

VIII. Action Plan

Table 8.1. Status of 2006-2008 Management Cycle and Identification of High-Priority Actions for the 2008-2010 Management Cycle.

Action	Responsible Agency	Status
Activities Addressing Contaminants in Fish and Wildlife		
Natural Resources Damage Assessment for Saginaw River/Bay AOC	MDEQ, USFWS	Ongoing
Velsicol Chemical Corporation Superfund Site (including Pine River sediment cleanup)	Pine River Sediment Cleanup	Ongoing
Investigation of Dioxins and Interim Response Actions in the Saginaw River and Bay Watershed	MDEQ, USEPA	Ongoing
Assessment of Persistent Bioaccumulative Toxic Chemicals in Michigan Fish from Several Trophic Levels	MDEQ, Annis Water Resources Institute Grand Valley State University Richard R. Rediske, Ph.D.	New for 2008-2010 Cycle.
Activities Addressing Nutrient and Bacteria Issues		
Agricultural Buffer Strips in the Saginaw Bay Area	MDEQ, Michigan Department of Agriculture (MDA), U.S. Department of Agriculture (USDA)	Ongoing
Adopt a Watershed Project: nutrient, bacteria & contaminant reductions	EC – ECB,EP, OMAFRA, OMOE, Conservation Authorities, local watershed groups	Completed in 2006-8 Cycle
Saginaw Bay Coastal Initiative	MDEQ	Ongoing
Saginaw Bay Science Committee Pathogen Work Group	MDEQ	Completed
Phosphorus Policy Advisory Committee	MDEQ/Local Stakeholders	Completed
Bacterial Beach Monitoring	MDEQ, Local health departments, USEPA	Ongoing
Lake Huron Southeast Shore Project - a Partnership Project	EC – ECB,EP, OMAFRA, OMOE, Conservation Authorities, local watershed groups	Ongoing
Southeast Shore Economic impact survey	EC, MOE, Conservation Authorities	New for 2008-2010 Cycle.
Southeast Shore Green Ribbon Program	EC, MOE, Conservation Authorities	New for 2008-2010 Cycle.

Lake Huron Binational Partnership 2008-2010 Action Plan

Action	Responsible Agency	Status
Southeast Shore Algal Fouling	OMOE – Environmental Monitoring and Reporting Branch	New for 2008-2010 Cycle.
Managing the Impact of Multiple Stressors in Saginaw Bay	NOAA, MDEQ, MDNR	New for 2008-2010 Cycle.
Activities Addressing Fish and Wildlife Habitat/Populations		
Presque Isle County Green Infrastructure Project	USEPA-GLNPO	Completed in 2006-2008 Cycle
Colonial waterbird population surveys	EC – CWS, USFWS	Ongoing
Fish Passage Program	USFWS Alpena NFWCO	Ongoing
AIS Surveillance and Nearshore Fish Community Monitoring	USFWS Alpena NFWCO	Ongoing.
Lake Sturgeon Restoration	USFWS Alpena NFWCO	Ongoing
Lake Trout Rehabilitation, Assessment, and population management	USFWS Alpena NFWCO, MDNR, Alpena Station CORA, OMNR	Ongoing
Brown and rainbow trout and Chinook salmon stocking, assessment, population management	MDNR and OMNR	Ongoing
Assessment of recreational harvest	MDNR and OMNR	Ongoing
Nearshore fishery assessment	MDNR and OMNR	Ongoing in Ontario, expanded in Michigan in 2008
Cisco (lake herring) rehabilitation	OMNR, MDNR, and CORA	Ongoing since 2006
Fishery restoration through cormorant population management	MDNR and U.S. Department Agriculture APHIS	Ongoing since 2005 in Les Cheneaux, since 2007 in Thunder Bay
Treaty Fishery Unit	USFWS Alpena NFWCO	Ongoing
Partners for Fish and Wildlife Program	USFWS Alpena NFWCO	Ongoing
Saginaw Bay Walleye Recovery Plan	MDNR Fisheries Division and collaborating partners	Ongoing
Saginaw Bay Fish Community Assessment	MDNR Fisheries Division	Ongoing
Fish community survey of the St. Marys River	MDNR, OMNR, CORA, USFWS, & other members of the St. Marys River Fisheries Task Group	Ongoing
Annual Fish Community Assessments	USGS- Great Lakes Science Center (GLSC)	Ongoing
Lake Huron Nearshore Monitoring	MDEQ Purdue University	New for 2008-2010 Cycle.

Lake Huron Binational Partnership 2008-2010 Action Plan

Action	Responsible Agency	Status
Saginaw Bay Coastal Initiative - Identification of High Quality Wetlands	MDEQ	New for 2008-2010 Cycle.
<i>Phragmites</i> control demonstration project	MDEQ	New for 2008-2010 Cycle.
Activities to Increase Understanding of Ecosystem Change, Biodiversity and the Impact of Exotic Species		
Benthic Macroinvertebrate Community Trends of Lake Huron	NOAA-GLERL, with assistance from EPA, EC, MDEQ, OMNR, and NWRI	Ongoing from 2007 Year of Coordinated Monitoring.
Studies to Determine Diets and Condition of Forage Fish	NOAA-GLERL, with assistance from EPA	Ongoing from 2007 Year of Coordinated Monitoring.
Changes in the Lower Food Web of Saginaw Bay	NOAA-GLERL	Ongoing.
Multiple Stressors in Saginaw Bay	NOAA-GLERL, MDEQ, MDNR, 4 Universities, Limno-tech	Ongoing.
Lake Huron Biodiversity Conservation Strategy	EC, USEPA, MNR, MOE, OMAFRA, MDEQ, MNRR, Parks Canada, and others.	New for 2008-2010 Cycle.
Activities at Areas of Concern		
St. Marys River AOC - Canada	EC – ECB, EP, CWS	Ongoing.
Saginaw River/Bay AOC	MDEQ, USEPA	Ongoing.
St. Marys River AOC- U.S.	MDEQ, USEPA	Update completed, criteria under revision (2008), restoration work ongoing.
St. Marys River Marsh Monitoring Program	Bird Studies Canada	New for 2008-2010 Cycle.
Biotic Integrity and Habitat Assessment within the St. Marys River AOC	MDEQ, USEPA	Ongoing.
Saginaw River/Bay AOC Delisting Criteria	MDEQ, USEPA	Completed in 2006-2008 Cycle.
Biotic Integrity and Habitat Assessment within the St. Marys River AOC	MDEQ, USEPA	Ongoing.
The Saginaw Bay Wetland Initiative	Ducks Unlimited, MDNR, MDEQ	Phase I completed, Phase II underway.
Sault Ste. Marie Area Watershed Project	MDEQ	Ongoing.
Managing the Impact of Multiple Stressors in Saginaw Bay	NOAA Great Lakes Environmental Research Laboratory, in conjunction with several partner agencies and institutions	New for 2008-2010 Cycle.

