and the fish community, especially walleye, in the Southern Grand River and to build capacity in local stewardship and rural water quality programs to address land use issues. Strategies to mitigate impairments will be finalized over the next year. Rehabilitation, protection and stewardship projects are being developed and implemented as financial resources become available.

### **Kettle Creek Watershed Project, Ontario**

Working in partnership with multiple stakeholders in the Kettle Creek Watershed in Ontario, the Lake Erie Public Forum will develop and implement a watershed strategy process. Through a series of public meetings, focus groups, and consultations, supported by local research, the objectives of the watershed strategy process are to:

- prioritize community environmental concerns
- identify activities to address Land Use Management, Emerging Issues, and Chemical Use Reduction
- identify resources to implement those activities

Focal Erie has met with the Kettle Creek Conservation Authority and is in the process of choosing a sub-watershed and strategizing outreach efforts.

## **Lake St. Clair Program**

The need for a Lake St. Clair focus to coordinate and communicate the various on-going programs and to identify areas where work is needed was recognized by the 4 lead government agencies (Environment Canada, U.S. EPA, Ontario Ministry of Environment and Michigan Department of Environmental Quality) and in 2000 they approved a resolution to include Lake St. Clair under the 4 Agency Letter of Commitment. Under this commitment, a framework for managing Lake St. Clair has been completed, a binational monitoring committee (MUGLCC) has been established, and two binational monitoring activities inventories (MUGLCC 2000 and 2002) have been published.

The management framework will provide a platform for better coordination of lake related issues and efforts so that decision makers may more efficiently and effectively focus their efforts and resources. The key elements which form the basis of the management framework are: a Binational Partnership Agreement; a Binational Management Committee; a Binational Working Group; separate local U.S. and Canadian Watershed Coordinating Committees; and a Biennial State of Lake St. Clair Conference.

### **U.S.:**

<http://www.epa.gov/glnpo/aoc/st-clair.html>

A team of stakeholders led by the U.S. Army Corps of Engineers (USACE) completed a draft Comprehensive Management Plan for Lake St. Clair/St. Clair River in September 2003. The Comprehensive Management Plan contains goals, objectives, and recommendations for environmental management of the lake. Final transmittal of the plan to U.S. Congress is expected in 2004.

Concurrent with the development of the Comprehensive Management Plan was development the Management Framework to detail procedures for coordination of binational lakewide management efforts. Under the Four Agency Letter of Commitment, the Four Agency Managers adopted a final Management Framework design document on February 3, 2004. The Four Agencies worked to develop the Framework design in consultation with US Army Corps of Engineers, Southeastern Michigan Council of Governments, Macomb/St. Clair Intercounty Water Quality Advisory Group, Great Lakes Commission, and Environment Canada on behalf of the Conservation Authorities and other Canadian non-governmental local groups. The U.S. Lake St. Clair Coordinating Council under the Lake St. Clair Management Framework has been meeting and has developed a list of priority projects for which they are currently pursuing funding.

In addition, an effort to create a coastal inventory for Lake St. Clair was kicked off on January 14, 2003, with a Project Management Team comprised of representatives from local, state/provincial and federal agencies. NOAA Coastal Services Center is leading the binational Project Management Team to develop an Integrated Coastal Management (ICM) tool. The tool is being designed to: identify and rank potential restoration and conservation areas; inventory habitat; plan for land use; and evaluate impacts and alternatives for land development or conservation. The tool will calculate statistics that are used to examine how habitats function within a landscape. Results can be displayed within the tool as reports and maps or separate from the tool as ARC GIS maps and databases.

This tool is designed to be consistent with other Lake St. Clair efforts such as the Clinton River RAP, and the US Army Corps of Engineer's Lake St. Clair Management Plan. Preliminary goals for which the tool will be used are to: identify, increase and restore habitat; reduce impairments to beneficial uses; and, as a regional planning resource.

