

# Remedial Action Plan Summaries for Michigan's Great Lakes Areas of Concern



Prepared by the  
Statewide Public Advisory Council  
for Michigan's Great Lakes  
Areas of Concern Program

*October 2001*

This document lists Remedial Action Plan (RAP) recommendations for each of Michigan's 14 Great Lakes Areas of Concern. State and local contacts are also listed as well as a brief overview of the status of each RAP and the designated beneficial use impairments for each Area of Concern. This document will be updated periodically to reflect new information and will be available online at [www.glc.org/spac/spac.html](http://www.glc.org/spac/spac.html).

# Clinton River Area of Concern



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Remedial Action Plan Status
The initial Remedial Action Plan (RAP) document was completed in 1988. The next iteration of the RAP was completed in January 1995. The 1998 Clinton River Watershed Remedial and Preventative Action Plan and the 1998 RAP Update and Progress Report were published in January 2000. These documents are produced primarily by work groups consisting of Public Advisory Council (PAC) and RAP Team representatives, other technical experts, and the general public.

Beneficial Use Impairments	
<ul style="list-style-type: none"> <li>➤ Restrictions on fish and wildlife consumption</li> <li>➤ Degradation of fish and wildlife populations</li> <li>➤ Degradation of benthos</li> <li>➤ Restriction on dredging activities</li> </ul>	<ul style="list-style-type: none"> <li>➤ Eutrophication or undesirable algae</li> <li>➤ Beach closings</li> <li>➤ Degradation of aesthetics</li> <li>➤ Loss of fish and wildlife habitat</li> </ul>

## Implementation Recommendations

### **Recreation**

- Update watershed recreation inventory.
- Network recreation interests.
- Recreation incorporated in local planning.
- Open space and recreation in developments.
- SW pond designs with recreation.
- Riverside parks.
- More fishing access.
- Fishing, canoeing maps.
- Wildlife viewing.
- Sponsor recreation events.
- Canoe trails, mini-parks.

### **Contaminated Sediments**

- Control sources of contaminants.
- Complete assessment; make remedial decisions.
- Implement remedial measures as necessary.

### **Habitat Restoration, Mitigation and Conservation**

- Develop basin-wide log and debris jam master plan.
- River clear of obstructions.
- Preserve and create vegetative buffer strips.
- Restore summer base flows; further evaluate best method(s).
- All public agencies protect high quality habitat lands they own.
- Evaluate and prioritize sites for habitat improvements.
- Restore in-stream habitat for sustainable fish communities.

### ***Habitat Restoration, Mitigation and Conservation (continued)***

- Restore fish migration ability and spawning habitat/dams and lake level controls.
- Protect functions of wetlands and floodplains/eliminate isolation practices.
- Acquire, restore and protect conservation lands.
- Restore recruitment of woody debris.
- Stream restoration projects.

### ***Nonpoint Source Pollution***

- Control bacteria in storm sewers and drains.
- Erosion control and no direct discharges at stream crossings.
- Watershed stormwater management for drains.
- Minimize impacts of road de-icing; consider alternatives.
- Reallocate resources from dredging and cleanouts to erosion control.
- Monitor and correct animal waste problems.
- Help livestock producers and stable managers develop and implement manure mgt. plans.
- Green golf course program.

### ***Pollution Prevention & Wastewater Management***

- Inspect inactive landfills.
- Expand storm drain stenciling program.
- Provide collection, recycling and disposal services where lacking.
- Correct problems at facilities.
- Control bacteria in storm sewers and drains.
- Erosion control and no direct discharges at stream crossings.
- Initiate/continue illegal connections program.
- Ensure proper septage disposal by haulers.
- Complete sewer system improvements with State Revolving Fund (SRF).
- Report on downspout removal programs (for Combined Sewer Overflows).
- All wastewater treatment plants undertake pollution prevention for households, etc.
- Preventive and corrective action for failing septic.

## Process and Planning Recommendations

### ***Education, Outreach and Public Participation***

- Incorporate pollution prevention/household hazardous waste into school curricula.
- Educate residents about pollution prevention.
- Produce audio and video vignettes.
- Educate owners and operators of junkyards about pollution prevention.
- Background information sheets.
- Market information available.
- Website about the watershed.
- Publicly accessible Geographic Information System.
- Watershed and stream crossing signs.
- Clinton River Information Archive.
- Michigan Sea Grant should continue GLEP. Create awareness of watershed address.
- Develop education and communication strategy.
- K-12 watershed curriculum.
- Enviroscope available to teachers.
- Inventory and network education programs.
- Watershed signs at nature centers and parks.
- Land information kiosks around the watershed.
- River calendar/photos.
- Stormwater management education for new development.
- Public education on buffer strips and other Best Management Practices.
- Enhance public awareness and local stewardship efforts.
- Education to prevent feeding of wildlife.

### ***Education, Outreach and Public Participation (continued)***

- Develop interactive tutorial for river/watershed.
- Historical and cultural profiles of the river.
- River stewardship programs.
- Trade journal articles.
- Water quality connection to river uses.
- Stormwater education.
- Public education, participation, stewardship.
- Produce brochures.
- Homeowners education.
- Provide residential education programs.
- Creekshed programs.
- Friendly Business program.
- Green golf course program.
- Developers education.
- Watershed education on pleasure cruises.
- Information on agency roles.
- Newspaper articles.
- RAP display.
- Speakers bureau.
- Youth involvement.
- Annual Clinton River Festival.
- Bike tours, canoe outings, etc.
- Flotilla boats.
- Watershed wide cleanup day.
- Train teachers in Projects WET, WILD, GREEN, Wow! The Wonders of Wetlands
- Pre-service teacher training.
- Re-establish CREWS, beginning in Bear Creek.

### ***PAC Capacity and Funding***

- Create institutional structure to implement plans and continue conservation efforts.
- Seek assistance and funding from the MDEQ for 319 funding, and other sources.
- Use State Revolving Fund loans to install erosion controls.
- Seek additional funding for technical assistance to landowners re: erosion.
- Allocate 0.01 mil of local property taxes to fund Natural Resources Conservation Service and erosion programs.
- Develop cost share program for erosion control with SRF.
- Adequately fund failing septic system detection and correction.
- Support river/creek watchdog groups.

### ***Policy, Enforcement and Regulatory Control***

- Obtain enhanced regulatory control over junkyard facilities.
- Approach potentially responsible parties for help with assessment and cleanup.
- Initiate illegal connections program.
- Sample discharges from suspect facilities; counties should include regular sampling in solid waste management plans.
- Local stormwater ordinances.
- Report on how to do illegal connection investigations well.
- Stormwater Best Management Practice inspection training.
- Uniform soil erosion control program throughout the watershed.
- Continue septic density policy.
- Enforce septic siting, design, and installation standards.
- Statewide septage disposal policy.
- SOCSDS meet new permit requirements and upgrade as necessary.
- Enact local ordinances to ban wildlife feeding.
- Enact pooper scooper ordinances and educate pet owners.
- Train local inspectors - erosion control.

### ***Policy, Enforcement and Regulatory Control (continued)***

- Municipal permits assistance.
- Staging, scheduling of construction; bare soil ordinance and/or incentives.
- Citizen site plan reviews and soil erosion inspectors.

### ***Research, Monitoring and Data Management***

- Establish a rigorous biomonitoring program.
- Implement regular monitoring programs to track progress and ID new problems.
- Develop and maintain Geographic Information System multi-variable database.
- Monitor new technologies for determining effects of atmospheric emissions/deposition.
- Quantify air emissions originating in the Clinton River watershed.
- Determine and quantify air pollutants contributing to use impairments.
- Evaluate existing household hazardous waste programs and facilities; determine needs.
- Establish hydrological model of the Clinton River...establish base flows.
- Determine measures to achieve base flow.
- Include in a publicly accessible database all identified contaminated sites in the basin.
- Identify and track progress at contaminated sites.
- Evaluate effects of contaminated sites on groundwater and surface water.
- Expand student water quality monitoring.
- Determine sufficiency of the MDEQ Surface Water Quality Division habitat inventory.
- Track exotics and controls.
- Assess existing habitat information; complete inventory; identify important natural features; database.
- Investigate wildlife problems in the watershed.
- Local natural features inventories and priorities for conservation.
- Wildlife progress report.
- Identify drain ownership and maintenance responsibility.
- Monitor new technologies for determining effects of atmospheric emissions/deposition.
- Continue monitoring at all facilities; monitor for source reductions (industrial).
- Continue monitoring at all facilities and update permits (wastewater treatment plants).
- Alternative technologies to septic systems.
- Investigate wildlife problems in the watershed.
- Recreation information clearinghouse.
- Evaluate grant projects impact on RAP.
- Report on river status employing indicators.

### ***Land Use and Watershed Planning***

- Develop hydrological watershed plan.
- Create watershed simulation game and check out existing resources such as Envirosapes.
- Maps in multiple media formats.
- Protect headwaters from channelization; incorporate flow patterns into drain design.
- Support Greenways Initiative.
- Complete watershed fisheries assessment.
- Subwatershed stormwater management planning.
- Inform local officials about watershed management.
- Public access on private riparian lands.
- Greenways and trailways.
- Watershed stormwater management for drains.
- Subwatershed stormwater management planning.
- Show drainage districts on drain maps.
- Map critical slope areas in the watershed.
- Identify important groundwater recharge areas; develop protection strategy.
- Preserve and create vegetative buffer strips.
- Incorporate habitat protection into local land use planning and zoning.
- Identify and prioritize joint efforts on uplands and drains.
- Map lands already committed to habitat protection.
- Complete watershed fisheries assessment.
- Coordinate work plans of conservation districts in watersheds.
- Inform local officials about watershed management.

# Deer Lake Area of Concern



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## Remedial Action Plan Status

The Public Advisory Council (PAC) is currently in the process of writing a Remedial Action Plan (RAP) Update and will include the identification of beneficial use impairments as outlined in the Great Lakes Water Quality Agreement. Issues relating to the Area of Concern and goals for the PAC have been identified.