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Lake Huron Binational Partnership 2008-2010 Action Plan

Action	Responsible Agency	Status
Monitoring Coordination/Data Sharing		
Lake Huron Geographic Information System (LHGIS) - A Partnership Project	MDNR, USEPA-GLNPO, OMNR, and other partners	Original effort completed. Collaboration on the LHGIS is ongoing.
Lake Huron State of the Lake Symposium, October 2006	EC, USEPA, Aquatic Ecosystem Health and Management Society (AEHMS)	Symposium held in 2006. Publication of papers in peer reviewed journal ongoing.
Sugar Island Monitoring Workgroup	MDEQ/EC/OMOE/Other Local Stakeholders	New for 2008-2010 management cycle.
2007 Intensive Sampling Year on Lake Huron	Facilitated by USEPA/EC, with DFO, MDEQ, NOAA, USGS, and	Ongoing.
Outreach Activities		
Lake Huron-Georgian Bay Watershed: A Canadian Framework for Community Action	EC, MOE, MNR, OMAFRA, First Nations, Stakeholders	Two "Think Tank" workshops and concerted effort by a steering committee and writing team produced the Framework for Community Action.
Lake Huron Community Action Pilot Projects in Three Canadian Watersheds	EC, DFO, MOE, MNR, OMAFRA, Nottawasaga Valley and Ausable Bayfield Conservation Authorities, Georgian Bay Biosphere Reserve Inc.	New project for 2008-2010 cycle.
Lake Huron Community Action Website	EC/MOE/MNR/OMAFRA, Stakeholders	New project for 2008-2010 cycle.
Lake Huron Youth Summit 2007, 2008	EC, MNR, MOE, OMAFRA, Parks Canada	Ongoing 2007 and 2008.

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Activities Addressing Contaminants in Fish and Wildlife

Natural Resources Damage Assessment for Saginaw River/Bay AOC

The PCB-contaminated sediment removal under the General Motors NRDA has been completed and follow-up activities including post-evaluation in the Saginaw River is underway by the MDEQ and the USFWS. Post evaluation of fish tissue under the Fish Consumption Advisory Program, as well as a caged fish effort to determine if sources have been controlled, is ongoing.

Velsicol Chemical Corporation Superfund Site (including Pine River sediment cleanup)

The Velsicol Chemical Corp Superfund site in St. Louis, Michigan consists of two main areas or operable units (OUs): The main plant site property (site of a former chemical manufacturing facility) that comprises most of OU1, and the Pine River adjacent to the plant site, OU2. Construction activities for the Pine River DDT/PBB sediment cleanup (OU2) were completed in the fall of 2006. The sediment remediation project began in 1998 as a fund-lead time-critical removal action (to address the most highly-contaminated areas of sediment) and transitioned to a fund-

lead remedial action in 1999 (to address the remaining contaminated sediments in the river). The removal and remedial actions collectively removed approximately 670,000 cubic yards of contaminated sediments from the river. During the sediment cleanup, seeps from the containment system that had been constructed around the main plant site in the 1980s and observations of dense non-aqueous phase liquids (DNAPL) within and on top of the glacial till underlying the Pine River called into question the integrity of the containment system.

To prevent these releases from recontaminating the Pine River, U.S. EPA took an interim response action (during the remedial action) and installed a NAPL collection system along the northern edge of the main plant site. The Michigan Department of Environmental Quality (MDEQ) currently is conducting a remedial investigation/ feasibility study (RI/FS) at the main plant site (OU1) to look at long-term remedial options for OU1. MDEQ finalized the RI Report in November 2006 and concluded that the OU1 containment system is not functioning as designed and is not protective of human health and the environment. MDEQ currently is conducting a feasibility study to evaluate a range of potential remedial alternatives for OU1, and is also conducting additional RI fieldwork to support development of the FS report. U.S. EPA will select a remedy for OU1 following completion of the RI/FS. No remedial action work at the site is anticipated during the 2008-2009 timeframe, and no additional remedial action work is anticipated for the Pine River. The NAPL collection system will continue to be operated until a final remedy for OU1 has been implemented. Additionally, U.S.

EPA anticipates that post-sediment cleanup monitoring efforts in the Pine River (including long-term monitoring of DDT levels in fish and sediments) will begin in 2008.

Investigation of Dioxin and Other Hazardous Constituent Contamination and Interim Response Actions in the Saginaw River and Bay Watershed

It has been confirmed by recent investigations (2004-2007) that extremely elevated dioxin and furan contaminated sediments (> 10,000 ppt TEQ) from the Tittabawassee River are entering the Saginaw River and Bay AOC. Fish consumption advisories are in effect for the Saginaw River and Bay related to this dioxin. An additional wild game advisory exists for dioxin in the Tittabawassee River floodplain. In December 2007, a 1,600,000 ppt TEQ sediment sample from the Upper Saginaw River triggered an EPA CERCLA Emergency Response Action at Wicks Park, immediately below the confluence with the Tittabawassee River. In addition, sampling at the Sixth Street Turning Basin (approximately 6 miles downstream of the confluence of the Tittabawassee and Shiawassee Rivers) indicates that high levels of dioxin (up to 30,000 ppt TEQ) are present in the mobile sediment bed load of the Saginaw.

The dioxin is believed to be eroding from bank and levee deposits of the Tittabawassee River and originated as discharge over a period of time (1900's-1980's) by Dow Chemical at their Midland facility location. Dow is conducting comprehensive remedial investigations (RIWPs) defining the nature and extent of contamination in the Tittabawassee River (underway since 2006) and the Saginaw River and Bay are expected to be completed by the end of 2008. This characterization is required as part of Dow Chemical's state-issued RCRA hazardous waste operating license.

