MICHIGAN

STATE of the GREAT LAKES 2013

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MICHIGAN OFFICE OF THE GREAT LAKES

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Photo: Robert, Kalamazoo

Governor's message

Gov. Rick Snyder

The success of Michigan's reinvention depends on real people coming together to make genuine progress. Inspiring collaboration can be challenging, but leaning on shared values often sparks meaningful partnerships. Michiganders of all beliefs share a profound appreciation for the Great Lakes – a shared value that we can and should use to bring us together.

People agree that the Great Lakes are an unparalleled global treasure, and we celebrate them for their beauty and rich resources. But the lakes are more than just that – they shape our past and they shape our future. They define our region, providing precious drinking water, recreation, and are a founding pillar of our economy and our culture.

With this shared resource so critical to our success as a state and region, we must foster a relationship of respect with our waters and with our neighbors. We must work together to develop economic opportunities–with an emphasis on sustainability. We have always depended on the Great Lakes and it is my goal to help improve Michigan's strategy to ensure decades of prosperity in the future.

As part of this effort, Michigan hosted the Great Lakes Governors and Premiers for a summit on Mackinac Island to discuss stewardship issues for this shared region. The meeting renewed a commitment originally formed 30 years ago in a similar gathering. It was a timely opportunity for the leaders to discuss respective economic and stewardship concerns and reaffirm their commitment to governing partnerships.

The conference's discussions, debates and decisions inspired a collaborative sense of community and duty. Above all, conference participants recognized that no challenge facing the Great Lakes belongs to one state or province alone. We share these waters and so we share our futures.

The summit resolved to promote Great Lakes trade, open procurement practices and increase exports from our region's small- and medium-sized companies. The U.S. and Canada enjoy the world's most significant trade relationship, and we hope to strengthen that bond.

Participants also voted to redouble efforts to attract tourists to our provinces and states, while boosting the health of our residents by promoting physical activities like paddling, swimming and fishing.

On the U.S. side, the Council of Great Lakes Governors unanimously resolved to support the continuation of a fully-funded Great Lakes Restoration Initiative. This program, active since 2010, has been instrumental in improving areas harmed by past environmental practices.

The Great Lakes are political boundaries, serving as the dividing lines between states and nations. But the summit brought to the fore the clear reality that we are united by our waters, and we share the responsibility for maintaining them for future generations.

As Michigan reinvents itself for a new era of prosperity and stewardship, our love of the Great Lakes can serve to bring us together. It is my hope that collaborations like the Governors' Summit will keep that spirit alive.

Photo: Shawn, China Township

Michigan's Water Strategy: Partnering with "a Great Lakes people"

Jon W. Allan
Director, Michigan Office of the Great Lakes

This year, Gov. Snyder's State of the Great Lakes message centered on a well-documented truth: We love the Great Lakes. Fishermen, swimmers, paddlers and other users love them. Even people who don't ever touch the water tell me they deeply appreciate the beauty of the lakes. We are a "Great Lakes people."

To date, we haven't thoroughly investigated why we all love the Great Lakes so much or how this impacts our day-to-day decisions – we just take it as a given. I believe that developing a better understanding of our relationship with this natural wonder will help us make Michigan an even better place and improve quality of life for our residents and visitors.

It is my goal to help ensure that Michigan has healthy, functional natural systems. The more we strengthen the health of our Great Lakes and other water resources, the more capacity they have to support human use and enjoyment. With more personal exposure to a healthier resource, I believe stewardship will also increase.

The more people appreciate, use and love the Great Lakes, I believe their stewardship actions will also grow. Stewardship comes from our experiences, our families, from the stories we hear and tell, from how we use them and from their mere presence.

At the Governor's request, the state has been working with partners across Michigan to develop a "Water Strategy" to guide how we collectively make decisions regarding water over the next 30 years and beyond. This Water Strategy will tackle big topics like water use – including conflict, invasive species, algal blooms and muck, legacy pollution, and restoration. It focuses equally on healthy systems, quality of life, and human use and enjoyment.

The Water Strategy also involves a broad engagement plan, which is already underway. Breaking with the historical approach, our team approached communities in all 10 of Michigan's economic development regions for input before even putting pen to paper. This group did not start with a strategy in mind, but entered conversations throughout the state to hear what matters to people first.

Through these groups of community leaders, partners, stakeholders and sovereign tribal voices, the team identified a set of common goals and outcomes for the strategy. These reflect the groups' ideas about how our state should focus on water quality and quantity, connection to place, and quality of life.

But that's just the beginning. The team will also reach out to communities with support from the Mott Foundation to test these outcomes more broadly. Additionally, with support from the Erb Foundation and in partnership with the Kalamazoo Nature Center, Michigan State University and Cranbrook Institute of Science the team will facilitate "intergenerational conversations" to illuminate what drives our persistent Great Lakes identity and affinity, regardless of our age.