## Beneficial Use Impairments

- Restrictions on fish and wildlife consumption
- Restriction on dredging activities

## Implementation Recommendations

### **Recreation**

- Feasibility study for boat launch.

### **Contaminated Sediments**

- Complete RAP update assessing current status of beneficial use impairments.

### **Habitat Restoration, Mitigation and Conservation**

- Continue fisheries habitat improvement: removing beaver dams, creating spawning habitat in partnership with Central Upper Peninsula Sportfishing Association and Trout Unlimited.

## Process and Planning Recommendations

### **Research, Monitoring and Data Management**

- Develop long-term monitoring plans.

### **Land Use and Watershed Planning**

- Develop a watershed management plan.

# Detroit River Area of Concern



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## Remedial Action Plan Status

The Detroit River Remedial Action Plan (RAP) was completed in 1996 by professionals and community representatives to address the water quality issues associated with the Detroit River. The Detroit River RAP was developed as a binational effort through a partnership between the Environmental Protection Agency and the Michigan Department of Environmental Quality to address impairments to beneficial uses of the river or water use goals. Approximately 104 recommendations were developed with the goal of restoring and maintaining the integrity of the Detroit River ecosystem to a standard that will provide a safe, clean, and self-sustaining natural environment, such that (1) self-reproducing, diverse biological communities are restored and maintained, and (2) the presence of contaminants does not limit the use or appreciation of fish, wildlife or waters of the river.

Despite several limitations, the Action Teams have carried out numerous activities needed to implement the Detroit River Remedial Action Plan.

## Beneficial Use Impairments

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|--|---|
| <ul style="list-style-type: none"> <li>➤ Restrictions on fish and wildlife consumption</li> <li>➤ Tainting of fish and wildlife flavor</li> <li>➤ Fish tumors and other deformities</li> <li>➤ Degradation of benthos</li> <li>➤ Restriction on dredging activities</li> </ul> | <ul style="list-style-type: none"> <li>➤ Restrictions on drinking water consumption, or taste and odor</li> <li>➤ Beach closings</li> <li>➤ Degradation of aesthetics</li> <li>➤ Loss of fish and wildlife habitat</li> </ul> |
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## Implementation Recommendations

### Recreation

- The Technical Work Group (TWG) recommends that the shorelines be protected and that public access to the Detroit river be increased to provide the public with more wildlife-oriented recreation and environmental education opportunities.

### Contaminated Sediments

- Remedial action on a list of “hot spots” based on mercury levels.

### ***Contaminated Sediments (continued)***

- Encourage the continuation of the Contaminated Sediments Technical Work Group.
- Mechanically dredge approximately 30,000 yards of sediment.

### ***Habitat Restoration, Mitigation and Conservation***

- Begin remedial actions recommended on the list of proposed habitat candidate sites.
- Provide more effective protection to the migratory birds and their habitat.
- Formulate a restoration plan for lake sturgeon in collaboration with regional fishery management authorities.
- Identify high priority fish and wildlife habitat enhancement opportunities.
- Provide associated recommendations regarding relative priority of habitat types for restoration, habitat targets, etc.
- Evaluate the potential of each site for protection and remediation.
- Prioritize sites in functional and impaired categories for remediation using an existing ranking system.
- Design and install appropriate habitat at identified project sites.
- Initiate initial assessment.
- Complete initial assessment (preparation of Preliminary Restoration Plan).
- Feasibility Phase after approval of Preliminary Restoration Plan.

### ***Nonpoint Source Pollution***

- Implement ERCA agricultural soil erosion control proposal.
- Create a strong soil erosion control program to reduce the amount of erosion and sedimentation. Construction sites should be considered a priority in such a program.
- Isolate areas with the use of silt barriers.

### ***Pollution Prevention & Wastewater Management***

- Implement the ERCA Private Sewage Disposal Proposal.
- Implement a source control program for mercury and PCBs.
- Complete implementation of short-term combined sewer overflow (CSO) controls by 2000.
- Meet water quality standards and use criteria for toxicity due to CSOs.
- Identify CSOs with greatest impact and implement remedial programs.
- Provide adequate disinfection of CSOs.
- Remove settleable solids and control all floatable sanitary waste from CSO discharges to ensure that downstream deposition and discharges of identifiable objects of human origin is minimized.
- Implement pollution prevention programs, particularly contaminants of concern to municipal sewers.
- Voluntary public and industrial pollution prevention initiatives to prevent spills to the collection system.
- Region-wide recycling and disposal programs for household hazardous waste.
- Institute rigorous industrial pretreatment and source elimination programs.
- A program for the elimination of PCBs currently in use (electrical transformers and capacitors for example) should be actively pursued.
- A minimization plan for PCBs in the Detroit waste water system will be developed and implemented. A minimization plan for mercury in the Detroit waste water system will be developed and implemented.
- Institute a toxic chemical source elimination or reduction program.
- Control documents and discharge permits should consider both concentration and loading limitations of pollutants and included when applicable.
- Implement a remedial plan for faulty private sewage disposal systems as outlined in ERCA's full proposal (i.e. grant assistance program to update septic systems where communal sewage treatment systems are not feasible).
- Determine the magnitude of faulty septic systems impacting rural watercourses to determine annual loading rates for tributary watersheds of the Detroit river (i.e. land use/building inventory to further extrapolate the big creek data).
- Pollution Incident Prevention Plans (PIPPs) should be developed by any industrial or commercial facilities which store or use materials which, if lost to the environment could directly or indirectly reach the Detroit river.
- Implement pollution prevention programs, particularly with respect to reduction or elimination of discharge of the contaminants of concern to municipal sewers.
- Identify the CSOs with greatest impact on the Detroit river (loadings of contaminants of concern or adversely affecting beneficial uses including sediments) and develop and implement appropriate remedial programs to control those CSOs as described in a.6.
- Complete implementation of short term CSO all PS controls by no later than 2000.

### ***Pollution Prevention & Wastewater Management (continued)***

- Complete development of long term plans by 1997 and implementation of final long term CSO controls no later than 2035.
- Meet the Michigan water quality standards and Ontario water use criteria for toxicity due to CSOs.
- Provide adequate disinfections of CSOs for protection of human health.
- Provide preferential treatment for separate sanitary flow and regulate combined sewer flows.
- Promote voluntary public and industrial pollution prevention initiatives particularly with respect to prevention of spills to the collection system.
- Assure proper implementation of the industrial pretreatment program (U.S.) and municipal sewer use by-laws (Ontario) as they relate to toxicant discharges to municipal sewer systems.
- The industrial pretreatment program and municipal sewer use by-law should be expanded to require indirect industrial dischargers that are tributary to CSOs to minimize their discharges during wet weather, where feasible.
- The industrial pretreatment program and municipal sewer use by-law should be expanded to require indirect dischargers to develop and implement pollution prevention plans.
- Adopt best management practices at facilities including “good housekeeping” to prevent stormwater runoff from collecting pollutants and depositing them in a combined sewer.
- Develop and implement region-wide recycling and disposal programs for household hazardous waste.
- Develop and implement a source control program for mercury and PCBs.
- Complete the development of regional hydraulic models to demonstrate appropriate CSO controls.
- Assist Michigan Department of Environmental Quality (MDEQ) with pollution prevention efforts for those businesses that may affect the waters of the Detroit River.
- Promote recycling at marinas.
- Encourage marina owners to preclude in-water boat/hull repairs.
- Encourage marina owners to remove aquatic plants as opposed to using chemicals.
- The city is acquiring land to build end-of-pipe treatment.
- The wastewater treatment plant expansion is due to begin in 2000.
- In-system storage and end-of-pipe treatment systems are expected to be installed beginning in 2001.
- Identify probable threats to water quality.
- Employ alternative treatment method for reuse.
- Employ conventional disposal options.

## Process and Planning Recommendations

### ***Education, Outreach and Public Participation***

- Public education program, involving a network of angler, environmental and conservation groups and schools.
- Education program to train (professionals) in permitting requirements, violations, and enhancement/protection.
- Develop an education program for homeowners and commercial properties for waste reduction.
- Develop and distribute public guidance documents in the Area of Concern (AOC) promoting an ecosystem approach to land development and provide direction on permit and planning application requirements.
- Improve communication among the public, local governments and developers with Michigan Department of Natural Resources (DNR) and Ontario Ministry of Natural Resources to preserve and protect existing habitat in the AOC.
- Establish an education program in the AOC to train local planning and zoning officials, real estate agents, consultants, developers, municipal building officials, and conservation officers.
- Encourage participation in existing federal, state and provincial incentive programs for habitat protection and rehabilitation activities in the AOC.
- DNR and MOEE should provide more information to dischargers on their programs and treatment technology.
- Educate and promote sound management practices through conservation farm management plans.
- Begin an intensive education effort aimed at pleasure craft and marina owners on how to avoid discharges of pollution to the river.
- Develop an education program at the local level for homeowners and commercial properties that targets waste reduction.
- Municipalities within the area of concern should disseminate information to indirect dischargers encouraging waste reduction practices.
- Educate public with regard to appropriate disposal of household hazardous waste.

### ***Education, Outreach and Public Participation (continued)***

- Identify specific businesses to coordinate with.
- Prepare a report that will be disseminated to the public.
- Disseminate information about the project widely.
- Educate the public about the influences of human immigrations, water level fluctuations, intensity of international trade, drainage laws, shipbuilding, industrialization, and wetland protection by private and public agencies, etc.
- Disseminate information and mapping tools to the general public via the Internet from a Web site and server located at Eastern Michigan University-CEITA lab.
- Highlight and explain the importance of this region as a major migration flyway.
- Produce an atlas which will be widely distributed to the public.