Agency (MDEQ/EPA/USACE) and Dow Chemical studies of dioxin contamination in the Saginaw River and Bay demonstrates that sediments from the Tittabawassee River are the active source of dioxin to the Saginaw River and Bay. The final response activities for the Tittabawassee and Saginaw Rivers will be identified and implemented as part of MDEQ's Resource Conservation and Recovery Act (RCRA) Corrective Action and the Natural Resource Damage Assessment (NRDA) process.

For additional information on Dioxin and Dioxin in the Saginaw AOC see the links below.

- Dioxin Fact Sheet: http://www.michigan.gov/documents/Dioxin_Factsheet_82359_7.pdf
- MDEQ Dioxin Information Page: http://www.michigan.gov/deq/0,1607,7-135-3311_4109_9846_9847-43808--,00.html

Assessment of Persistent Bioaccumulative Toxic Chemicals in Michigan Fish from Several Trophic Levels

Working with MDEQ, Grand Valley State University will conduct an investigation of PBDEs in fish from multiple trophic levels in Saginaw Bay and the waters near the Les Cheneaux Islands in Lake Huron, among other areas in the Great Lakes. The locations represent systems with varying degrees of anthropogenic impact and have significant sport fisheries with respect to angler usage and fish production. Forage and predator species will be collected from each location and analyzed for PBDE congeners and fat content. The higher trophic level fish collected in this project will also be analysed for PCB congeners and mercury in a manner consistent with the MDEQ Fish Contaminant Monitoring Program and use Pentwater Lake as a reference system. These data will provide important information concerning the concentrations of these bioaccumulative chemicals in fish and how they are distributed in the food web, as well as inform efforts in Michigan Areas of Concern.

New for the 2008-2010 management cycle.

Activities Addressing Nutrient and Bacteria Issues

Agricultural Buffer Strips in the Saginaw Bay Area

The MDEQ has been working closely with the Michigan Department of Agriculture to implement a federal-state-local conservation partnership program, referred to as the Conservation Reserve Enhancement Program (CREP), to reduce significant environmental effects related to agriculture in the Saginaw Bay watershed. Eligible conservation practices include filter strips, riparian

buffer strips, field windbreaks, and wetland restorations. The MDEQ and the U.S. Department of Agriculture has provided cost sharing for the implementation of Natural Resources Conservation Service approved conservation practices, monitoring, and permanent conservation easements. The success of the program will be measured in reduced sediment, phosphorus, nitrogen, pesticide, and pathogen inputs to surface waters and improved water quality in the Saginaw River and Saginaw Bay.

Through September 2007, the Saginaw Bay watershed has had the largest number of acres enrolled (47,976) in the program, and the highest percentage (79%) of all the CREP implementation sites. All 22 counties in the Saginaw Bay watershed have implemented CREP practices. The counties in the Saginaw Bay watershed with the most acreage enrolled in the program include Saginaw (9,369), Huron (8,337), Tuscola (7,196), and Arenac (5,036). The CREP program has installed over 29,000 acres of filter strips and restored over 14,000 acres of wetlands in the Saginaw Bay Watershed.

Adopt a Watershed Project: Nutrient, Bacteria & Contaminant Reductions

Environment Canada's Adopt a Watershed pilot project (completed March 2008) focused on communities adopting watersheds to promote ecosystem health by caring for water, land, air, and conserving biodiversity and species at risk. Subwatersheds in Huron, Bruce and Lambton Counties along the southeast shore were targeted and promoted the protection of ecosystem, healthy communities and sustainable agriculture industry by education and stewardship. The project supplemented and was built on existing programs in the watershed and on forming partnerships. The objectives were to: promote the adoption of sub-watersheds by rural communities; increase rural community awareness of water and air quality issues, biodiversity conservation and protection of species at risk within the rural landscape; assist community/sector/stakeholder working groups to access technical and financial support to develop and implement strategic action plans to secure ecosystem health within their sub-watershed; realize measurable reductions

in the release of deleterious substances to water; reduce/eliminate house-hold garbage burning to reduce/eliminate the release of toxins to air; raise awareness on the need to control invasive species and to conserve biodiversity and to protect species at risk and celebrate the achievements of the sub-watershed project through media releases and a community gathering. Upon completion of the pilot projects, two communities in the Pine River and St. Joseph's area of the Lake Huron watershed submitted successful applications for Environment Canada's Community Action Fund (EcoAction) to implement best management practices on properties along with contributing landowners. A final report on the pilot project will be completed by fall, 2008 and successful strategies for "adopt a watershed" are being incorporated into other Lake Huron pilot projects and in the Lake Simcoe watershed.

Saginaw Bay Coastal Initiative

Through the Saginaw Bay Coastal Initiative, the DEQ and other state agencies will be working with citizens, local government officials, and multiple regional and federal agencies to develop and implement a comprehensive approach to promoting environmentally sound economic development and resource restoration in the Saginaw Bay coastal areas by: Identifying methods to enhance the economic development of the Saginaw Bay coastal area and the quality of its parks and beaches and other natural areas; seeking partnerships to develop new cultural, recreational, and social resources for Bay area citizens and visitors; and working with local interests to improving water quality in Saginaw Bay and its associated waterways. For more information, see: http://www.michigan.gov/deq/0,1607,7-135-7251_30353_42900---,00.html.

Saginaw Bay Science Committee Pathogen Work Group

In 2007, the MDEQ Director organized a Saginaw Bay Science Committee Pathogen Work Group to address the issue of excessive algal growth, detritus or "muck" covering the shoreline in parts of the Great Lakes (in particular Saginaw Bay). The Science Committee was charged

with addressing issues and needs regarding *E. coli* pathogen risks, and specifically, address citizen concerns on the presence of *E. coli* in detritus material in the Saginaw Bay area.

The findings of the Science Committee were reported in the *Saginaw Bay Coastal Initiative: Potential Public Health Risks Associated with Pathogens in Detritus Material ("Muck") in Saginaw Bay*.

Phosphorus Policy Advisory Committee

In June 2006, the MDEQ Director requested the participation of a wide range of stakeholders on the MDEQ's Phosphorus Policy Advisory Committee. The charge to the Advisory Committee was to identify the major source categories of phosphorus loadings to Michigan's surface waters, and for each of these categories, to review and compile the voluntary and regulatory management approaches that are being or could be used to control phosphorus. Based on that review, the Advisory Committee developed findings and recommendations to help advance phosphorus management strategies protective of Michigan's surface waters, taking into consideration effectiveness, costs of implementation, feasibility, and the potential reductions associated with the various phosphorus control options.