The team and its partners will pursue the important effect of water on place and how this affects choices in communities. Studying which types of investments create the broadest improvements to the environment, the best economic opportunities and the greatest benefits to the most people will help guide decision-making in Michigan. This also adds to our understanding of the blue economy.

This State of the Great Lakes report should set the stage for the kinds of thinking and issues you'll soon hear more about, or have already participated in, with the Michigan Water Strategy. We seek to create a compelling and integrated vision that will make life in Michigan a better one, that will attract and keep talent, that will grow economies and support healthy natural systems now and far into the future.

Across the state the message is clear: Water is one of our greatest natural assets – if not the greatest asset - for what it provides and for what it means to our identity. Our relationship with water must reflect its great value throughout Michigan and the Great Lakes region.

Photo: Christian, Saginaw

Great Lakes water levels

Dr. Andrew Gronewold
Physical Scientist
NOAA Great Lakes Environmental Research Laboratory

Changes in the water levels of the Great Lakes impact humans and environmental systems across a variety of time and space scales. Storm events, for example, can lead to damaging and life-threatening water level surges along the Great Lakes coastline that are not only greater than the tidal fluctuations of marine coastlines, but are also more difficult to predict.

Long-term changes in regional precipitation and evaporation rates, on the other hand, drive seasonal, inter-annual and decadal water level fluctuations, and can lead to periods of extremely high or low water levels. These extreme water levels can persist for months or years, and have important implications for human-ecosystem interactions along the 10,000 miles of state, provincial and tribal lands that constitute the Great Lakes coastline.

When water levels are too low, for example, commercial shipping, recreational boating and hydropower facility capacity (among other uses and infrastructure) are impaired. When water levels are extremely high, coastal erosion and flooding become widespread.

The Great Lakes coastal ecosystem and the regional population have historically adapted to water level fluctuations. These adaptation measures range from technological innovation to internationally-coordinated water resources management protocols to modification of expected ecosystem services. Water levels on the Lake Michigan and Huron system, however, have been below their long-term average for over a decade, and Lake Superior has been below its long-term average for most of that period as well.

Interestingly, water levels on the Lake Michigan and Huron system over this recent period have varied little from year to year relative to historical inter-annual variability. Moving forward, there will be a continued, if not growing importance of adapting to water level dynamics and ensuring management protocols are in place for supporting adaptation and mirroring the system's resilient past.

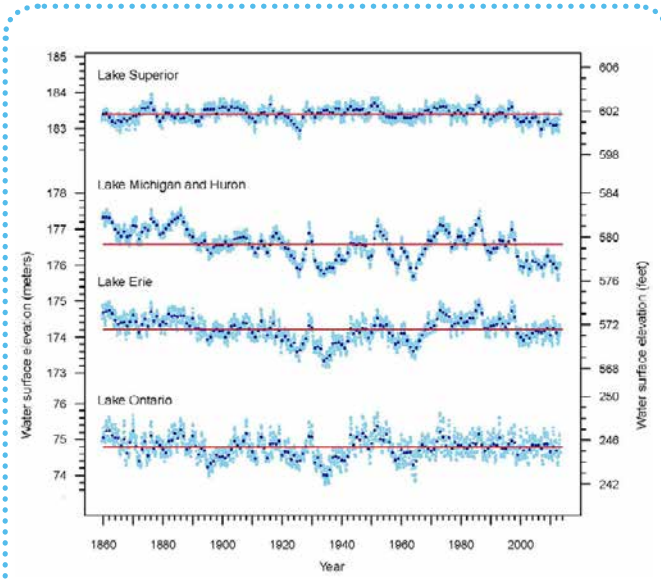


Image: NOAA

The water levels of the Great Lakes, the flows in the channels that connect them and the major components of the Great Lakes water budget are collectively monitored, assessed and forecast by a collaborative international network of federal agencies including the National Oceanic and Atmospheric Administration, the U.S. Army Corps of Engineers, the U.S. Geological Survey, Environment Canada and Canada's Department of Fisheries and Oceans.

This coordinated effort underscores the fact that the Great Lakes are not just the largest network of lakes on Earth, but are also a massive interconnected ecosystem requiring extensive resources to understand and interact with it in a way that ensures both human and environmental well-being.

Civilizations throughout human history have met and overcome challenges stemming from extreme conditions in the hydrologic systems on which they depend. The 40 million people in the Great Lakes region are certainly prepared to meet the challenges currently posed by the low water level conditions on the upper lakes. However, that challenge is intensified because water levels could again rise to extreme highs, or they could drop further.