### ***PAC Capacity and Funding***

- More efficient use of staff through coordination.
- Use of settlement and judgment awards to restore and protect habitat in the AOC.
- Direct federal funding to support specific activities required by the Great Lakes Fish and Wildlife Restoration Act in the AOC.
- Make more efficient use of existing staff by coordinating environmental protection activities in the AOC and other agencies.
- Additional funding mechanism should be identified (concerning point source discharges).
- Encourage marinas to make use of matching grants for installing of pump-out systems.
- Continue to solicit contributions from other agencies for the project.

### ***Policy, Enforcement and Regulatory Control***

- Local agencies review of plans and ordinances/bylaws to incorporate environmental aspects.
- Improve communication between local government and developers with the MDEQ and OMNR.
- Assure proper implementation of the Industrial Pretreatment Program (US) and Municipal Sewer Use By Laws (Ontario).
- Develop a program to identify and remove illegal connections to the storm water system.
- Require MDNR & local government review of all county stream improvement projects in the Detroit river watershed.
- Amend the planning act so that it will function more effectively in protecting fish and wildlife habitat and encourage more widespread proactive municipal planning on an ecosystem basis.
- Develop specific provincial legislation with associated policy and adequate penalties to protect wetland area and function.
- The Conservation Authorities Act needs to be amended to give direct mandate to conservation authorities for the preservation and protection of wetlands, fish habitat and other environmentally significant areas.
- Increase staffing levels in Michigan and Ontario regulatory agencies which have jurisdiction in the AOC.
- Increase permit coordination and the availability of information on permit requirements.
- Encourage local agencies in the AOC to review existing plans and local zoning ordinances/by-laws to incorporate environmental aspects and be aware of existing environmental legislation over all program areas.
- Reinstate the applicability of the Ontario conservation land tax rebate to conservation authority lands in order to protect these holdings located within the various AOCs.
- Maintain good communication between all parties involved: federal, state/provincial, city/county and the facility.
- Regulatory staff need to be better trained in order to 1) understand the technical issues of various wastewater treatment systems and 2) be able to help dischargers with clear, consistent advice on administrative procedures or technology transfer.
- Allow permit and monitoring data to be submitted by the discharger electronically (concerning point source dischargers).
- Review permits and certificates every 5 years. Make any appropriate changes.
- Increase the number of field staff in regulatory programs and clearly prioritize their workload.
- Do multi-media inspections at least once per year with staff from all applicable regulatory programs.
- Change legislation to allow local government to levy significant fines for programs which fall under their jurisdiction.
- Streamline penalty collection mechanisms. An example is greater use of the administrative consent order in Michigan instead of going to court (concerning point source discharges).
- A clearly defined strategy for enforcing compliance in local PP programs should be developed.

### ***Policy, Enforcement and Regulatory Control (continued)***

- Develop an illegal connections elimination program to identify and remove illegal connections to the stormwater system.
- Develop a strong stormwater regulatory program.
- The regulatory agencies should act as a clearinghouse for current information on control measures.
- Larger fines for spills from industrial facilities.
- Quicker, more efficient methods of enforcement.
- Include remediation sites in stormwater regulations which are developed.
- Institute deposits or disposal fees on items which are composed of significant portions of the parameters of concern and are often improperly disposed of such as tires and batteries.
- Implement Michigan CSO permitting strategy through effective NPDES permit application and enforcement.
- Adopt and implement the proposed Ontario policy for CSO control.
- Toxic release notification education strategy.

### ***Research, Monitoring and Data Management***

- Monitoring to confirm storm water loadings.
- Develop a habitat inventory for the AOC.
- Develop a Geographic Information System (GIS) for the AOC.
- Conduct and evaluate a hydraulic study of the Detroit River.
- River monitoring to determine local impacts and total loading to the river.
- Establish a monitoring/modeling group for the overall Remedial Action Plan.
- Evaluate nonpoint and nontraditional point sources to quantify and qualify source loadings of mercury and PCBs.
- Develop habitat inventory for the AOC.
- Develop GIS system for the St. Clair-Detroit River corridor to identify various habitat types.
- Complete a Cumulative Impact Hydrologic Study for The Detroit River.
- Judge the status of fish populations in the Detroit River.
- Support an increased level of sediment monitoring.
- Support an increased level of monitoring of sources in support of sediment modeling.
- Obtain a higher level of support for modeling activities.
- The Point Source/Nonpoint Source Technical Working Group recommends the formation of monitoring and modeling groups to oversee the collection of data and the evaluation of available models and model outputs for the AOC.
- Continue data acquisition and evaluation on all point source dischargers for the parameters of concern at acceptable frequency and detection level to accurately define the total loading from each individual point source as well as the total load.
- Set up a river monitoring program which will determine the local impacts of discharges as well as the total loading to the river.
- Further investigative work should be conducted on the Rouge and Ecorse rivers to determine the sources of cadmium loadings in these tributaries to the Detroit River.
- Further investigative work should be conducted on the Rouge and Ecorse rivers to determine where the high loadings are originating (copper).
- A quantitative evaluation of nontraditional sources is necessary to accurately qualify and quantify source loadings for the expressed purpose of control and elimination (PCBs).
- A quantitative evaluation of nonpoint and nontraditional point sources is necessary to accurately quantify and qualify source loadings of mercury for the purpose of control and elimination of PCBs.
- Streamline the data acquisitions process. Use computer databases and electronic transfers of monitoring data to make more accessible, easier to use, and readily accessible to the public. Eliminate unnecessary or redundant paper work.
- Monitoring should initially occur at a frequency determined to provide statistically accurate representations of the stormwater, which would include sampling storm events (prior, during and after). This data should be used to make specific, long term monitoring recommendations.
- Monitor, on a sub-watershed basis the effects of remedial actions on improving water quality.
- Further investigative work should be done within the tributary watersheds of the Detroit River to determine loading rates of various pollutants associated with sediment runoff from agricultural lands. (Develop Total Maximum Daily Loadings)
- Some site specific monitoring is needed to confirm or adjust the loadings so that decisions can be based on sound data. The monitoring should also evaluate control measures as they are installed.

### ***Research, Monitoring and Data Management (continued)***

- Methods should be evaluated to reduce the quantity of stormwater into the collection system of developed areas through retention and detention.
- Expand data acquisition to accurately define total loadings from tributaries to the Detroit river specifically including sampling to reflect storm events.
- The work group proposed a joint U.S. -Canadian air deposition study.
- Continue to catalog all existing and abandoned landfills and remediation sites or any other identified groundwater contamination problems.
- Continue to gather data to quantify and qualify pollutant levels (particularly to toxics) in CSOs and pollutant loadings from CSOs to the Detroit river.
- The city is conducting a rainwater test program in four neighborhoods to determine how effective these methods are in reducing the amount of rainwater that gets into the system.
- Identify causes and sources of the threats and impairments to water quality by modeling geo-statistical correlations between the distributions of certain land cover types and levels of water quality impairments.
- Survey the St. Clair/Detroit Rivers with approximately 1139 cross sections at 100-meter line spacing.
- Conduct parameter estimation analysis to quantify the reliability of flow simulation results.
- Data collection and review.
- Evaluation of alternatives.
- Prepare draft preliminary analysis.
- Prepare final analysis report.
- Gather lake sturgeon spawning, nursing, feeding, resting and migration information in the Detroit River in order to determine habitat needs.
- Evaluate the physical, chemical, and biological aspects of current or potential lake sturgeon habitat in the Detroit River.
- Research how exposure to contaminated sediments affects sturgeon growth and survival.
- Evaluate effects of contaminants on ecosystem.
- Establish factors influencing the ecological effects of individual contaminants.
- Determine the number, location, and extent of remaining functional and impaired candidate sites of fish and wildlife habitat.
- Characterize their present fish and wildlife resource value and function.
- Compile a summary report of baseline data on the existing aquatic habitat conditions in the Trenton Channel within the proposed project area.
- Document rates of change in wetlands, farmlands, forests, and lake plain prairie resulting from transformation of the natural landscape into an urban environment in the Detroit-Windsor corridor.
- Assess losses of fish habitat over time caused by changes in the channels of the Detroit River, including increased water depth and cross-sectional area, as a result of numerous navigation projects that deepened the river, armored the shoreline, etc.
- Develop and distribute a survey to U.S. and Canadian agencies responsible for AOC, Lake St. Clair remediation and habitat restoration efforts.
- Develop data processing and presentation protocols, based on survey.
- Process data and design customized mapping tools for standard mapping presentations.
- Distribute standardized data layers and mapping tools on CD-ROM media to stakeholder agencies.

### ***Land Use and Watershed Planning***

- Develop a habitat management plan for the AOC.
- Development of long term plans by 1997 and implementation of controls by 2035.
- Encourage the development of a common wetland evaluation system for use in both Michigan and Ontario.
- New, long term planning programs are needed.
- Identify zones of local impact where possible.
- Identify geographic extent of the watershed.
- Inventory existing land cover by remote sensing.
- Field reconnaissance/plan formulation.
- Define type of ecosystem (major component of hydrologic cycle, breeding and rearing wildlife valuable to people, readily accessible and low cost water source for domestic and industrial use, recreational and aesthetics value).
- Describe the geology of the watersheds.
- Describe pre-settlement vegetative conditions, and identify remnants of these communities.