The Advisory Committees findings were reported in *Phosphorous Policy Advisory Committee: Final Report* (PSC, 2007). These findings will augment the Saginaw Bay Phosphorus Reduction Strategy, in place since 1987 and lead to further improvements in the phosphorous load in the Saginaw Bay.

Bacterial Beach Monitoring

In FY08, the MDEQ will be committing funding to local health departments along Saginaw Bay for water quality analyses. MDEQ is working with the local health departments to implement beach sanitary surveys to identify potential sources of *E. coli* and possibly additional genetic testing of *E. coli*. MDEQ will be conducting sanitary surveys focusing on animal feedlot operations in areas suspected to be contributors to the *E. coli*.

MDEQ is in the process of evaluating Discharge Monitoring Reports to identify permitted facilities that may not be in full compliance with permit requirements, and any follow-up action will be taken as appropriate.

The MDEQ has requested funding from USEPA to undertake additional baseline studies that would include genetic testing to determine the origin of *E. coli*.

MDEQ will be providing funding for the development of the Kawkawlin River restoration plan, an area suspected to be a contributor to the *E. coli* problem.

MDNR and MDEQ have been working with local leaders using beach grooming equipment at the Bay City State Recreation Area to minimize the muck problem. To date, the success has been limited and the muck has continued to accumulate. The MDNR and the MDEQ will continue to evaluate the effectiveness of the shoreline maintenance equipment and work with the local community leaders towards a solution.

New for 2006-2008 management cycle.

Lake Huron Southeast Shore Project - a Partnership Project

The Lake Huron South East (SE) Shores Working Group continues to provide a forum for further collaboration on research and monitoring on a range of issues, including microbial pollution, affecting the Lake Huron shoreline.

In May, 2005, the Ontario Ministry of the Environment released the Lake Huron Science Committee's report entitled, "*Sources and Mechanisms of Delivery of E. coli (bacteria) Pollution to the Lake Huron Shoreline of Huron County.*" Studies in 2006 have been completed including: characterization of spatial/temporal variability of *E. coli* in the swash zone of specific beaches; tracking *E. coli* from septic, including plume characterization; characterization of *E. coli* discharge from groundwater to lake; and, infiltration rates of *E. coli* through beach sand.

Lake Huron Southeast Shore Tourist – Economic Impact Study

The Lake Huron south east shore working group will undertake tourist surveys to understand spending habits during beach visits as well as what tourists are looking for in beach visits.

With assistance from Ryerson University, the members of the south east shore will utilize an existing survey (completed in 2007) to address the economic impact of beach postings and closures caused by *E. Coli* along the south east shore of Lake Huron.

Lake Huron Southeast Shore Green Ribbon Program

In Spring 2007, the Lake Huron Centre for Coastal Conservation with Environment Canada funding support prepared a draft guide outlining a program to recognize coastal communities who are actively engaged in beach stewardship activities and implementing Best Management Practices. The Green Ribbon program resembles the International Blue Flag program in requiring recipients to meet a series of environmental stewardship and environmental education criteria. While the Blue Flag program targets high use municipal public beaches, the Green Ribbon program focuses on lower use rural beaches.

The Green Ribbon program continues to be under development and the Coastal Centre is working with local beach associations to pilot the program. It is intended that the program be offered publicly in the summer of 2008.

Sturgeon Bay Blue Green Algae Blooms and the Water Quality Action Group

Scientists from Environment Canada and the Ontario Ministries of Environment and Natural Resources through their participation on the Sturgeon Bay Water Quality Action Group are providing ongoing scientific advice and monitoring support to the evaluation of causes and possible solutions to blue green algae blooms in Sturgeon Bay. The group, lead by the Township of the Archipelago has initiated a

consultant's study to assess the options for and feasibility of remediating Sturgeon Bay waters. Options have been evaluated and discussions continue amongst responsible agencies and a public meeting is scheduled for June 2008.

Managing the Impact of Multiple Stressors in Saginaw Bay

In January 2008, the National Oceanic and Atmospheric Administration awarded a regional consortium of Great Lakes area universities and research organizations \$760,000 for the first year of a five-year, \$3.8 million pilot project to develop a new approach to analyzing and managing the cumulative effects of climate change, land use, invasive species, and other environmental stressors on Saginaw Bay and its surrounding ecosystem. (See also the "Activities Addressing Fish and Wildlife Habitat/Populations.")

New for 2008-2010 management cycle.

Activities Addressing Fish and Wildlife Habitat/Populations

Presque Isle County Green Infrastructure Project

Support North East Michigan Council of Government's (NEMCOG) effort to provide ecological information and tools to local units of government, organizations and landowners in Presque Isle County. The project is an innovative partnership between NEMCOG and Michigan's Nature Features Inventory (MNFI), with guidance provided by a locally-based steering committee. The projects will address biodiversity and ecosystem change and support the conservation of fish and wildlife habitat.

Completed. The final report can be found at: http://www.nemcog.org/Pages/...PRESQUE_ISLE_COUNTY_GREEN_INFRASTRUCTURE.htm

This planning effort provided ecological information and tools to local units of government, organizations, and landowners in Presque Isle County through an innovative partnership between NEMCOG and Michigan's natural

heritage program (MNFI), with guidance provided by a locally based steering committee.

Colonial Waterbird Population Surveys

In 2007 the 4th binational decadal survey of breeding colonial waterbird populations across all of the Great Lakes began. In 2007 Lakes Superior, Michigan and Erie were surveyed. Lakes Huron and Ontario and connecting channels will be surveyed in 2008. This project determines distribution and estimates population size for ~15 species of colonial nesting waterbirds on islands and mainland sites within 2 km of Great Lakes shoreline. The survey has been conducted in the 1970s, the '80s, the '90s.

This project is ongoing through summer 2009.

Fish Passage Program

Funding and technical support, which includes information on fish habitat needs and methods to bypass barriers, is provided through this U.S. Fish and Wildlife Service program.

AIS Surveillance and Nearshore Fish Community Monitoring

Aquatic Invasive Species (AIS) and monitoring population trends of the nearshore fish community is conducted at northern Lake Huron ports and river mouths as well as the St. Marys River. These efforts help locate new AIS populations, provide information on the status of established invasive species and their potential impacts on existing fish community, and establish baseline fishery data prior to potential AIS invasions.