It is important to recognize, for example, that the results of current annual investments of hundreds of millions of dollars in restoration efforts through the historic Great Lakes Restoration Initiative are highly sensitive to future water level fluctuations. While these current investments are critically important, it is equally important to recognize that investments in water level-related resource management must continue if we hope to realize the full value of the Great Lakes as a unique and essential resource.

The future of Great Lakes water levels is highly uncertain. Changes in regional climate and meteorology could cause water levels on Lakes Superior, Michigan and Huron to drop further – or they could cause water levels to increase abruptly. A combination of continued monitoring, improvements in forecasting, and anticipation of adaptation measures needed to ensure system resilience will collectively define how successfully we, as a region, meet current challenges and those we will undoubtedly face in the future.

Sedimentation and nutrient loading in Lake Erie and the Saginaw Bay

Dr. Jeffrey M. Reutter
Director, Ohio Sea Grant College Program
F.T. Stone Laboratory, Ohio State University

Dr. David S. Karpovich
Director, Saginaw Bay Environmental Science Institute
Saginaw Valley State University

The quantity and quality of freshwater in this country and around the world are growing concerns. Extreme low water levels observed during the winter of 2012-13 in the Great Lakes were relieved considerably by significant snow melt and spring and early summer rains across the region. However, excessive nutrient loading and blue-green algal blooms are a growing regional, national and global problem with significant occurrences in Canada and 21 states in 2012 and 2013.

Lake Erie

Lake Erie is the southernmost, shallowest, warmest and most nutrient-enriched of the Great Lakes. That combination also makes Lake Erie the most productive, but too much nutrient enrichment can be dangerous. In the 1960s and 70s, Lake Erie was labeled a "dead lake" as a result of these issues, leading to the Clean Water Act and the Great Lakes Water Quality Agreement. At that time, most of the load of phosphorus, the main concern, came from sewage treatment. Improving sewage treatment was expensive, but it was accomplished by the mid-1980s, reducing phosphorus by almost two-thirds. Today, Lake Erie is the "Walleye Capital of the World."

Unfortunately, in the mid-1990s, phosphorus began to increase due to changes in agricultural practices, more frequent severe storms related to climate change and effects of invasive species. Harmful algal blooms of blue-green algae or cyanobacteria, capable of producing dangerous toxins, returned in the late-1990s and have occurred annually since 2002 in the Western Basin. Excessive phosphorus, primarily from agricultural runoff (about 80 percent) is the primary cause of the blooms. Central Basin blooms occurred in 2012 and 2013.

NOAA, Heidelberg, the University of Toledo and Ohio State University have collaborated to develop a model to annually predict the severity of Western Basin blooms based on the amount of phosphorus from the Maumee River between March 1 and June 30. The 2011 bloom (very wet year) was 2.5 times worse than any other. The 2012 bloom (drought year) was about 10 percent of 2011's. The 2013 bloom will likely be about a third to half the size of the historic 2011 bloom. Algal toxins appeared in treated drinking water in several locations outside Michigan in 2013, causing shutdowns, do-not-drink orders and importation of bottled water.

In March 2013, the Ohio Phosphorus Task Force II developed target loads to eliminate, or greatly reduce, Western Basin harmful algal blooms, and agreed that a phosphorus reduction of 40 percent was needed, coupled with a robust monitoring program. The International Joint Commission has adopted Ohio's recommendations. Scott's Miracle Grow responded by removing phosphorus from lawn care products on January 1, 2013. The Detroit Sewage Treatment Plant, which was out of compliance from 2009-2011, is back in compliance. Almost all combined sewer overflows in the Lake Erie watershed – and all in Michigan – have approved plans to address the problem.

Farming leaders from Ohio, Indiana and Michigan are going to OSU's Stone Lab at Put-in-Bay, Ohio, to learn about the problem and how to solve it. The Ohio Farm Bureau has encouraged farmers to take voluntary action. Surveys of Maumee River farmers show that more than 70 percent now understand that they are part of this problem and are willing to take action to address it. Best management practices for farmers and the Ohio Phosphorus Index are being evaluated and updated.

We appear to be headed in the right direction to solve the problem but may not be moving fast enough. (cont'd)

2011 Lake Erie toxic algae bloom

Sedimentation and nutrient loading in Lake Erie and the Saginaw Bay cont'd

Saginaw Bay

Saginaw Bay, an Area of Concern, is heavily impacted by nutrient loading, which has for decades contributed to eutrophic conditions. Amendments to the Great Lakes Water Quality Agreement of 1978 set a target for total phosphorus in the bay at 440 metric tons per year and stayed at that level in the 2012 agreement. While monitoring data are sparse, research led by NOAA Great Lakes Environmental Research Laboratory suggests the target is rarely met. Point sources have largely been addressed over the years, with non-point source phosphorous remaining a primary concern. Scientists estimate that approximately 90 percent of NPS phosphorus in the watershed is agricultural.