# Kalamazoo River Area of Concern



PAC Chair	Local Coordinator	State Contact
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Remedial Action Plan Status
<p>The Michigan Department of Environmental Quality (MDEQ), with support from the Kalamazoo River Watershed Public Advisory Council (PAC) continues to coordinate efforts to restore beneficial uses in the Area of Concern (AOC). Impaired uses within the AOC have been identified and recommendations regarding additional problems associated with land use and fish consumption have been written.</p> <p>Since the PCB contamination was identified as a problem in 1971, several actions have been taken to improve conditions within the AOC. The discharge of PCBs has been substantially reduced due to the ban on PCB production, and other regulatory point source controls, such as the National Pollutant Discharge Elimination System (NPDES) permit program. However, in-place contaminated sediments in the upstream areas including the Allied Paper/Portage Creek/Kalamazoo River Superfund site continues to serve as a source of PCBs to the Kalamazoo River.</p> <p>PCB-laden sediments eroding from Portage Creek banks at Bryant Mill Pond have been removed. PCB-contaminated soils at landfills have been encapsulated. A remediation plan for PCB-contaminated sediments in the Kalamazoo River is being developed.</p> <p>In 1998, the Michigan Department of Environmental Quality published the Kalamazoo River Remedial Action Plan (RAP). In the summer of 2001, the Superfund site became an Environmental Protection Agency lead.</p>

Beneficial Use Impairments	
<ul style="list-style-type: none"> <li>➤ Restrictions on fish and wildlife consumption</li> <li>➤ Degradation of fish and wildlife populations</li> <li>➤ Bird or animal deformities or reproductive problems</li> <li>➤ Degradation of benthos</li> </ul>	<ul style="list-style-type: none"> <li>➤ Restriction on dredging activities</li> <li>➤ Beach closings</li> <li>➤ Degradation of aesthetics</li> <li>➤ Loss of fish and wildlife habitat</li> </ul>

## Implementation Recommendations

### **Habitat Restoration, Mitigation and Conservation**

- Superfund Records of Decision finalized and recommendations implemented.
- Habitat restoration at sites identified by local organizations and district staff.

### **Nonpoint Source Pollution**

- Nonpoint source pollution control projects completed at sites identified by local organizations and district staff.

## Process and Planning Recommendations

### **Education, Outreach and Public Participation**

- Public education on health issues and pollution prevention.

### **PAC Capacity and Funding**

- Support for the Kalamazoo River Watershed Council.

### **Land Use and Watershed Planning**

- Local land use planning educational efforts for elected and appointed officials. Geographic Information System data available for this application.

# Manistique River Area of Concern



PAC Chair	Local Coordinator	State Contact
Merilee Blowers Chair, Manistique River PAC 453 S. Mackinac Manistique, MI 48954 (906) 341-4223 (W) (906) 341-4221 (fax) <a href="mailto:mblowers@ma.kruger.com">mblowers@ma.kruger.com</a>	Merilee Blowers Chair, Manistique River PAC 453 S. Mackinac Manistique, MI 48954 (906) 341-4223 (W) (906) 341-4221 (fax) <a href="mailto:mblowers@ma.kruger.com">mblowers@ma.kruger.com</a>	Sharon Baker Michigan Dept. of Environmental Quality Surface Water Quality Division P.O. Box 30273 Lansing, MI 48909 517-335-3310 Fax: 517-373-2040 <a href="mailto:bakersl@state.mi.us">bakersl@state.mi.us</a>

Remedial Action Plan Status
<p>The significant progress that has been made in improving water quality in the Area of Concern (AOC) over the last twenty years has resulted from increased treatment of wastewater discharged into the river. Additionally, to date, over 111,000 cubic yards of contaminated sediments have been removed for treatment and disposal. However, some beneficial uses in the AOC continue to be impaired due to historical pollution concerns. PCB sediment contamination in the AOC has continued to be the factor promoting the greatest concern in the Manistique River AOC. In 1996, the United States Environmental Protection Agency (U.S. EPA) proposed that it had developed innovative dredging and treatment technologies that could result in an environmentally sound dredging project that could remove PCB contamination from the AOC. There was mutual support for the effort among the community, the Potentially Responsible Parties (PRPs) and the U.S. EPA. The dredging of contaminated sediments took place in succeeding years and was completed at the end of 2000.</p> <p>In 1997, a Remedial Action Plan (RAP) Update was developed by the local community to address other impaired beneficial uses in the AOC.</p>

Beneficial Use Impairments	
<ul style="list-style-type: none"> <li>➤ Restrictions on fish and wildlife consumption</li> <li>➤ Degradation of benthos</li> <li>➤ Restriction on dredging activities</li> </ul>	<ul style="list-style-type: none"> <li>➤ Beach closings</li> <li>➤ Loss of fish and wildlife habitat</li> </ul>

## Implementation Recommendations

### ***Contaminated Sediments***

- Completion of the EPA Superfund dredging of contaminated sediments in the harbor.

### ***Nonpoint Source Pollution***

- Priority nonpoint source project identified by the Watershed Partnership completed in the watershed.
- Streambank erosion control (with nonpoint source pollution best management practices) is needed in the upper watershed to restore fish habitat and prevent sedimentation in the harbor.

### ***Recreation***

- Support for the Manistique River Watershed Partnership and waterfront access projects.

## Process and Planning Recommendations

### ***Education, Outreach and Public Participation***

- Several local educational projects have been accomplished but additional efforts by and support for the PAC are needed.

### ***PAC Organizational Capacity and Funding***

- Support for the Manistique River Watershed Partnership and waterfront access projects.

# Menominee River Area of Concern



PAC Chair	Local Coordinator	State Contact
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Remedial Action Plan Status
<ul style="list-style-type: none"> <li>The Menominee River Area of Concern (AOC) Remedial Action Plan (RAP) Update was completed and distributed in February 1996.</li> <li>A Remedial Action Plan documenting cleanup and other actions was released by the Wisconsin Department of Natural Resources in February 1991.</li> <li>The Stage 1 Report for the Lower Menominee River RAP was completed and submitted to the U.S. Environmental Protection Agency (U.S. EPA) and International Joint Commission (IJC) in 1991.</li> </ul> <p>The Wisconsin Department of Natural Resources (WDNR) has worked with the Michigan Department of Environmental Quality (MDEQ) to develop and implement the RAP. The multi-stakeholder Citizens' Advisory Committee (CAC) and a Technical Advisory Committee (TAC) have been instrumental in the development of the RAP by mobilizing public support, increasing awareness, and conducting data and problem analysis. A vision statement for the desired future state of the Lower Menominee River was developed by the CAC and used as guidance in the preparation of RAP goals and objectives that were developed jointly by the CAC and TAC.</p> <p>The U.S. EPA and WDNR are working with Ansil Fire Protection Company under the RCRA Corrective Action Program to address arsenic contamination in the AOC.</p>

Beneficial Use Impairments	
<ul style="list-style-type: none"> <li>➤ Restrictions on fish and wildlife consumption</li> <li>➤ Degradation of fish and wildlife populations</li> <li>➤ Degradation of benthos</li> </ul>	<ul style="list-style-type: none"> <li>➤ Restriction on dredging activities</li> <li>➤ Beach closings</li> <li>➤ Loss of fish and wildlife habitat</li> </ul>

## Implementation Recommendations

### **Habitat Restoration, Mitigation and Conservation**

- Fish population and habitat restoration.
- Local brownfields restoration projects.
- Local waterfront redevelopment projects.

### **Pollution Prevention & Wastewater Management**

- Pollution prevention education and projects.

## Process and Planning Recommendations

### **Education, Outreach and Public Participation**

- Pollution prevention education and projects.

### **PAC Organizational Capacity and Funding**

- Support for Citizens Advisory Committee.

# Muskegon Lake Area of Concern



PAC Chair	Local Coordinator	State Contact
<p>Cynthia Price West Michigan Region Environmental Network 1357 W. Summit Muskegon, MI 49441 231-755-3478 (H) 231-784-1090 or 231-784-9942 (W) 231-784-1268 (Fax) <a href="mailto:timrcd@iserv.net">timrcd@iserv.net</a> or <a href="mailto:skyprice@yahoo.com">skyprice@yahoo.com</a></p>	<p>Kathy Evans Muskegon Conservation District 1001 E. Wesley Ave. Muskegon, MI 49442 (231) 773-0008 (W) (231) 773-1210 (fax) <a href="mailto:KEvansMCD@aol.com">KEvansMCD@aol.com</a></p>	<p>Sharon Baker Michigan Dept. of Environmental Quality Surface Water Quality Division P.O. Box 30273 Lansing, MI 48909 517-335-3310 Fax: 517-373-2040 <a href="mailto:bakersl@state.mi.us">bakersl@state.mi.us</a></p>

Remedial Action Plan Status
<p>The initial Muskegon Lake Remedial Action Plan (RAP) was completed in 1987 and involved limited public involvement. A Muskegon Lake Public Advisory Council (PAC) was officially established in October 1993 to obtain broad-based stakeholder input to the development and implementation of the RAP. The PAC includes representation from various interest groups in the area. An update to the Muskegon Lake RAP was completed in October 1994 and focused on five objectives: 1) Affording and insuring participation opportunities in the process by a PAC as well as a team of specialists from various Michigan Department of Environmental Quality (MDEQ) divisions (Surface Water Quality, Environmental Response, Waste Management, Fisheries, Air Quality, Land and Water Management, and Wildlife); 2) Documenting water quality data collected and analyzed since the 1987 RAP was published; 3) Analyzing the current status of use impairments; 4) Making recommendations, that when carried out, will lay the foundation for the next phase of the RAP process (i.e., implementing specific measures to remediate water quality problems and use impairments); and 5) Identification of data gaps.</p> <p>Studies addressing contaminated sediments, habitat, and water quality have been completed to fulfill recommendations of the 1994 RAP. A repository of that information is located at the offices of the Muskegon Conservation District.</p>

Beneficial Use Impairments	
<ul style="list-style-type: none"> <li>➤ Restrictions on fish and wildlife consumption</li> <li>➤ Degradation of fish and wildlife populations</li> <li>➤ Degradation of benthos</li> <li>➤ Restriction on dredging activities</li> </ul>	<ul style="list-style-type: none"> <li>➤ Eutrophication or undesirable algae</li> <li>➤ Restrictions on drinking water consumption, or taste and odor</li> <li>➤ Degradation of aesthetics</li> <li>➤ Loss of fish and wildlife habitat</li> </ul>

## Implementation Recommendations

### **Contaminated Sediments**

- Sediment characterization in Bear Lake at Bear Creek mouth.
- Identify atrazine "tributary source" and Mass Balance pollutant "soil source" hot spot areas in the Muskegon River watershed for best management practice, education and remediation potential.
- Identify health of benthic/ecosystem of nearshore sediments adjacent to brownfield (high potential redevelopment/dredge areas).
- Contaminated sediment remediation on Muskegon Lake's south side.
- Brownfield remediation on Muskegon Lake's south shore. Numerous brownfield sites are adjacent to the contaminated sediments sites listed above. There are three priority sites for a coordinated soil and sediment cleanup approach.