Fourteen ports, river mouths and channels were surveyed from 2006 to 2007. No new populations of invasive species were discovered. Established populations of round goby were monitored at eight locations. One population of Eurasian ruffe was monitored. Relative abundance and distribution data was collected on 36 species of the nearshore fish community. Annual reports and catch summaries of AIS activities is available on Alpena National Fish and Wildlife Conservation Office web site (<http://www.fws>

gov/midwest/alpena). This is an ongoing effort and will continue in the 2008-2010 cycle.

Lake Sturgeon Restoration

The Alpena NFWCO has led an interagency effort in the Lake Huron– Lake Erie region of the Great Lakes to determine the status and trends of lake sturgeon stocks and has relied on cooperation from state and provincial commercial fishers to compile biological data and externally tag by-caught sturgeon to develop movement and distribution information. Additional research coordinated at the Alpena Office includes studies in the Maumee River (OH), Detroit River (MI), St. Clair River (MI), Saginaw River watershed (MI), and the St. Mary’s River (MI) to determine the contribution to Lake Huron stocks and genetic profile of lake sturgeon utilizing these sites. The Alpena Office is coordinating a multi-agency effort to standardize procedures for genetic analysis and profiling of spawning stocks from numerous Great Lakes tributaries.

Habitat, spawning and population assessment studies were conducted on the Maumee River (OH), Saginaw River watershed (MI), Detroit River, and St Mary’s River with final reports pending. Other efforts are ongoing and will continue in the 2008-2010 cycle.

Lake Trout Rehabilitation

The U.S. Fish and Wildlife Service (Service), USGS, MDNR, CORA and OMNR are partners in an international effort to restore lake trout to self-sustaining levels in Lake Huron. Lake trout stocking in U.S. waters of Lake Huron is conducted primarily by the Service’s National Fish Hatcheries and the new stocking vessel “Baird”.. Likewise, OMNR stocks lake trout in its waters of Lake Huron. All contributing agencies conduct annual fishery assessments of lake trout stocks in waters under their respective jurisdictions. Offshore reef surveys are conducted by the large vessels operated by the Service and USGS. A new element in 2008-10 will be an assessment of pre-recruit lake trout by the agencies to address the concern that younger lake trout appear to be declining in standard spring assessments.

This is an ongoing effort and will continue in the 2008-2010 cycle.

Recreational Harvest Assessment

An expandable harvest survey is conducted by MDNR at all major Michigan access sites to estimate harvest and monitor harvest trends for species of recreational importance. Biological data from the catch are also systematically recorded. The survey has documented a pronounced shift from offshore species to predominantly nearshore species since 2003. OMNR periodically estimates harvest from several important access sites in Ontario.

Stocking and Assessment of Steelhead, Brown Trout, and Chinook Salmon

MDNR and OMNR stock and assess the status of these species, which until 2003 had served as important biological controls of alewives and served to produce economically important recreational fisheries. With the collapse of alewives these programs are now under review in Michigan.

Nearshore Fishery Assessment

Both OMNR and MDNR are now assessing nearshore fish stocks along the perimeter of Lake Huron. In 2008, MDNR expanded its monitoring of Saginaw Bay and Les Cheneaux Islands to the Thunder Bay-Port Huron nearshore zone. The focus of the OMNR survey is the southern half of the Main Basin.

Lake Herring Rehabilitation

In accordance with the Lake Huron Committee’s Lake Herring Recovery Guidelines, OMNR, CORA, and MDNR are investigating lake herring culture techniques and implementing protective commercial harvest regulations where needed. A larger-scale stocking effort is being contemplated for the 2008-2010 period.

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Restoration of Nearshore Fish Communities Through Management of Cormorant Populations

The focus of fish production appears to have migrated to nearshore areas of Lake Huron. However, in Les Cheneaux Islands and Thunder Bay, most or nearly all annual fish production was being consumed by double-crested cormorants. In collaboration with USDA APHIS, the MDNR and CORA are reducing cormorant numbers and assessing fish community responses. Lake Superior State University is monitoring diets of cormorants during the experimental control period. The objective is to restore a balance between cormorant consumption and the desire to have a portion of the fish community made available for human harvest. Les Cheneaux study is nearing completion in 2008, the Thunder Bay study will continue through 2010.

Treaty Fishery Unit

The Alpena NFWCO Treaty Fishery Unit fulfills Department of Interior and Service federal-tribal trust responsibilities by conducting activities in support of the Year 2000 Consent Decree, a 20 year fishery allocation for 1836 Treaty waters between the federal government, state of Michigan, and 5 Native American tribes. The Treaty Fishery Unit conducts fishery assessments in Lake Huron, annually performs statistical-catch-at-age modeling as part of the Modeling Subcommittee (MSC) of the Technical Fisheries Committee to determine safe harvest limits of lake trout and lake whitefish in 1836 Treaty waters, co-chairs meetings and activities of the MSC, and provides technical assistance to tribal and state resource agencies.

This is an ongoing effort and will continue in the 2008-2010 cycle.

Partners for Fish and Wildlife Program

The Service's Partners for Fish and Wildlife (Partners) Program delivers technical assistance and funding for habitat restoration efforts on private properties. A specific focus of the program is to restore habitats for native fish and wildlife resources. The program targets wetland and

grassland habitat restoration on private lands and has diversified in recent years to include riparian and in-stream habitat restoration. This partnership driven effort is delivered throughout the Lake Huron basin. The Alpena FRO delivers the program to the northern 20 counties of the lower peninsula of Michigan, which includes both Lake Huron and Lake Michigan tributaries.

From 1999-2007 the Alpena NFWCO has restored 740 acres of wetlands, improved 120 river-miles by placement of large woody debris and the improvement of stream bank erosion sites, opened 103 river-miles to fish passage with the completion of 16 projects, and restored 46 acres of grassland to native grasses on 4 sites. This is an ongoing effort and will continue in the 2008-2010 cycle.