In June 2003, U.S.EPA held the second Lake St. Clair Conference. The subject of the conference was the review of efforts to restore and protect the lake, present the USACE draft Comprehensive Management Plan, discuss recommendations contained in the plan, and present the draft Management Framework.

**Canada:**

[http://www.on.ec.gc.ca/water/raps/stclair/intro\\_e.html](http://www.on.ec.gc.ca/water/raps/stclair/intro_e.html)

In 2002, Environment Canada established a technical workgroup comprised of agencies with a responsibility for the environmental health of the Lake St. Clair Canadian watershed. Representatives from the following agencies participated in this workgroup: Environment Canada (chair), Fisheries and Oceans Canada, Canadian Coast Guard, Ontario Ministry of the Environment, Ontario Ministry of Natural Resources, Ontario Ministry of Agriculture and Food, Essex Region Conservation Authority, Lower Thames Valley Conservation Authority, St. Clair Region Conservation Authority, Upper Thames River Conservation Authority and Walpole Island First Nation. Agriculture and Agri-food Canada and Health Canada provided additional information. This workgroup was tasked with providing the Canadian information to be included into the USACE Lake St Clair St. Clair River Comprehensive Management Plan and for preparing the Canadian Lake St. Clair Watershed Technical Report. Key management areas that were identified in the Canadian Lake St. Clair Watershed Technical Report were: land use, nutrients, chemical contamination and habitat loss & biological contamination.

In 2004 the Canadian Watershed Coordinating Council for Lake St. Clair will be established and will be comprised of largely the same members as the workgroup. Over the next two years, the Canadian Watershed Coordinating Council will complete a consultation process and develop recommendations to address the key management areas identified in the backgrounder report.

# Lake Huron

(Excerpts from 2004 Update to the Lake Huron Binational Partnership)

## Lake Huron Areas of Concern

In 1987, four AOCs were identified within the Lake Huron watershed, as well as the St. Marys River. Collingwood Harbour and Severn Sound in Canada were delisted in 1994 and 2003 respectively. Monitoring is ongoing in these areas to ensure that environmental quality is maintained. Each of the remaining AOCs are being addressed through on-going programs, as described below. For more information on AOCs, see the following websites:

[http://gldev.on.ec.gc.ca/water/raps/map\\_e.html](http://gldev.on.ec.gc.ca/water/raps/map_e.html)

<http://www.epa.gov/glnpo/aoc/index.html>

## Saginaw River/Bay, Michigan

The Saginaw Bay Watershed is one of Michigan's most diverse areas-its rich resources support agriculture, manufacturing, tourism, outdoor recreations, and a vast variety of wildlife. The watershed is 8,709 square miles in size and is America's largest contiguous freshwater coastal wetland system. Contaminated sediments, fish consumption advisories, degraded fisheries and loss of significant recreational values are the major reasons for this AOC's designation. Saginaw Bay priorities include remediation of PCB contaminated sediment, nonpoint pollution control, wetland restoration, and habitat restoration.

The Stage 1 Saginaw River/Bay Remedial Action Plan (RAP) process began in July 1986 and was completed in September 1988. Following substantial progress, an updated Saginaw River/Bay RAP was developed in 1994. More recently, the Measures of Success report (2001) provides a foundation for redirecting and refocusing efforts. It recommends a list of targeted restored conditions that should be viewed as steps toward the delisting of the Saginaw Bay/River AOC. Preparation of the updated Saginaw River/Bay RAP is being done through the committee structure of the Partnership for the Saginaw Bay Watershed.

Major ongoing efforts are addressing contaminated sediments and floodplain soils within the Tittabawassee and Saginaw River. Sediments and floodplain soils in the Saginaw River Watershed contain a variety of organic compounds, including dioxins, furans, and PCBs. The 1998 \$28.2 million natural resources damages settlement funded the removal of 342,433 cubic yards of contaminated sediments from the river, protection of coastal wetlands (1677 acres), and restoration of coastal wetland and lakeplain prairie on 391 acres. Portions of this settlement used as match for a \$1M North American Wetlands Conservation Act (NAWCA) grant that is improving habitat on approximately 3,000 acres. Also, plans are being finalized for restoration of the hydrology of Tobico Marsh, a 900 acre wetland immediately adjacent and connected to Saginaw Bay. This project is expected to improve spawning opportunities for Saginaw Bay northern pike.