### **Habitat Restoration, Mitigation and Conservation**

- Restoration of native habitat landscapes on brownfield/foundry fill areas along Muskegon Lake's south and east shoreline.
- Permanent easement/conservancy of identified sensitive wildlife habitat and critical fish habitat areas (based on existing natural features inventory; pre-settlement vegetation maps; 1995 Muskegon Lake Habitat and Aquatic Plant Assessments; Michigan Department of Natural Resources information).

### ***Habitat Restoration, Mitigation and Conservation (continued)***

- Remove and prevent sediment load at mouth of river in Muskegon Lake's northeast end to restore critical fish and wildlife habitat.

### ***Nonpoint Source Pollution***

- Implement Best Management Practices (BMPs) on sites identified in the Muskegon River Streambank Erosion Inventory.

### ***Pollution Prevention & Wastewater Management***

- Map/Identify groundwater quality from contaminated sites discharging/leaching into the lake and rivermouth area.
- Identify point source water quality discharged from regulated sources to lake/tributaries/storm drain.
- Identify and correct sanitary sewer integrity and cross connection problems to prevent direct sewage discharge and issue health advisories for Muskegon Lake and immediate tributaries.
- Phase II voluntary stormwater ordinance and technical assistance program to incorporate BMPs into shoreline and watershed brownfield redevelopments.

## Process and Planning Recommendations

### ***Education, Outreach and Public Participation***

- Increase youth/adult public knowledge on ecosystem principles, remediation of contaminated sites, needs, management via programming in schools, conservation districts, university extensions and community colleges.
- Sustainability Training Program to institutionalize "Adopt-A-Watershed" activities throughout the Muskegon Lake AOC/River watershed (initiate sustainable volunteer and school programs to monitor ecosystems, restore habitat, clean up waterways, etc).

### ***Research, Monitoring and Data Management***

- Develop a coordinated volunteer water quality monitoring program in Muskegon Lake, tributary creeks and Muskegon River watershed tributaries (based on results of the Lake Michigan Tributary Monitoring project).
- Muskegon Lake nutrient budget (Total Maximum Daily Loads, sediment loads, etc).
- Determine impact of contaminated groundwater on the ecosystem in the Bear Creek, Bear Lake and Zephyr Oil sediment/wetland areas.
- Drinking water protection assessments (correlate Lake Michigan Mass Balance information with Lake Michigan and Muskegon Lake current and discharge information).

# River Raisin Area of Concern



PAC Chair	Local Coordinator	State Contact
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Remedial Action Plan Status
<p>In 2001, the River Raisin Public Advisory Council (PAC) became a standing committee of the River Raisin Watershed Council.</p> <p>The PAC was formed in March of 1993 to assist Michigan Department of Environmental Quality (MDEQ) staff on all phases of the Remedial Action Plan (RAP) project. Membership consists of citizens representing a wide range of interests such as the River Raisin Watershed Council, local government, businesses, industries, and environmental groups. The PAC has initiated a number of activities to benefit not only the Area of Concern (AOC), but the entire River Raisin watershed.</p> <p>In mid-1992, a River Raisin RAP Team was formed primarily to deal with technical issues associated with the project. Membership consists of representatives from various federal, state and local agencies such as the Natural Resources Conservation Service, MDEQ, Michigan Department of Public Health, Monroe County Health Department and Monroe County Soil and Water Conservation District.</p> <p>The River Raisin RAP was completed and submitted to the International Joint Commission in October 1987. The purpose of the RAP was to compile and analyze existing river data and to recommend actions needed to address known problems.</p>

Beneficial Use Impairments	
<ul style="list-style-type: none"> <li>➤ Restrictions on fish and wildlife consumption</li> <li>➤ Bird or animal deformities or reproductive problems</li> <li>➤ Degradation of benthos</li> <li>➤ Restriction on dredging activities</li> </ul>	<ul style="list-style-type: none"> <li>➤ Eutrophication or undesirable algae</li> <li>➤ Beach closings or restrictions on body contact</li> <li>➤ Degradation of aesthetics</li> <li>➤ Loss of fish and wildlife habitat</li> </ul>

## Implementation Recommendations

### **Recreation**

- Increase public access throughout the watershed.
- Identify sources of bacterial contamination and remediate to restore full body contact swimming/recreational opportunities.
- Eliminate beach closings at Sterling State Park resulting from flows from the River Raisin.
- Develop signage related to fish consumption advisories at the Detroit Edison Corporate Levy.

### **Contaminated Sediments**

- Removal (dredging) of the remaining contaminated sediments in the AOC.
- Eliminate unusual restrictions on dredge spoil disposal due to contamination.

### **Habitat Restoration, Mitigation and Conservation**

- Preserve and enhance dwindling agricultural lands.
- Improve and enhance the quality and quantity of fish in the AOC.
- Improve and enhance the quality and quantity of benthic populations in the AOC.
- Stabilize or reduce the zebra mussel population.
- Maintain or increase the quantity and quality of wetlands in the watershed.
- Maintain or increase the lotus beds in the lower river marshes, protect "special" plants in the upper watershed.

### ***Habitat Restoration, Mitigation and Conservation (continued)***

- Removal of dams in the River Raisin watershed.

### ***Nonpoint Source Pollution***

- Considerably reduce soil erosion throughout the watershed.
- Curb the erosion of cropland.
- Source identification for bacterial contamination.

### ***Pollution Prevention & Wastewater Management***

- Restore and maintain water quality, meeting objectives of Michigan Water Quality Standards and the designated uses.
- Eliminate the input of persistent toxic substances.
- Address water quality management issues regarding on-site septic and/or small wastewater treatment systems.
- Implement storm sewer identification program.
- Reduce nutrients from point and nonpoint sources to levels recommended by the International Joint Commission (IJC).
- Control combined sewer overflows (CSOs) and reduce turbidity by implementing Best Management Practices throughout the watershed. Address all CSOs and Sanitary Sewer Overflows (SSOs) in the watershed.
- Remediate old wastewater lagoons, then sell site to the Monroe Metropolitan Wastewater Authority for future use as a wet weather retention basin.
- Implement wastewater treatment expansion.
- Identify and track fecal contamination through long-term E Coli testing in the watershed. Results of the testing will be used to issue public advisories when warranted, to identify specific areas of the basin that are contributing to bacterial contamination and to guide future remediation efforts.

## Process and Planning Recommendations

### ***Education, Outreach and Public Participation***

- Develop an effective education program that will inform the public of the pressing environmental issues facing the community.
- Continue partnering with the Monroe Public Schools Lake Erie Environmental Outreach Program.
- Continue Lotus Identification Program.
- Continue river cleanup projects.
- Develop RAP newsletter.
- Partner with Monroe Community College and develop classes related to the watershed.
- Continued involvement in the educational outreach with area schools.

### ***PAC Capacity and Funding***

- Now that the PAC is a standing committee of the River Raisin Watershed Council, apply for grants necessary to conduct the programs identified in the RAP. This partnership will not only ensure the continuation of the PAC, but will also strengthen the Watershed Council.

### ***Policy, Enforcement and Regulatory Control***

- Development of new initiatives and stronger enforcement of existing legislation as needed to address point and nonpoint sources that impact the watershed and the AOC.
- Adopt and enforce stormwater controls, flood plain management plans and soil erosion and sedimentation control ordinance.

### ***Policy, Enforcement and Regulatory Control (continued)***

- Encourage the development of programs and regulations that would maintain a viable agricultural industry.
- Review and update flood plain regulations.

### ***Research, Monitoring and Data Management***

- Monitoring to ensure that persistent toxic material is not continuing to be introduced from upstream sources.
- Conduct and maintain Natural Features Inventory that would include identification and cataloging of natural features throughout the watershed.

***Research, Monitoring and Data Management (continued)***

- Conduct regular public health assessments upon delisting of the AOC to ensure that there are no other problems in the AOC.
- Conduct a Thermal Discharge Study.
- Recommend continued monitoring of fish contaminants by the Michigan Department of Environmental Quality.

***Land Use and Watershed Planning***

- Update local master/land use plan.
- Update local zoning regulations.
- Develop a watershed management plan.

# Rouge River Area of Concern



PAC Chair	Local Coordinator	State Contact
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Remedial Action Plan Status
<p>The Rouge River Remedial Action Plan (RAP) was completed in 1989 and has been heralded as a model for community involvement and public support. The process of implementing and further updating the RAP is ongoing. The Michigan Department of Environmental Quality (MDEQ) and its partners will be using a biennial progress report card as a mechanism to help celebrate implementation, make mid-course corrections, provide public accountability, and further develop the RAP. The last Rouge Report Card was issued in 1999. MDEQ and the Southeast Michigan Council of Governments (SEMCOG) issued the first Rouge River RAP Annual Progress Report in 1992. MDEQ, in cooperation with the Rouge RAP Advisory Council (RRAC), updated the RAP in 1994 and issued a Rouge River RAP Progress Report in 1998.</p> <p>The Rouge River RAP is a watershed-wide effort that is led by MDEQ in partnership with other stakeholders. The institutional framework for updating the RAP is being modified to better meet the needs for implementation and ensure accountability in the planning process. The institutional structure includes: MDEQ staff with responsibilities to update the RAP; a Rouge Program Office created for the Rouge River National Wet Weather Demonstration Project (NWWDP); technical advisory groups; a newly revised Rouge River Steering Committee to oversee implementation activities with the Voluntary Stormwater Permit; and the RRAC to advise the MDEQ and assist in updating and implementing the RAP. The RRAC includes representatives of industry, environmental interests, citizens, universities, the Natural Resource Conservation Service, local and county governments, and parks and health departments.</p>

Beneficial Use Impairments	
<ul style="list-style-type: none"> <li>➤ Restrictions on fish and wildlife consumption</li> <li>➤ Tainting of fish and wildlife flavor</li> <li>➤ Degradation of fish and wildlife populations</li> <li>➤ Fish tumors and other deformities</li> <li>➤ Bird or animal deformities or reproductive problems</li> </ul>	<ul style="list-style-type: none"> <li>➤ Degradation of benthos</li> <li>➤ Restriction on dredging activities</li> <li>➤ Eutrophication or undesirable algae</li> <li>➤ Degradation of aesthetics</li> <li>➤ Loss of fish and wildlife habitat</li> </ul>

## Implementation Recommendations

### **Contaminated Sediments**

- Cleanup sites of environmental contamination, Part 201 sites, including river sediments.
- U.S. Army Corps of Engineers (USACE) Rouge River Dredging.