Saginaw Bay Walleye Recovery Plan

The MDNR Fisheries Division Saginaw Bay Walleye Recovery Plan is a science-based blue print for management actions intended to achieve a self-sustaining walleye population and restore ecological balance to the fish community. Biological benefits from the recovery plan are anticipated to extend to the greater fish community, including yellow perch. The recovery plan focuses on 1) reducing stream habitat and sediment delivery to the through collaboration with partner agencies such as MDEQ and the Natural Resources Conservation Districts, as well as stakeholder watershed groups will be key to realizing this strategy, 2) achieving fish passage at key dams, 3) reef rehabilitation, and 4) increased stocking of fingerling walleye (to 2.8 million) to shift the predator/prey balance. Recovery in the Saginaw Bay will be defined as a self sustaining walleye population capable of supporting an annual yield of 1 million pounds, at a density such that growth rate of age-3 walleyes declines to 110% of the state average rate.

Production of wild walleyes has greatly increased since 2003. This is believed to be driven mainly by the decline of alewives in Lake Huron. Three relatively very strong walleye year classes have been established as a result and represent significant progress towards recovery.

The recovery plan included benchmarks for making management decisions. The threshold for deciding about the future of walleye stocking (three predominantly wild year classes out of five consecutive years) was reached in 2005. Consequently, The MDNR has not stocked Saginaw Bay since 2006.

The strong three years of wild walleyes juvenile production has caused biologists to revisit many of the widely held conclusions assumptions about factors limiting walleye reproduction in the bay. It now appears that adult alewives may be the most significant factor in reproduction suppression in most years. Despite this, the MDNR feels that the provisions of the Recovery Plan remain appropriate, including those calling for habitat improvement.

Walleye recovery has not yet been achieved in Saginaw Bay but recent developments are a substantial movement in that direction. The implementation of the Recovery Plan is ongoing.

and biological conditions, management actions and effects of non native species.

This action is ongoing.

Fish Community Survey of the St. Marys River

To estimate trends in abundance of various fish species in the fish community of the river. Survey serves as a measure of natural reproduction, year class strength, some evaluation of walleye stocking. Survey also provides some measure of presence of exotic species. Survey is gillnet based with 44 stations being assess on a schedule (target) of approximately once every three years. First survey was completed in 1975 and a total of five such surveys have been completed.

The most recent survey was conducted in 2006 and the results can be found at on the Great Lakes Fishery Commission web page. The next survey is tentatively scheduled for 2009.

Annual Fish Community Assessments

GLSC conducts annual bottom trawl surveys at Detour, Hammond Bay, Thunder Bay (Alpena), Ausable Point (Tawas), Harbor Beach, and Goderich (Ontario). Surveys examine abundance, size and age structure of key prey species, community composition, and prevalence of exotics. Fish collections are also sampled for analysis of contaminants, energy density, genetics, epizootics, and coded wire tags (lake trout). Recent additions to the survey include *Diporeia* monitoring, analyses of mechanisms regulating diet and growth of lake whitefish, re-examination of bloater (chubs) age structure, and examination of the ecological role of invasive round gobies in deepwater habitats. Fish community assessments are expanding, with hydroacoustic studies of the pelagic community beginning in 2004, and planned additional sampling of lower trophic levels in conjunction with fish surveys.

Bottom trawling and a lakewide hydroacoustic survey were completed during 2007, and both surveys are scheduled to occur again in 2008. See www.glsc.usgs.gov for annual reports on both surveys.

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Saginaw Bay Watershed Initiative Network (WIN): Cass River Fish Passage Study

In 2006, a WIN funded fish passage study was completed on the Cass River. In 2007, the city of Frankenmuth worked with the Corps of Engineers to complete conceptual design for fish passage at the city's dam.

New for 2008-2010 management cycle.

Saginaw Bay Coastal Wetland Mapping

Ducks Unlimited (DU) completed a project to map the coastal wetland vegetation along the Saginaw Bay coastline using airborne hyperspectral imagery acquired in 2002 by the U.S. EPA.

Saginaw Bay Fish Community Assessment

Research vessels from the Mt. Clemens and Alpena Fishery Research Stations are performing annual gillnetting and trawling surveys to assess responses of the Saginaw Bay fish community to changing environmental

Lake Huron Nearshore Monitoring

Purdue University will measure temporal and spatial trends in the nearshore biological community (benthic invertebrates and zooplankton), detect existing/spreading and newly introduced non-native aquatic species, and determine whether discernable patterns in water quality data can be detected in Lake Huron nearshore waters. The study was postponed in 2006 and is scheduled to begin in 2008.

New for 2008-2010 management cycle.

Saginaw Bay Coastal Initiative

Wetland Protection Technical Work Group

A Saginaw Bay High Quality Wetland Protection Technical Work Group has been formed, through the SBCI, to identify wetlands that are critical to Saginaw Bay and inform local authorities of the various methods that may be used to preserve these areas. New for the 2008-2010 management cycle.

Phragmites Control Demonstration Project

Beginning in late 2007, in response to the growing need to address the rapid spread of *Phragmites* in Saginaw Bay, the MDEQ and other stakeholders implemented a *Phragmites* control demonstration project along selected reaches of *Phragmites* infested public and private owned shorelines. The results of the demonstration project will be used to develop a public outreach and educational brochure describing treatment options, associated state permit requirements, and restoration opportunities. New for the 2008-2010 management cycle.

Activities to Increase Understanding of Ecosystem Change, Biodiversity and the Impact of Exotic Species

Trends in the Benthic Macroinvertebrate Community of Lake Huron

Benthic communities in many of the Great Lakes are currently undergoing extensive

changes because of dreissenid mussels, and efforts are focused on documenting if similar changes are occurring in Lake Huron. Benthic macroinvertebrate surveys were conducted in the main basin of Lake Huron in 2000, 2003, 2007, and in Georgian Bay and North Channel in 2002 and 2007. Of most interest are changes in abundances of the amphipod *Diporeia* and dreissenid mussels (zebra and quagga).

An assessment of changes between 2003 and 2007 will be completed by late 2008.

Studies to Determine Diets and Condition of Forage Fish

This study examines the seasonal diet composition, diet selectivity, and depth distribution of forage fish in southern Lake Huron off Harbor Beach. In the context of declining populations over the past several years, this study examines food selection of these fish relative to the food items present. Of note, the amphipod *Diporeia* has been gone from this area of the lake for at least 7 years. Given this loss, fish that heavily fed on *Diporeia* now must find alternate food items.