Existing data from US Army Corps of Engineers, U.S. EPA, and Michigan DEQ indicate that, at some locations, dioxin contamination exceeds human health risk-based regulatory levels and ecological risk based screening levels. Michigan Department of Environmental Quality is actively characterizing Saginaw River sediments and floodplain soils for compounds of regulatory and environmental significance. The data collected will assist in decision making regarding short-term protection of human health and the environment and long-term remediation of the Saginaw River and Saginaw Bay. It will also provide input to similar decision-making on the Shiawassee River, a tributary of the Saginaw River. Michigan DEQ is engaging the community as an integral part of addressing the dioxin issues in the watershed and Area of Concern. A Community Advisory Panel (CAP) has been established to bring stakeholders together and advance remediation.

### **St. Marys River: A Binational Area of Concern**

The St. Marys River is a 112 km connecting channel between Lakes Superior and Huron and is subject to many activities under the binational Remedial Action Plan. Accomplishments on the Canadian side have included the development of wetland protection strategies, the recovery of walleye populations, the design of habitat features in the city's waterfront development, and installation of an activated sludge treatment facility to reduce the oxygen demand and suspended solids in the discharge water of the St. Marys Paper mechanical pulp mill. The Environmental Management Agreement with Algoma Steel, to be renewed in 2004, has likewise resulted in many improvements to both air and wastewater discharges. Current projects include: funding for the design of a strategy for contaminated sediment; review of delisting criteria; wastewater characterization study; and wetland conservation. Future challenges include the need to control inputs from the century-old Algoma slag site, long-term sea lamprey control efforts to restore impaired fisheries, and the finalization and implementation of a sediment management plan.

Priorities of the St. Marys River on the Michigan side are cleanup of the Cannelton Tannery Superfund site, sea lamprey control, and elimination of combined sewer overflows. The Cannelton Superfund site has been restored for re-use by the city of Sault Ste. Marie and its citizens. Once remediated, the site may support light industry, residential homes, or park areas. Certain use restrictions will apply to various parts of the site to prevent contamination from affecting human or ecosystem health. The sea lamprey control efforts will help restore impaired fisheries in the St. Marys River as well as northern Lake Huron and Lake Michigan. This will be a long-term, continuing effort since the opportunistic lamprey can take quick advantage of any lapse in larvae and adult control measures. Combined sewer separation in Sault Ste. Marie, Michigan has already eliminated the worst of the occasional overflows of sewage to the St. Marys River in Michigan waters. Continued work on this will eventually stop all potential for untreated sewage entering the river, even in the worst run-off events.

### **Targeting the Saginaw Bay Aquatic Ecosystem**

Saginaw Bay is one of the most biologically productive portions of the U.S. Lake Huron watershed. Several efforts are advancing the restoration of this critical region. Two are highlighted below.

### **Addressing Contaminated Sediments in Areas of Concern**

Some harbors and rivers within the Lake Huron watershed continue to be contaminated by the legacy of industrial pollution. Several programs target contaminated sediments for removal, before the sediments are dispersed by storm or flood events. The recently-passed Great Lakes Legacy Act (Public Law No: 107-303) may help advance ongoing efforts. The act authorizes appropriations up to \$50M per year from FY2004 through FY2008 to address contaminated sediment projects in Great Lakes Areas of Concern.