### **Habitat Restoration, Mitigation and Conservation**

- Detroit log jam removal.
- Newburgh Lake-Remediation/Restoration.
- Removal of significant log jams in Wayne County.
- Streambank Stabilization Projects.
- Creation of wetlands to mitigate high flow storm water discharges in Inkster.

### **Nonpoint Source Pollution**

- Regional detention pond for erosion.
- Impoundment sediment control and removal demonstration – Newburgh Lake.

### ***Recreation***

- Canoe livery during dry weather (discontinued because of high bacteria levels).
- Fishing derbies in Rouge communities.
- Walking and biking paths near the river in various communities.
- Nature centers and natural areas available to visit and enjoy.
- Promote conservation easements along Fowler Creek and Lower Rouge.
- Purchasing parcels of land for preservation, along with education.

### ***Pollution Prevention and Wastewater Management***

- Elimination of illegal/illicit connections to the river.
- Elimination of improper connections to storm drains.
- Planned projects completed (see Table 1), but new information indicates that many sanitary sewer overflows (SSOs) still exist.
- Installation of outlet control structure at the Caddell Regional Storm Water Detention Facility.
- Model local storm water ordinance.
- Traditional polluted storm water runoff control measures evaluation: Dearborn Heights comparative catch basin cleaning and street sweeping study, Redford Township Roadway Source Control Project, Livonia and Farmington Hills catch basin maintenance study.
- Voluntary Storm Water General Permit/prototype storm water management control program.
- Expansion of Incident Prevention Emergency Response Plan.
- Full implementation of the Industrial Pretreatment Program.
- Initial projects to control combined sewer overflow (CSO) discharges/additional planning.

## Process and Planning Recommendations

### ***Education, Outreach and Public Participation***

- 24-hour hotline for environmental services
- Outreach programming for school groups.
- Development of public education materials and activities to promote projects and educate residents.
- Implementation of "Rouge Friendly" programs to promote stewardship.
- Presentations about Rouge initiatives and opportunities – speaker's bureau.
- Environmental Interpretive Center.
- Environmental Education Institute.
- Promotion of proper lawn care to reduce pollutant runoff.
- Nature and history exhibits at Nankin Mills completed.
- Rouge Education Project.
- Rouge River Stewards Workshop.
- Brochures to residents about hazardous waste, recycling, composting, etc.
- Rouge Friendly Neighborhood Program – lawn fertilization.
- Friends of the Rouge – Rouge Rescue, and frog and toad monitoring.
- River Watch Program Adopt-a-Stream.
- Educate stakeholders about controls for storm water runoff. Conduct 4-5 storm water seminars to educate stakeholders.

### ***PAC Organizational Capacity and Funding***

- Secure state and federal funding support.
- Discussion of financial and institutional arrangements to fund a watershed management system.
- Rouge River Bird Observatory Project Manager.
- Soil Erosion Core Groups formed and functioning.

### ***Policy, Enforcement and Regulatory Control***

- Reissue National Pollution Discharge Elimination System (NPDES) permits on a five-year schedule.
- Inspection guidelines and uniform construction standards.
- Development of a generic document for investigation and closure of abandoned dumpsites.
- Failing on-site system investigations.
- Ensure that regulated storm water discharges comply with permit requirements for construction sites and industrial facilities.

***Research, Monitoring and Data Management***

- Evaluation of illicit connection program.
- Studying the feasibility of integrating municipal Geographic Information System (GIS) and Rouge Project GIS.
- Tracking bird populations.
- Study to explore funding mechanisms for ongoing maintenance of detention ponds, training of citizens and conditions of existing ponds in Canton Township.
- City of Detroit/Detroit Coke Site Study.
- Evaluation of wetlands as polluted storm water runoff control.
- Wet weather water quality survey.
- Local storm water management evaluation.
- Results of fish assessment and tumors.
- Investigate sources of phosphorous in stormwater.
- Quantify streambank erosion.
- Mussel species survey.
- Stream channel geomorphology study.
- Stream shading study.

***Land Use and Watershed Planning***

- Prepare a fisheries management plan.

# Saginaw River/Bay Area of Concern



PAC Chair	Local Coordinator	State Contact
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## Remedial Action Plan Status

The Saginaw River/Bay Remedial Action Plan (RAP) process began in July 1986. After several drafts, the initial RAP document was completed in September 1988. Substantial progress has been made since then, with over two-thirds of the actions identified in the 1988 RAP having been implemented. Development of an updated Saginaw River/Bay RAP document occurred in 1994. Meanwhile, extensive efforts continue on the coordination and implementation of ongoing activities and in seeking funding for, and ways to implement, the remaining actions.

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 delisting of the Saginaw River/Bay Area of Concern (AOC).

Preparation of the updated Saginaw River/Bay RAP is being done through the committee structure of the Partnership for the Saginaw River/Bay Watershed in cooperation with Public Sector Consultants. The technical work is being conducted by the Technical Committee that has been established to address the following specific topic areas: water quality; contaminated sediments; soil erosion and sedimentation; and habitat. The Technical Committee has representation from a wide range of agency, stakeholder, and public groups interested in, and/or affected by, these environmental issues in the Saginaw Bay watershed.

## Beneficial Use Impairments

<ul style="list-style-type: none"> <li>➤ Restrictions on fish and wildlife consumption</li> <li>➤ Degradation of fish and wildlife populations</li> <li>➤ Bird or animal deformities or reproductive problems</li> <li>➤ Degradation of benthos</li> </ul>	<ul style="list-style-type: none"> <li>➤ Restriction on dredging activities</li> <li>➤ Eutrophication or undesirable algae</li> <li>➤ Restrictions on drinking water consumption, or taste and odor</li> <li>➤ Beach closings</li> </ul>	<ul style="list-style-type: none"> <li>➤ Degradation of aesthetics</li> <li>➤ Degradation of phytoplankton and zooplankton populations</li> <li>➤ Loss of fish and wildlife habitat</li> </ul>
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## Implementation Recommendations

### **Contaminated Sediments**

- Document the improvements in PCB contamination levels in the sediments of the shipping channel of the Saginaw River/Bay following the remedial actions now under way.
- Following completion of the PCB-contaminated sediment removal project, conduct an economic analysis of the cost of routine navigational dredging in the Saginaw River/Bay compared to the cost of comparable dredging in rivers and harbors of the Great Lakes where sediments are not classified as polluted.
- Fully evaluate cuts/slips along the Saginaw River for sediment contamination and work to develop remediation alternatives for any significant sites of sediment contamination identified. In particular, remediation alternatives should be developed for the Weiss Street Channel.

### **Habitat Restoration, Mitigation and Conservation**

- Ensure that all dam releases are in compliance with Federal Energy Regulatory Control (FERC)/state negotiated release levels to help maintain adequate flows and dissolved oxygen levels below dams.
- Work with individual communities/citizens/businesses within the watershed to identify dams for potential removal or for installation of fish passage devices.
- Identify opportunities provided by the MDNR Fisheries Division Lake Sturgeon Recovery Plan to expedite restoration of this important species in the bay area.

### ***Habitat Restoration, Mitigation and Conservation (continued)***

- Coordinate with the county drain commissioners to evaluate opportunities for fish and wildlife habitat restoration.
- Identify marshes that are particularly vulnerable to upland activities and implement actions to safeguard them and control upland threats.

### ***Nonpoint Source Pollution***

- Track the success of local programs (like the federally funded Conservation Reserve Enhancement Program) that make full use of available state and federal funds to protect watercourses by providing buffer strips of land surrounding bodies of water that can trap and hold nutrients contained in runoff.
- Continue to support efforts to improve and document the management of crop residue, fertilizer, and animal and human waste applications on agricultural land in the basin.

### ***Pollution Prevention & Wastewater Management***

- Through the cooperative efforts of (1) the Michigan Department of Environmental Quality (MDEQ), (2) local wastewater treatment plant operators, and (3) local health officials, establish appropriate sampling methods (including frequency and location of sampling) to monitor bacteria levels in the Saginaw River.
- Eliminate all known sanitary sewer overflows (SSOs) and all untreated or inadequately treated combined sewer overflows (CSOs).
- Encourage local health departments with public access sites on Saginaw Bay to monitor bathing beach areas from April through October.
- Establish a database and annually summarize (in a report made available to the public) the bacteria sampling results from the river and bay, particularly below wastewater discharge points.
- Conduct an annual review of the data collected to determine whether or not (1) sample numbers and/or locations should be increased or decreased and (2) new potential sources of human waste entering the river need to be addressed.
- Implement investigations/remediation at any sites identified as the source of a pollutant responsible for fish tainting.
- Prioritize subwatersheds (or smaller sub-eco-systems) that are tributary to the bay on the basis of how much phosphorus they contribute and develop and support plans that will result in significant reductions.