Phosphorus loading is strongly linked to erosion and transport of soil. Programs such as the Great Lakes Restoration Initiative and the Michigan Agricultural Environmental Assurance Program have encouraged the implementation of agricultural best management practices in the Saginaw Bay watershed. Agricultural BMPs include creating vegetative buffer strips adjacent to ditches to reduce runoff and planting winter cover crops to reduce wind erosion. Increasing the use of BMPs could reduce soil erosion and thus phosphorus transport; however, this would require additional conservation funding.

A strategy for placement of BMPs for the largest impact on ecological outcomes could help utilize conservation funds more effectively. New research aims to quantify the effects of land-based agricultural BMPs in the Saginaw Bay watershed on water quality and other ecological outcomes. The goal is to provide a scientific connection to enable a more informed BMP placement strategy.

Toxic algae bloom and sedimentation in Saginaw Bay

The recent NOAA-funded Saginaw Bay Multiple Stressors project resulted in a comprehensive assessment of the Saginaw Bay ecosystem. Additional research is needed to fully understand the bay and determine restoration targets. As restoration actions continue in the Saginaw Bay watershed, it will also be necessary to document the effects by establishing and maintaining ongoing monitoring programs in tributaries as well as the bay. Finally, it is important to help stakeholders in the watershed understand how their land use affects Saginaw Bay water quality in order to encourage stewardship.

Students from Saginaw Valley State University make observations at Bay City State Recreation Area.

Great Lakes fisheries

Todd Grischke, Todd Kalish and Phillip Schneeberger
Basin Coordinators for Lakes Huron, Michigan/Erie and Superior
Michigan Department of Natural Resources

Lake Superior

Lake Superior is reliably cold all year, and bad weather can materialize quickly, so anglers must always take care and think clearly while out on the lake. Nearshore fishing for salmon and trout is usually best near bays, harbors, breakwalls and piers in spring and fall. During summer, fishing is generally concentrated farther offshore, but because the lake characteristically has a steep drop off, anglers need not go too far to find deeper water. For those anglers who have the desire and the ability to venture farther, Stannard Rock and Big Reef are two of the most renowned offshore fisheries in which fishermen consistently catch large lake trout.

Lake trout is by far the top species caught by Lake Superior anglers. Three forms of lake trout are found in the lake's cold waters: leans, humpers and siscowets. Lean lake trout are mostly associated with nearshore waters, siscowets are the deepwater form, and humpers are in-between, living near seamounts out in the lake.

Coho salmon rank second in the recreational harvest, with most of the catch occurring during spring and fall. Chinook salmon, steelhead and splake are all caught in considerably lower numbers relative to lake trout and coho.

Over the last five years in Michigan waters of Lake Superior, average annual recreational harvests of salmonids were estimated to be 24,985 lake trout, 8,400 coho salmon, 1,484 Chinook salmon, 1,435 steelhead, and 1,333 splake. There is year-to-year variation in catches of all species, with no particular trends either up or down during the period, except that for lake trout, harvest numbers have increased about 85 percent since 2007. The rise in lake trout catch is partly attributable to the enactment of a more liberal lake trout bag limit in Lake Superior east of the Keweenaw Peninsula in 2010.

In 2013, five fish species were stocked in Michigan's Lake Superior waters: brown trout (27,940 yearlings), Chinook salmon (342,861 spring fingerlings – adipose clipped), rainbow trout (82,790 yearlings and 55,000 fall fingerlings), splake (107,559 yearlings) and lake sturgeon (7,000 swim-up fry and 290 fall fingerlings). Lake trout are self-sustaining in Lake Superior and haven't been stocked by the state since the mid-1990s.

Photo: Robert, St. Ignace

Lake Erie

The fish community of Lake Erie cannot be appropriately managed without strong collaboration among all natural resource jurisdictions bordering the lake. The Joint Strategic Plan for Management of Great Lakes Fisheries establishes a foundation for collaborative management through information sharing and joint decision-making. In 2010 the Lake Erie Committee, consisting of agency representatives from Ontario, New York, Pennsylvania, Ohio and Michigan working through the Joint Strategic Plan, developed a process to actively engage agency experts and stakeholders to review and recommend enhancements to the current walleye and yellow perch assessment models and harvest control rules. These models and rules are used to recommend recreational and commercial harvest limits in each of the state and provincial jurisdictions of Lake Erie.