#### Saginaw Bay

Following the removal of about 345,000 cubic yards of contaminated sediments from five areas in the lower Saginaw River, Michigan Department of Environmental Quality and the U.S. Fish & Wildlife Service continue to implement post-dredging activities and monitor ecosystem recovery. These activities are pursuant to a 1998 \$28.2 million natural resources damages settlement [under Superfund]. Michigan Department of Environmental Quality and U.S. EPA's Great Lakes National Program Office are performing surveys of the horizontal and vertical distribution of dioxin/furan concentrations in the Tittabawassee, Saginaw, Cass, and Shiawassee Rivers. While PCB contamination has been well documented in this area, dioxins and furans have not. This project is funded through U.S. EPA's GLNPO's competitive grant program and has received strong support from the U.S. Fish and Wildlife Services, as it will complement USFWS ecological risk assessment for dioxin like compounds in this watershed. The Service plans to ultimately use these study results to calculate congener-specific sediment to biota accumulation factors. The assessment is expected to be completed by 2005. Meanwhile, MDEQ has completed an aquatic ecological risk assessment for the Tittabawassee River and is working with Dow Chemical (under

RCRA) to implement interim actions to protect human health while they develop plans for corrective actions to address the dioxin and dibenzofuran contamination in the Tittabawassee River and its floodplain.

Michigan Department of Environmental Quality and U.S. EPA Region 5 are continuing the DDT/PBB PineRiver sediment cleanup and post-evaluation. This effort is funded through the Clean Michigan Initiative and Superfund. Total project cost to date is \$53 million. To date, about 400,000 cubic yards of DDT contaminated sediment has been removed (which includes approximately 750,000 lbs. of DDT). About 280,000 cubic yards remain. The clean-up to be completed by the end of 2007.

#### St. Marys River

U.S. EPA - GLNPO and Lake Superior State University is investigating possible downstream contamination of sediments at two focus areas with St. Marys River: the Little Rapids area, a candidate for restoration of open rapid habitat, and Munuscong Lake in the lower St. Marys, which has undergone substantial hydrological manipulations in the past. This project was funded through U.S. EPA B GLNPO-s competitive grant program. The assessment is expected to be completed in 2004.

#### **Walleye Recovery in Saginaw Bay**

In 2003, the MDNR Fisheries Division presented the Saginaw Bay Walleye Recovery Plan to stakeholders for their approval and endorsement. The Saginaw Bay Walleye Recovery Plan is a science-based blue print for management actions intended to achieve a self-sustaining walleye population and restore ecological balance to the fish community. Biological benefits from the recovery plan are anticipated to extend to the greater fish community, including yellow perch. The recovery plan focuses on 1) reducing stream habitat and sediment delivery to the bay, through collaboration with partner agencies such as MDEQ and the Natural Resources Conservation Districts as well as stakeholder watershed groups, 2) achieving fish passage at key dams, 3) reef rehabilitation, and 4) increased stocking of fingerling walleye (to 2.8 million) to shift the predator/prey balance. This effort is closely linked to the effort described below.

#### **Restoring Fish Passage to Saginaw Bay Tributaries**

A pilot project is currently investigating how to restore natural flows and enhancing fish passage over lowhead barrier dams in the Saginaw River watershed. A decision-making tool and strategy for resource managers and communities that will identify the most cost-effective options for dam removal/fish passage to achieve the targeted, sustainable fish population goals for Saginaw Bay. In cases where dam removal is unlikely in the near-term, a design feasibility study will identify techniques for enhancing fish passage over a barrier dams. This effort, organized by Public Sector Consultants, includes the following project partners: The Partnership for the Saginaw Bay Watershed, Michigan Department of Natural Resources, City of Frankenmuth, Michigan Department of Environmental Quality, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and community representatives. This project could provide a template for fish passage on other Great Lakes tributaries.

#### **Changes in the Lower Food Web of Saginaw Bay**

The Great Lakes Environmental Research Laboratory, NOAA conducted a large study in Saginaw Bay between 1990 and 1996 to assess the impact of the zebra mussel on the lower food web (nutrients, phytoplankton, zooplankton, benthos). While a portion of the data has been analyzed and published, present efforts will complete the analysis and provide an overall synthesis.