## Process and Planning Recommendations

### ***Education, Outreach and Public Participation***

- Expand public information and education efforts to inform the public about the critical role the watershed's rivers play in restoring and sustaining the bay's fisheries.
- Evaluate alternatives and develop a strategy to effectively disseminate information on Fish Consumption Advisories in the Saginaw River/Bay.

### ***Research, Monitoring and Data Management***

- Reestablish effective dissolved oxygen monitoring in the Saginaw River during critical low-flow summer periods to determine whether or not the water quality standard is being achieved.
- Develop a computer-based geographic information system (GIS) to systematically inventory coastal marsh habitat areas critical to fish and wildlife. The system will identify those areas most at risk and allow for monitoring the success of programs intended to protect these areas.
- Continue to monitor the annual harvest of walleye and yellow perch and conduct annual net-ting surveys to determine whether or not (1) targeted restored conditions are being met and/or maintained and (2) natural reproduction of walleye continues to provide evidence of improved habitat conditions.
- Establish a baseline of data on the levels of PCBs and dioxins currently found in walleye in the Saginaw River/Bay that can be compared against contaminant levels in walleye taken from other areas of Lake Huron and/or other Great Lakes. Analysis of fish contaminant levels to determine trends is essential to understanding how effective efforts to control toxic pollutants have been and whether or not further remedial actions are required.
- Conduct caged catfish studies in the Tittabawassee River downstream of Midland and in the Saginaw River near the mouth following completion of remedial dredging to determine whether or not additional actions are required to control sources of PCBs and dioxins.
- Implement sediment monitoring on the Tittabawassee River downstream of Midland and on the Saginaw River and Bay after remedial dredging on the Saginaw River is completed to provide a comprehensive baseline for PCB and dioxin/furan levels in this AOC.

**Research, Monitoring and Data Management (continued)**

- Conduct a survey of area anglers to determine the location and frequency of any fish taste and/or odor problems.
- Incorporate existing information and compile new data within a computer-based geographic information system (GIS) that clearly identifies Saginaw Bay coastal marsh areas that are essential habitat for fish and wildlife. Parcel-based maps showing the area riverward or bayward of the 585-foot contour line will be essential for analysis.
- Establish a coastal habitat index and monitoring system that can be used to periodically document the status of a representative sample of vulnerable wetland areas important to sustaining bay fish and wildlife populations.
- Continue support for routine monitoring of bald eagle nesting success within Michigan's Lake Huron shoreline.
- Continue comparative analysis of PCB levels in herring gull eggs from nest sites within Saginaw Bay (i.e., Channel/Shelter Island and Charity Islands) and those in other areas of Lake Huron.
- Monitor Saginaw Bay periodically to determine phosphorus concentrations.
- Support funding for annual monitoring and reporting of the abundance of *Hexagenia* sp. in the bay.
- Periodically determine Nitrogen/Phosphorous ratios in the bay, particularly at or near water system intakes.

**Land Use and Watershed Planning**

- A comprehensive plan for sustainable development of the Saginaw River/Bay area should be developed that includes specific recommendations for pollution prevention activities applicable to industrial and commercial enterprises, agricultural operations, government functions, and individual households.

# St. Clair River Area of Concern



PAC Chairs	Local Coordinator	State Contact
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Remedial Action Plan Status
<p>The Stage 2 Remedial Action Plan (RAP) was updated in September 1999. The Stage 2 process for the three Michigan-Ontario binational RAPs (St. Clair, St. Marys, and Detroit River Areas of Concern) involved the use of a task-oriented focus. As part of this process, the St. Clair River RAP Team and Binational Public Advisory Council (BPAC) established four "Task Teams" to undertake the assessment and evaluation of remedial options. Each Task Team consisted of BPAC and RAP Team members and others having interests and expertise relating to various tasks. Agency representatives on each Task Team provided technical input and support as required.</p>

Beneficial Use Impairments	
<ul style="list-style-type: none"> <li>➤ Restrictions on fish and wildlife consumption</li> <li>➤ Bird or animal deformities or reproductive problems</li> <li>➤ Degradation of benthos</li> <li>➤ Restriction on dredging activities</li> </ul>	<ul style="list-style-type: none"> <li>➤ Beach closings</li> <li>➤ Degradation of aesthetics</li> <li>➤ Loss of fish and wildlife habitat</li> </ul>

## Implementation Recommendations

### **Contaminated Sediments**

- Recommend contaminated sediment remediation on Canadian side, which acts as a source of pollutants for the river and Lake St. Clair.

### **Habitat Restoration, Mitigation and Conservation**

- Protect existing natural areas and undertake remedial measures.
- Reduce ship wakes and surges and minimize impacts from winter shipping.
- Undertake habitat restoration and enhancement measures.
- Ensure protection of shorelines from erosion and protect/enhance/restore other natural habitats in watershed.
- Control/eradicate exotic species.

### **Nonpoint Source Pollution**

- Promote agricultural programs and technology to reduce contamination to rural runoff.
- Reduce use of road salt and seek alternatives.

### **Pollution Prevention and Wastewater Management**

- Source discharges of coliform bacteria.
- Correct direct discharges of untreated grey water.
- Improved waste site planning and management.

### **Pollution Prevention and Wastewater Management (continued)**

- Complete sewer separations.

## Process and Planning Recommendations

### ***Education, Outreach and Public Participation***

- Develop and implement communications/education program and appropriate landowner guidelines.
- Small business toxic reduction education.

### ***Policy, Enforcement and Regulatory Control***

- Develop whole plant permitting system.
- Develop discharge permits on the basis of discharges already approved or under application and assess total mass loadings to the river.
- Toxic release notification education strategy.

### ***Research, Monitoring and Data Management***

- Complete sediment characterization studies.
- Assess storm water impacts.
- Setting new yardsticks and adjusting existing (as required).
- Acquire additional information to improve modeling accuracy.

### ***Land Use and Watershed Planning***

- Watershed/subwatershed management plans.
- Develop long-term habitat management plan.

# St. Marys River Area of Concern



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Remedial Action Plan Status
Results from ongoing projects pertaining to sediment remediation and habitat restoration, along with Task Team reports, are being incorporated into the Stage 2 Report for the Remedial Action Plan (RAP). Some progress has been made toward restoring beneficial uses. 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. Work is continuing on the Canadian side to upgrade the East End Sewage Treatment Plant to prevent sewage outflows. The city is struggling to find funding to complete this work. The steel mill and paper mill in Sault Ste. Marie, Ontario have greatly improved the quality of their effluent due to new provincial guidelines.

Beneficial Use Impairments		
<ul style="list-style-type: none"> <li>➤ Restrictions on fish and wildlife consumption</li> <li>➤ Degradation of fish and wildlife populations</li> <li>➤ Fish tumors and other deformities</li> </ul>	<ul style="list-style-type: none"> <li>➤ Degradation of benthos</li> <li>➤ Restriction on dredging activities</li> <li>➤ Eutrophication or undesirable algae</li> </ul>	<ul style="list-style-type: none"> <li>➤ Beach closings</li> <li>➤ Degradation of aesthetics</li> <li>➤ Loss of fish and wildlife habitat</li> </ul>

## Implementation Recommendations

### ***Habitat Restoration, Mitigation and Conservation***

- Continue to support sea lamprey control efforts.
- Stream Bank Stabilization on Munuscong River.
- Establish an Ashmun Creek Bioreserve.
- Enhance habitat and water quality in tributary watersheds.
- Create new wetland/rapids complexes.
- Create wetlands downstream of Whitefish Island to connect wetland habitat to adjacent remnant rapids.
- Mitigate the effects of land use practices upstream of historic walleye spawning grounds.
- Rapids habitat. (A number of options have been presented for the remediation of rapids habitat and associated wetlands.)
- Protect remnant rapids habitat from further reduction and degradation and maximize the productive capacity of the rapids area.
- Enhance remnant rapids habitat by placing additional spawning substrate in rapids area.
- Create new rapids areas elsewhere in the St. Marys River, especially in the Little Rapids area.
- Create alternative to rapids habitat such as artificial spawning substrate.
- The Algoma Slag Dump shoreline is an eyesore. Shoreline stabilization and providing habitat for plant growth (eg., via soil addition) would help to soften and stabilize the landscape.

**Recreation**

- Riverfront Walk – City of Sault Ste. Marie, Michigan.
- Lower River Islands Access.

**Nonpoint Source Pollution**

- Control nonpoint source pollution from agricultural activities.
- Control nonpoint source pollution from agricultural activities and road crossings on tributaries.

**Pollution Prevention & Wastewater Management**

- Continue with Clean Water Regulation (Canada) and National Pollutant Discharge Elimination System (U.S.) programs for industrial dischargers.
- Construction and maintenance of a permanent household hazardous waste facility – Chippewa County.
- Upgrade East End Water Pollution Control Plant to secondary treatment.
- Design and implement monitoring system for storm water.
- Reduce storm water infiltration to prevent sewage bypasses.
- Continue with process improvements at industrial and municipal facilities.
- Virtually eliminate all persistent and bioaccumulative contaminants from industrial and municipal discharge.
- Combined Sewage Overflow project for the City of Sault Ste. Marie.
- Address contaminants in stormwater discharge system by source control, air quality control, and pollution prevention education programs.
- Relocate discharge pipe from East End Water Pollution Control Plant to deeper, faster moving water in the Lake George Channel in order to improve dispersion of discharge plume.

## Process and Planning Recommendations

**Education, Outreach and Public Participation**

- Assistance in the formation of the Mission Creek Watershed.