The Lake Erie Committee formed the Lake Erie Percid Management Advisory Group, comprised of agency representatives, commercial, charter and recreational anglers. This group was formed to review and enhance the current assessment models and harvest control rules through a structured decision making process that highlights the interconnectedness and value of the social, economic and biological components of the fishery. By featuring connections over differences, diverse interests with wide ranges of experiences and opinions clearly defined a common goal and worked effectively to achieve it.

In 2013, the LEPMAG and LEC finalized an enhanced walleye assessment model and harvest control rule that incorporates the most current scientific, social and economic information and knowledge. This enhanced model and harvest control rule will provide more accurate walleye population estimates used to recommend recreational and commercial harvest limits.

Angler hours were lower than previous years on Lake Erie due to poor weather conditions. However, walleye fishing success was similar to historic years with strong contributions from the 2003, 2007, 2009 and 2010 year classes. Yellow perch fishing was above average during the summer with strong contributions from the 2007 and 2008 year classes. (cont'd)

Great Lakes Fisheries cont'd

Lake Michigan

The Lake Michigan food web is a dynamic system affected by weather and climate; exotic and invasive species; management activities such as stocking; and water and habitat quality affected by natural and human activity.

Prey fish abundance and biomass is an indicator of ecosystem stability and health, and has been collaboratively monitored by state and federal agencies on an annual basis since the 1970s. Recent surveys indicate that prey fish abundance is low, and in some cases near record lows over the survey period of record.

In light of this information, all state natural resource agencies bordering Lake Michigan decreased salmon stocking lake-wide by 50 percent beginning in 2013 and continuing until 2015. The results will be monitored and assessed by state, federal and tribal resource agencies. This management action exemplifies the strong intent of state natural resource agencies to work together toward common goals. Indeed, all management actions within one jurisdiction have the potential to impact others.

Angler success in Lake Michigan was influenced by colder-than-normal water temperatures that persisted into the early summer, and frequent high winds that precluded stable thermocline development. Chinook salmon catches were lower than normal, but average weight was much higher than normal with numerous fish caught at 20 pounds or higher.

Coho salmon fishing was better than normal, especially in the southern portion of Lake Michigan. Steelhead and brown trout fisheries were average, and the lake trout fishery was above average, particularly in the northern Lower Peninsula. The walleye fishery in Bays de Noc was good in the spring but slowed in the summer due to abundant natural forage availability such as mayflies and alewives.

Photo: Jill, Presque Isle

Lake Huron

Native species are faring well in Lake Huron despite dramatic changes to the lake ecosystem over the past decade. Natural reproduction of lake trout continues to increase, and multiple year classes of naturally reproduced fish now make up more than 50 percent of harvested lake trout in Lake Huron.

Evidence is mounting that it may be time to reduce and/or suspend lake trout stocking in Lake Huron. Under the auspices of the Great Lakes Fishery Commission, the State of Michigan, Ontario Ministry of Natural Resources and tribal governments continued their collaboration to investigate this idea of stocking cessation, and work continued to collect biological information, answer key remaining questions, and address data gaps.

Partnerships among state and federal agencies to control invasive sea lamprey are likely contributing to the recent success in lake trout recovery. Recent treatments have resulted in sea lamprey populations remaining below historic levels. While almost unthinkable a decade ago, conversations regarding the suspension of lake trout stocking in Lake Huron are now commonplace.

Walleye harvest, catch rate and overall population remained high in 2013, and stocking of walleye has not been necessary in Saginaw Bay since 2006. Research into migration patterns of adult walleye into and out of Saginaw Bay has produced data demonstrating the importance of this spawning population to the entire main basin of Lake Huron.

The successful partnership between Lake Superior State University and the State of Michigan has produced an Atlantic salmon fishery in Lake Huron since the 1980s. More recently, this collaboration has been extended as key MDNR staff and constituent organizations working on Lake Huron have developed additional rearing and stocking plans for Atlantic salmon. The result is an expanded Atlantic salmon program for Lake Huron that includes long-term stocking, marking and monitoring of stocked fish.

Invasive species, namely dreissenid mussels, round gobies and bythotrephes, still have serious impacts on the lower trophic levels of Lake Huron, thereby impacting the entire food web. Lake Huron's alewife population, which crashed and nearly disappeared in 2005, remains very low while smelt and bloater chubs have experienced a slight increase. Lake wide, stocked Chinook salmon contributions to the fishery remain well below historic highs, yet several ports from Rogers City north enjoyed very good fisheries in 2013. The steelhead fishery remains strong throughout the lake, continuing the increases seen in recent years.

Focus on Michigan's Coastal Zone Management Program:

The Great Lakes make great water trails

Lynda Krupansky
Michigan Coastal Zone Management Program
Michigan Office of the Great Lakes, MDEQ

Photo: Michigan Sea Grant

Michigan's natural areas offer an incredible resource for outdoor recreation. Our state and national parks host extensive hiking trails, but a new path that trades boots and poles for paddles and sails is now more popular than ever. Great Lakes water trails offer a unique outdoors experience, and this year navigating through online maps and information got a whole lot easier.