Field work for this study was initiated in 2007. Collections of fish, zooplankton (including Mysis), and benthos were made between May and October at 7 sites between 18m and 90 m. These data will be analyzed in 2008 with no more field work planned.

Changes in the Lower Food Web of Saginaw Bay

A large study was conducted in Saginaw Bay by GLERL between 1990 and 1996 to assess the impact of the zebra mussel on the lower food web (nutrients, phytoplankton, zooplankton, and benthos).

While a portion of the collected data has been analyzed and published, current efforts will complete the analysis and provide an overall synthesis.

Multiple Stressors in Saginaw Bay

This project will develop and evaluate a series of ecosystem models to predict how fish populations, water quality, and regional economics respond to multiple stressors (i. e., land use, climate change, and invasive species in Saginaw Bay. An Adaptive Integrative Framework (AIF) will be used to facilitate the synthesis and prioritization of research and management efforts. This approach is an iterative process in which modeling outputs will identify knowledge gaps that will be filled through field collections and experimental research and will, ultimately, help management agencies identify management alternatives. This project will run through 2012.

So far, a workshop was held that brought together key modelers, researchers, and managers to outline and discuss planned activities. Several more specific workshops will include managers/ stakeholders to discuss issues and needs, and modelers/ researchers to address those needs. Synthesis of historical data and planning for collection of new data in the bay and surrounding watershed has begun.

Lake Huron Biodiversity Conservation Strategy

In keeping with the Great Lakes Water Quality Agreement (GLWQA), participants in the LHBP are developing a biodiversity conservation initiative that will advance efforts to restore, maintain and protect the chemical, physical, and biological integrity of the waters of Lake Huron and provide long-term conservation strategies for biodiversity in the watershed. The project will identify biodiversity conservation needs in the Lake Huron watershed and allow participants to meet future challenges in the Lake Huron watershed. The effort will strengthen partnerships and communication and increase awareness of Lake Huron biodiversity and is expected to build on existing initiatives such as the LHBP, Great Lakes Fishery Commission's Environmental Objectives for Lake Huron, Lake Huron-Georgian Bay Watershed Framework for Community Action, the Michigan Wildlife Action Plan and other conservation efforts around the watershed.

This initiative is being implemented through the "Lake Huron Biodiversity Conservation Strategy" effort on the Canadian side. A project team comprised of representatives from government agencies, university scientists, stakeholders, Aboriginal groups, and non-governmental conservation practitioners will lead this project. The project will include workshops throughout the watershed to engage conservation partners in both countries. A similar effort is being explored on the U.S. side.

This new project is expected to be substantially completed within the 2008-2010 management cycle.

Activities at Areas of Concern

St. Marys River AOC - Canada

Stage 2 implementation projects include completion of a fisheries assessment plan, wetland and shoreline evaluation and protection activities, and a \$60M (CAN) upgrade to the Sewage Treatment Plant and sewer system improvements. The Algoma Environmental Management Agreement is undergoing an amendment to incorporate the reduction of air releases. A detailed sediment and benthos study was carried out in the fall of 2002, the report was finalized in 2004.

See also Activities Addressing Contaminants in Fish and Wildlife Section.

2006-2008 activities include: development of a strategy for contaminated sediment in the Bellevue Marine Park area; review of delisting criteria; wastewater characterization study; a coastal wetland assessment and protection program and the development and implementation of an overall sediment management plan for the St. Marys River.

East End Wastewater Treatment plant was upgraded to secondary treatment and the outfall pipe was relocated to deeper water.

The Bellevue Marina Sediment Management Strategy was completed.

St. Marys River Marsh Monitoring Program

The Marsh Monitoring Program, a binational marsh bird and amphibian population monitoring initiative, is providing information about the long-term health and ecological integrity of coastal and inland wetlands located in the St. Marys River AOC. In the spring and summer months of 2007, training of volunteers and monitoring occurred. The 2008 field season is currently being planned. New for the 2008-2010 management cycle.

St. Marys River AOC - U.S.

The MDEQ completed a RAP Update for the St. Marys River AOC in 2006. In the spring of 2007, the BPAC received a PAC support grant from the MDEQ to develop the fish and wildlife restoration criteria and Restoration Plan. The project is expected to be completed by the end of June, 2008. In addition to the fish and wildlife BUIs, the BPAC is currently in the process of comparing criteria outlined in the Stage 2 RAP with the statewide criteria. Determination of the final suite of criteria for Michigan's portion of the AOC is also expected to be complete by the end of June, 2008. Binational consultation will occur throughout the entire process. The MDEQ will proceed with approving BUI removal criteria for the St. Marys River AOC, as it has with other Michigan AOCs, by the end of 2008.

Sault Ste. Marie Area Watershed Project

The Sault Ste. Marie Area Watershed Project is a non-point source pollution planning project attempting to bring together the people within the Sault Area to address water quality issues, identify pollution sources, and construct a plan to reduce those sources within the watershed project area, including the Sault city limits. The Sault Project encompasses several small "sub-watersheds" of the St. Marys River that course through the city, including Ashmun Creek, Mission Creek, Seymour Creek, Shunk Creek, and the area east to Frechette Creek.

The watershed management plan was completed and approved by the MDEQ in 2007. The Chippewa/East Mackinac Conservation

District has convened a steering committee to prioritize tasks and implement the project.

Biotic Integrity and Habitat Assessment within the St. Marys River AOC

LSSU is conducting a two year study to augment existing base line monitoring data (ongoing at LSSU and other organizations), to provide a mechanism to assess ecosystem health, and to provide information that may (or may not) lead to the delisting of a number of RAP beneficial use impairments (BUIs). LSSU is using multimetric indices of biotic integrity to assess habitat availability and the "health" of nine St. Marys River coastal marshes. Bio-indices will be measured (e.g., biodiversity, population genetics, and reproductive health), with a particular emphasis on upper trophic level fish. Environmental sampling and analysis of organic (total PAH and total PCB) and trace-metal contaminants in fish, sediment, and water will also be conducted. In addition, LSSU will develop a GIS database to incorporate data generated by the project to enhance evaluation and interpretation of the data collected.

All field studies have been completed and indices of biotic integrity are being developed. Further refinement and development of biotic and chemical integrity models is ongoing. A final report is to be submitted to the USEPA in the summer of 2008. Saginaw River/Bay AOC

Contaminated sediment studies as described in Section I. Support the continued development and evaluation of the Saginaw River/Bay Measures of Success report. See Activities Addressing Contaminants in Fish and Wildlife Section.