**Research, Monitoring and Data Management**

- Monitor surface water, groundwater, wetland soils, and biota at the Cannelton Industries Superfund site to ensure protection of the ecological food chain. Conduct a site review every five years to ensure the remedy continues to provide adequate protection.
- Conduct further studies to characterize sediment quality in high priority areas (ie., adjacent to Algoma Slag Dump, portion of Little Lake George Channel downstream of East End WPCP, and the Algoma Slip).
- Investigation of the Mission Creek Waste Dump.
- Continue with St. Marys River Fishery Task Group efforts to develop a 10-year assessment program for the river.
- Continue with sport fish contaminant monitoring programs in the St. Marys River and tributaries.
- Complete a Canadian Wildlife Survey assessment of common tern and black tern populations for the entire St. Marys River.
- Continue monitoring of lamprey populations to recommend control.
- A monitoring program should be developed to assess change in fish and wildlife populations in the AOC in response to habitat enhancement efforts.
- Monitor the receiving water every three years at St. Marys Paper Ltd. to document response of fish communities to improved effluent quality as mill upgrades and process improvements are implemented.
- Algoma Steel Inc. has removed sediments from the slip during maintenance dredging operations. Therefore, further sediment quality & benthic community assessments should be made to determine effectiveness of contaminant removal & need for further dredging.
- Reproductive assessments of herring gulls, black terns, and common terns should be done throughout the AOC. Deformities should be assessed in common terns in the St. Marys River.
- Monitor effluent from East End Water Pollution Control Plant for concentrations and loadings of persistent contaminants exceeding guidelines in Lake George Channel sediments.
- Complete sediment chemistry analysis and benthic community assessment as part of the St. Marys River Contaminated Sediment Zones Evaluation (Kauss 1999b).
- Periodically conduct benthic, toxicity, and sediment chemistry studies in the Bellevue Marine Park area.
- Resample river sediments every five years to obtain trend with time information.
- Analyze contaminant levels in eggs from herring gull, black tern, and common tern nests in the AOC.
- Investigation of Steinbeck Road Landfill.

***Research, Monitoring and Data Management (continued)***

- Munuscong Lake Environmental Survey.
- Little Rapids Biotic Study.
- Mortality rates for walleye, northern pike, and yellow perch require further assessment.
- Fisheries Assessment.
- A monitoring program should be developed to assess change in fish and wildlife use of the AOC in response to habitat enhancement efforts.
- Walleye recovery in the Bar River.
- Map existing substrate, identify target fish species assemblages, and note areas likely to become dewatered under differing flow conditions.
- Identify areas with the hydrologic and physical characteristics to support rapids generation.

***Land Use and Watershed Planning***

- Develop a multi-agency sediment management plan for the river to address remedial options and implement actions recommended for contaminated sediments, including long-term sediment contamination studies.
- Develop a multi-agency sediment management plan for the river to address immediate dredging needs.

# Torch Lake Area of Concern



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Remedial Action Plan Status
<p>The draft Remedial Action Plan (RAP) update has been completed and distributed by the Torch Lake Public Advisory Council (TLPAC) Technical Committee to TLPAC members. They have approved of it and sent it to state and federal agencies for review and comment. The selected remedies for the Superfund site were documented in two Record of Decisions (ROD). A ROD for OU I and OU III was completed in 1992 and a ROD for OU II was completed in 1994. Remedies were selected to address the mine tailings, slag piles, Torch Lake itself and other water bodies. The remedies primarily address ecological impacts. The most significant ecological impact is the severe degradation of the benthic communities in Torch Lake as a result of metal loadings from the mine tailings. The primary components of the selected remedy for OU I and OU III include a soil (6 inches of sandy loam soil) and vegetative cover over about 700 acres of tailing and slag piles to reduce metal loadings to Torch Lake and other water bodies in the area. The selected remedy for OU II is no action with natural recovery of the bottom of Torch Lake and other water bodies. Long-term monitoring of the lake is also required as part of the selected remedy for OU I and OU III to measure and verify the lake's recovery progress. Additional components of the selected remedy for OU I and OU III include groundwater monitoring and institutional controls.</p> <p>Superfund site remediation work began in 1999. The U.S. Environmental Protection Agency (U.S. EPA) funded the remediation at \$15.2 million with 10% state match. Monitoring data collection for Torch Lake began during the summer of 1999. The Lake Linden Sands site remediation was completed in 1999. The operation and maintenance baseline monitoring for the lake was completed in 2000. The Traprock River/Scales Creek subwatershed survey report was completed in 1999 by the Natural Resources Conservation Service (NRCS) with distribution to the TLPAC, natural resource managers, and local governmental agencies for watershed planning purposes. Tamarack City sands site remediation, including Hubbell, was completed in 2000. Mason sands are scheduled to begin remediation in 2001, and all stamp sand work is scheduled for completion in 2003.</p>

Beneficial Use Impairments
<ul style="list-style-type: none"> <li>➤ Degradation of benthos</li> <li>➤ Restriction on dredging activities</li> <li>➤ Degradation of aesthetics</li> </ul>

## Implementation Recommendations

### **Habitat Restoration, Mitigation and Conservation**

- Stamp sand transport along Lake Superior shoreline on both sides of the peninsula.
- Traprock River sediment and copper loadings.

## Process and Planning Recommendations

### **Research, Monitoring and Data Management**

- Define human health risks.
- Identify habitat needs within the Area of Concern (AOC).
- Characterize the state of the phytoplankton and zooplankton communities.
- Identification of leaching rates from stamp sands and other mining wastes which might potentially contaminate the aquifer from which residents draw water from.
- Understanding of copper uptake by plants, both aquatic and terrestrial and the organisms which consume them.
- Determine sedimentation rate for the lake.

***Research, Monitoring and Data Management (continued)***

- Continue fish sampling for use in the fish contaminant monitoring program.
- Continue monitoring fish populations dynamics related to walleye plantings.
- Continue monitoring baseline parameters as required in the Superfund Site Record of Decision.

***Land Use and Watershed Planning***

- Develop a watershed management plan.
- Get Traprock River watershed management plan to be an approved watershed management plan for use with Clean Michigan Initiative grants and other funding programs.

# White Lake Area of Concern



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Remedial Action Plan Status
<p>White Lake was originally listed as an Area of Concern (AOC) because of venting of a groundwater plume contaminated with an organic solvent from the Occidental Chemical Company site. Analysis of recent well monitoring data indicates that the plume of contaminated groundwater moving from the site is being intercepted by the lakefront purgwell network and effectively treated prior to discharge to White Lake. Other potential sources of groundwater contamination to White Lake and its tributaries have been identified and remediation efforts are under way.</p> <p>The White Lake Public Advisory Council (PAC) and Michigan Department of Environmental Quality (MDEQ) are focusing on eight priority use impairments on White Lake. There was substantial improvement in the water quality of White Lake prior to 1987 simply because of the diversion of industrial and municipal discharges away from the lake by the mid-1970s. Similarly, analytical results for water samples collected in 1992 from the navigational channel between White Lake and Lake Michigan indicate that water quality has improved since the previous samples were taken in 1983. All parameters measured in 1992 met Michigan's water quality standards, established to protect human and aquatic life. Heavy metal concentrations are lower than those observed in earlier sampling, chloride concentrations are the lowest recorded since testing of this parameter began in 1963; and phosphorous and nitrogen levels have remained relatively stable since diversion of wastewater from White Lake in 1974. While a 28-day caged fish study conducted in the channel in 1992 showed that chlordane, DDE and dieldrin are present, the levels accumulated in the fish do not suggest a substantial problem.</p>

Beneficial Use Impairments	
<ul style="list-style-type: none"> <li>➤ Restrictions on fish and wildlife consumption</li> <li>➤ Degradation of fish and wildlife populations</li> <li>➤ Degradation of benthos</li> <li>➤ Restriction on dredging activities</li> </ul>	<ul style="list-style-type: none"> <li>➤ Eutrophication or undesirable algae</li> <li>➤ Restrictions on drinking water consumption, or taste and odor</li> <li>➤ Degradation of aesthetics</li> <li>➤ Loss of fish and wildlife habitat</li> </ul>

## Implementation Recommendations

### ***Contaminated Sediments***

- The Hooker Chemical/Occidental Chemical Company is currently sampling and evaluating sediment contamination. Remediation of specific lakebottom sites is likely and would benefit from a match of federal funds.
- Assessment is needed of sediments at discharge points for other contaminated sites, including Muskegon Chemical/Koch Chemical, the White Lake landfill, an old Whitehall city wastewater treatment facility, and a former landfill on the marsh upstream from the lake.
- Further study of the extent of contamination from the Whitehall Leather Company is completed on Tannery Bay. Decision on cleanup has been announced by MDEQ/Genesco to remove 73,000 cubic yards of contaminated sediments from Tannery Bay. Further efforts are needed on remediation of contaminated soils at the tannery site/facilities.

### ***Habitat Restoration, Mitigation and Conservation***

- Native fish species (white bass, Great Lakes spotted muskellunge) restoration.
- Implement recommendations from the "White Lake Fish and Waterfowl Aquatic Habitat Assessment" (2000) by Tom Hamilton. This update to the 1995 aquatic plant survey is very user friendly for riparian landowners and government officials for aquatic habitat management.

### ***Pollution Prevention and Wastewater Management***

- Assessment and remediation of shoreline sewage gaps.

## Process and Planning Recommendations

### ***Education, Outreach and Public Participation***

- School curriculums, tying environmental issues to state tests, such as the Michigan Education Assessment Program (MEAP).
- Habitat education programs for shoreline property associations and schools, including fact sheets that can be tailored to specific AOCs.
- Public education programs on ecosystems for schools and adult populations.

### ***PAC Organizational Capacity and Funding***

- Funds for outreach and implementation of habitat study recommendations.

### ***Research, Monitoring and Data Management***

- Quantitative information on the extent and impact to sediments of historical pollution from contaminated sites around the lake.
- Specific fish and wildlife contaminant monitoring data based upon knowledge of contaminated sites and sediments to direct sampling.
- Regular assessment of the health of benthic populations.
- Nonpoint source assessment.
- Nutrient budget of lake/river.

### ***Land Use and Watershed Planning***

- Acquisition of two large, undeveloped shoreline tracts owned by Dupont and Hooker Chemical/Occidental Chemical.
- Comprehensive land use planning within White Lake and White River watersheds.