With Great Lakes water trail information scattered in countless corners of the Internet, planning a trip was sometimes more like a scavenger hunt. That's why this year the Michigan Coastal Zone Management Program, the Land Information Access Association, Michigan Sea Grant, and several regional partners created an online water trails database and interactive website (www.michiganwatertrails.org).

Paddlers can now click on a region of the state and instantly find information on local water trails and their associated amenities. The tool serves as a statewide repository for all Great Lakes water trail resources to improve the sharing of information between regions, heighten awareness of coastal access availability and increase visibility and marketability of local trails.

The tool will also encourage the growth of the Great Lakes water trails system, toward the goal of a fully connected path around our state. The project's development of technical and data resources will make future trail development easier.

A separate water trails project with the CZM Program and Western Michigan University focused on Lake Michigan, mapping public access sites for kayaks. The project created a website (www.lmwta.org/maps.html) that includes printable maps, trip planning, kayaking information and paddling resources. For Lake Michigan, the data collected is being used as a starting point in obtaining more detailed information for each public access site.

Photo: Curt, Sanford

A public awareness campaign raised support for the project, and the first Lake Michigan water trail conference took place in the fall of 2012, bringing together representatives from Michigan, Indiana, Wisconsin, Illinois and other interested parties and partners.

Additionally, the CZM Program is partnering with regional organizations, nonprofits, universities and governments to comprehensively plan, map and promote coastal water trail development along Michigan's Great Lakes. Part of the project includes entering all water trail data inventoried and mapped by these partners into the Great Lakes Water Trails website created by LIAA.

We believe that fostering water trails will enhance public access to coastal areas, encourage stewardship, increase accessibility and support waterfront redevelopment plans. The CZM Program will be a driving force in continuing with our partners toward the shared vision of a connected Great Lakes water trail, for community growth, vibrant economies, education and environmental awareness.

Focus on Michigan's Coastal Zone Management Program:

Improving beach safety at Michigan's coastal state park beaches

Matt Warner
Michigan Coastal Zone Management Program
Michigan Office of the Great Lakes, MDEQ

A beautiful summer day spent swimming at a Lake Michigan beach serves up wonderful, lasting memories. However, the power of Great Lakes waves and dangerous nearshore currents, if not properly understood and respected, can quickly turn an enjoyable outing into a heartbreaking one. Michigan's Coastal Zone Management Program is working to minimize this kind of preventable tragedy.

Great Lakes beaches, especially those along the Lake Michigan coast, contain physical features and weather conditions that make them ripe for dangerous currents, including rip currents. In addition, Great Lakes beach safety is challenged by our many navigational breakwaters which can cause rip currents and Great Lakes waves that typically impact swimmers at a much higher frequency than those along the nation's salty shores.

Michigan's CZM Program has partnered with the Parks and Recreation Division of the Michigan Department of Natural Resources to improve beach safety at coastal State Park beaches. Michigan Technological University and Michigan Sea Grant are key partners performing research to improve dangerous currents forecasting, as well as developing new and better ways to raise awareness of the issue.

Photo: Matt Warner

Researchers with Michigan Tech's Great Lakes Research Center and the University of Michigan used special radar technology to study dangerous currents along Lake Michigan's shore. The researchers tracked wave movements with "new eyes," which could provide new insight in detecting and predicting rip currents.

The system shows promise as a component of potential active rip current detection and warning systems that could make our high-use beaches safer. Michigan Tech GLRC Director Guy Meadows predicts that "the combination of better nearshore forecasts, an early warning rip radar system and education of the beach-going public to these threats will make our beaches safer."

Public outreach and education developed by Michigan Sea Grant focuses on increasing understanding about dangerous currents among park staff, beachgoers, community leaders and educators. "We have a targeted educational approach to dangerous currents," said project investigator Elizabeth LaPorte. "Working with risk and safety specialists, researchers, and others, we will be developing materials to promote beach and swimming safety."

DNR will directly apply knowledge gained through an update to a department policy that guides beach safety provisions at DNR-managed beaches. This will result in visible, on-the-ground changes in beach safety signs, rescue equipment and the beach warning flag system.