Saginaw River/Bay AOC Delisting Criteria

On May 31, 2006, the Saginaw River/Bay PAC held a meeting and voted to adopt the delisting targets included in the Guidance to evaluate the status of the AOC BUIs.

A RAP Update for the Saginaw River/Bay was completed in early 2008.

The Saginaw Bay Wetland Initiative

Ducks Unlimited and a coalition of seventeen conservation partners have conserved 4,125 acres of wetland and associated grassland habitat on public and private lands across the 22-county Saginaw Bay Watershed. Funding for Phase II of the Saginaw Bay Wetland Initiative came from a \$1,000,000 federal grant from the North American Wetlands Conservation Council (NAWCC) awarded to Ducks Unlimited in 2001. Ducks Unlimited accepted this grant on behalf of the partnership that together pledged \$4.07 million in matching funds toward the grant. This project was undertaken under the Michigan Joint Venture Group, organized in support of the North American Waterfowl Management Plan, and built on the success and expanded conservation efforts of the Phase I Saginaw Bay Wetland Initiative completed in 2004 that resulted in the conservation of an additional 4,178 acres of wetland and grassland habitat in the Saginaw Bay watershed.

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In addition, Ducks Unlimited in partnership with 16 conservation organizations was awarded a \$1 million grant from the NAWCC to conserve approximately 3,800 acres of wetlands and associated uplands in the coastal counties from northern Saginaw Bay to the Ohio border. This grant was awarded in the fall of 2005 and is expected to be completed in the fall of 2009.

Also, there are two small North American Wetland Conservation Act projects along Saginaw Bay. DU, DNR and MDHA partnered to receive a \$36,105 grant from the North American Wetlands Conservation Council to improve the water level and vegetative management of 819 acres of coastal wetland, moist soil wetland and seasonally flooded crops at Nayanquing Point Wildlife Area. This project also improved 46 acres of associated upland (this project is complete). The second project is a partnership between DU, DNR, Saginaw Bay Watershed Initiative Network, Bay Area Community Foundation and Dow. Via this partnership, DU received a \$75,000 grant to restore at least 135 acres of coastal wetlands at Wigwam Bay State Wildlife Area (project is ongoing).

Phase I completed, Phase II underway.

Monitoring Coordination/Data Sharing

Lake Huron Geographic Information System (LHGIS) - A Partnership Project

The development of the LHGIS makes all public GIS data available for wide distribution and use.

Original effort completed. Collaboration on the LHGIS is ongoing. Agencies are seeking to add all publicly-available data to the LHGIS, and are always looking for new contributors of data.

For more information on the LHGIS see: http://www.glf.org/glgis/fact_sheets/LHGIS_fact_sheet_1204.pdf. To acquire the LHGIS, please contact Christine Geddes via email (cgeddes@umich.edu). For information on the Great Lakes GIS project, visit the Great Lakes GIS web site at: <http://www.glf.org/greatlakesgis/>.

Lake Huron State of the Lake Symposium, October 2006

The Aquatic Ecosystem Health and Management Society will publish peer-reviewed articles on Lake Huron ecosystem research and monitoring results presented at the 2006 Symposium.

Sugar Island Monitoring Workgroup

Responding to residents' concerns about beach closings and water quality in the Sugar Island area in the summer of 2006, the RAP team agencies partnered with representatives from local, tribal, state/provincial, and federal agencies in Canada and the U.S. to form the Sugar Island Monitoring Work Group (SIMWG) in 2007. The agencies involved in the SIMWG include: Algoma Public Health, Chippewa County Health Department, Ontario Ministry of Environment (OMOE), MDEQ, EC, Health Canada, USEPA, Bay Mills Indian Community, and Sault Ste. Marie Tribe of Chippewa Indians (Sault Tribe). The purpose of the SIMWG is to develop and carry out a coordinated monitoring plan for the St. Marys River along the North Shore of Sugar Island. The workgroup's task is conducting water

quality monitoring, characterizing the severity of water quality impairment, and identifying potential sources of bacteria and floating solids.

Outreach Activities

Lake Huron-Georgian Bay Watershed: A Canadian Framework for Community Action

The framework provides a comprehensive community-based approach based on best science and the use of existing and new initiatives to promote and assist local community-based projects focused on improved and sustained ecosystem health of Lake Huron.

Pilot projects initiated under the Canadian Framework for Community Action include:

- Lower Nottawasaga River Stewardship Program: Coordinated by the Nottawasaga Valley Conservation Authority, this project will work with local government agencies and community partners to plan and conduct specific stewardship activities in the Lower Nottawasaga watershed and associated Lake Huron shoreline.
- North Gullies Subwatershed Pilot Study: Coordinated by the Ausable Bayfield Conservation Authority, this project will bring interested partners together to develop a long term subwatershed plan for the North Gullies subwatershed, providing an action process to enhance and protect the area.
- Georgian Bay Biosphere Reserve Stewardship Strategy and Guideline: Coordinated by the Georgian Bay Biosphere Reserve Inc (GBBR), to increase public awareness of environmental condition, stressors and stewardship opportunities through conservation workshops, symposia and public outreach, and to initiate demonstration projects to use as good examples of stewardship, rehabilitation and best management practices and policies.

Lake Huron Community Action Website

An information resource network intended for action-oriented communities, groups and people interested in land and water stewardship activities

to sustain a healthy Lake Huron and Georgian Bay environment for future generations. The website provides current information on water, fish and wildlife, wetlands and other natural resources, as well as government agencies, community organizations and funding sources across the Lake Huron watershed. The site includes an index for people to register stewardship projects and to share local knowledge of ecosystems <http://www.lakehuroncommunityaction.ca>.

Lake Huron Youth Summit

Grade 12 students from the Canadian Lake Huron watershed were invited to discuss environmental issues confronting the watershed and basin and ways to actively participate as environmental ambassadors in their communities. Twenty nine students attended a three-day Youth Summit at Bruce Peninsula National Park on Sept 28-30, 2007. Youth Ambassadors went on to initiate personal environmental stewardship action plans, and engaged and encouraged municipal councils and other organizations in their communities to join them in signing the Lake Huron Charter.

A second Youth Summit is being planned for the fall of 2008 in Parry Sound.