Photo: Michigan Sea Grant

More information:

Michigan Sea Grant Dangerous Currents:

www.dangerouscurrents.org

NOAA Coastal Storms Program:

www.csc.noaa.gov/csp/projects_greatlakes.html#BeachHazards

Focus on Michigan's Coastal Zone Management Program:

Coastal resiliency in Michigan

Alisa Gonzales-Pennington
Michigan Coastal Zone Management Program
Michigan Office of the Great Lakes, MDEQ

Photo: Deb, Traverse City

When storms like Hurricane Sandy strike, they rock the nation with deadly and destructive impacts to the U.S. coastline. Damages from that storm are estimated at more than $68 billion. Severe flooding, power outages, loss of homes and lives – Sandy's adverse impacts were felt far and wide.

The storm even impacted the Great Lakes region, where strong winds caused power outages for about 120,000 households in Michigan. As these communities continue to rebuild more than a year later, they would be wise to incorporate coastal resilience into their planning.

Coastal resilience is the ability of a community to recover after stresses like coastal storms, drought and flooding, rather than simply reacting to impacts. In the Great Lakes region, we must frequently respond to the effects of severe weather and climate-related events, including changing water levels.

Associated hazards such as large-scale shoreline erosion can negatively impact coastal populations, property, resources and economies. A community's ability to respond quickly can significantly reduce impacts on human health, environment, and the local and regional economy.

The Michigan Coastal Zone Management Program is assisting coastal communities in building their resiliency. The first step is to assess a community's current and future vulnerabilities to climate variability and coastal hazards. Once a community has assessed its vulnerabilities, it can begin to develop adaptation approaches for reducing risks and exposure through improved planning and decision-making processes.

While climate science and predictions for the Great Lakes region are not perfect, communities would be well-advised to develop a variety of strategies to adapt to our unpredictable world and the stresses it sometimes brings. Life in the Great Lakes basin comes with many benefits, but also some risks. Preparedness in the form of increased coastal resiliency is a great way to improve quality of life in the Great Lakes state.

Wins and challenges for Michigan's ports and harbors

Emily Finnell
Great Lakes Policy Specialist
Michigan Office of the Great Lakes, MDEQ

In January, after a decade of low water levels and backlogs in dredging requests, issues facing Michigan's harbors reached a critical mass that required more than just short-term solutions.

Faced with an emergency, Michigan developed a comprehensive dredging plan for short-term relief -- $21 million – that ensured our recreational harbors were open for the boating season. But our ports and harbors face a larger, systemic problem of ensuring access to the lakes for trade and recreation.

Michigan's ports and harbors are important components to the state's blue economy and commercial navigation system. They provide opportunities for recreation and tourism, and support local, regional, and state economies by enabling transportation, commerce and trade.

Keys to future vitality of Michigan ports and harbors

- Federal, regional, state and local partnerships around shared goals to ensure access to the lakes for trade and recreation
- The Great Lakes must be regarded as a single navigation system to improve competitiveness
- Long-term strategies for sustainable harbor management, infrastructure maintenance and sediment management

Without maintenance dredging, many of our ports and harbors will become unusable. Historically, dredging projects were funded through federal earmarks and the U.S. Army Corps of Engineers. When earmarks became politically unfeasible in 2010, maintenance dredging in the Great Lakes all but ceased, contributing to this year's emergency and an estimated $200 million dredging backlog.

The USACE is responsible for assessing and awarding funding for dredging projects and has viewed the Great Lakes as a collection of 140 individually authorized navigation channels and ports for its project selection system. This has, in effect, pitted neighbors against each other for funding.

Photo: Michigan Sea Grant

To overcome challenges facing Michigan's ports, Michigan's navigation system must be viewed within the context of the larger Great Lakes-St. Lawrence River navigation system. This year, the Council of Great Lakes Governors issued a resolution recognizing the Great Lakes Navigation System as a single entity and encouraging a change in USACE policy. In addition, a reauthorization of the Water Resources Development Act – which for the first time directs USACE to change the policy – has enjoyed bipartisan support.

WRDA also takes important steps toward ensuring that a significant portion of the Harbor Maintenance Trust Fund, which had largely gone unused for dredging projects, will go to USACE operation and harbor maintenance. Additionally, WRDA will likely assist recreational harbors by allowing federal navigation maintenance funding to come from non-federal sources and to establish public-private partnerships.

Other initiatives are underway to develop long-term strategies to support port and harbor sustainability, including planning, infrastructure maintenance and sediment management. Several current efforts employ a "systems" approach to assess community needs, future use trends and the health of the natural environment.

The Michigan Department of Natural Resources Waterways Program is working with communities to assess the state's harbor system and the current infrastructure conditions and needs. This evaluation is part of a larger effort to support sustainable harbor management that will involve a process for full engagement within a community, including boaters, business, tourism, local government, community planners, commercial fishing, anglers and watershed groups.

The Michigan Office of the Great Lakes, DEQ Water Resources Division, Michigan Department of Agricultural and Rural Development and several academic partners are also examining potential upstream sources of sediment to harbors along Michigan's coast. The state will explore options for addressing sources from agricultural and other land uses by implementing targeted best management practices such as planting cover crops to reduce wind erosion and creating buffer strips near property edges.

Michigan's ports and harbors are crucial to the state's economy, its people and visitors. As we shift from short-term solutions to long-term strategies, this positive action will continue to grow.

From remediation to restoration to revitalization: Great Lakes restoration at work in Michigan

Matt Doss
Policy Director
Great Lakes Commission

In 2005, more than 1,500 stakeholders from across our region came together to develop a comprehensive restoration strategy for the Great Lakes. Eight years later Great Lakes restoration is well underway, as we find ourselves halfway through the Great Lakes Restoration Initiative, President Obama's program to implement our regional restoration strategy. In its first four years, the GLRI invested over $1.3 billion for more than 1,700 projects to address the most urgent problems facing the Great Lakes.

The GLRI has enjoyed strong bipartisan support in Congress, which recognizes the Great Lakes as our region's most valuable natural resource and a key asset to fuel future economic growth.

Nowhere does Great Lakes restoration offer more promise – and greater challenges – than the State of Michigan. The Great Lakes are both a natural treasure and an invaluable economic asset for our state. As such, restoring them isn't just about correcting mistakes from the past, but leveraging a vital resource to build a better future.

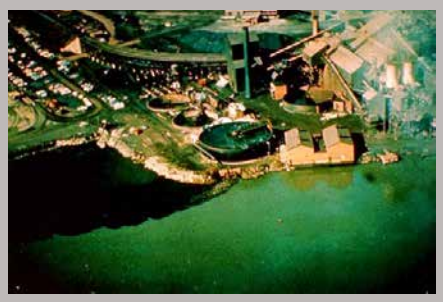
So, halfway through this unprecedented restoration effort, where do we find ourselves? Simply put, we've accomplished a great deal, but much work remains. This is particularly true when it comes to cleaning up Areas of Concern, the most degraded parts of the Great Lakes. With nearly half of the U.S. AOCs, Michigan is moving aggressively to identify key restoration actions and secure GLRI support for their implementation.

To date, Michigan has removed 27 beneficial use impairments (a key yardstick for measuring progress) and positioned at least four areas to be "delisted" soon – removed from the official list of AOCs. Staff from the Office of the Great Lakes are working closely with local advisory councils to design key restoration projects that advance us toward this goal. (cont'd)

Great Lakes Restoration Initiative targets

- Cleaning up toxic pollution and restoring heavily degraded coastal areas
- Restoring habitat for valuable fish and wildlife resources
- Combating Asian carp and other harmful invasive species
- Reducing polluted runoff and safeguarding beaches
- Monitoring environmental health, tracking progress and educating the public

Case study: The "Black Lagoon" becomes Ellias Cove



Oil and grease pollution earned this Detroit River inlet the name "Black Lagoon."

Through the Great Lakes Legacy Act, more than 470,000 pounds of contaminated sediment were removed.

Heavy machinery was required to remove the oil and grease from the bed of the inlet.

These plantings stabilize the banks, preventing erosion and beautifying the site.

Today, Ellias Cove is a jewel of the Detroit River International Wildlife Refuge.

From remediation to restoration to revitalization: Great Lakes restoration at work in Michigan cont'd

Results from some projects – such as diverting a creek away from an abandoned mine to prevent mercury from contaminating Deer Lake and Lake Superior – may not be striking to the naked eye. Others, however, are dramatically transforming waterfront areas.

Key Great Lakes Restoration Initiative challenges for the future

- Investing in AOCs where progress can be made quickly, while maintaining momentum in other areas
- Collaborating with industries and other partners to clean up contaminated sediments
- Ensuring restoration projects are resilient to impacts from climate change
- Focusing on the highest priority restoration needs while recognizing that the GLRI isn't intended to solve every environmental problem
- Establishing strong performance measures, with necessary monitoring and reporting, to clearly assess progress being made under the GLRI
- Communicating effectively with all partners on restoration priorities, funding decisions and upcoming actions
- Maintaining baseline funding for environmental programs so that progress continues after the GLRI is completed

While most of our AOCs are still focused on the first two Rs in the triad – **remediation** and **restoration** – we must also look forward to the third R – how we will **revitalize** waterfront areas after remediating pollution and restoring coastal resources. Here it's up to our own creativity and energy to define and advance a new vision for our coastal communities. Locally driven, place-based efforts can tap into Michigan's burgeoning blue economy, which leverages fresh water to stimulate new economic activity, create jobs, and attract and retain talented workers.

Just as the Great Lakes shaped our identity and fueled our economic growth in the past, they will continue to be a foundation for economic prosperity and a high quality of life in the future.

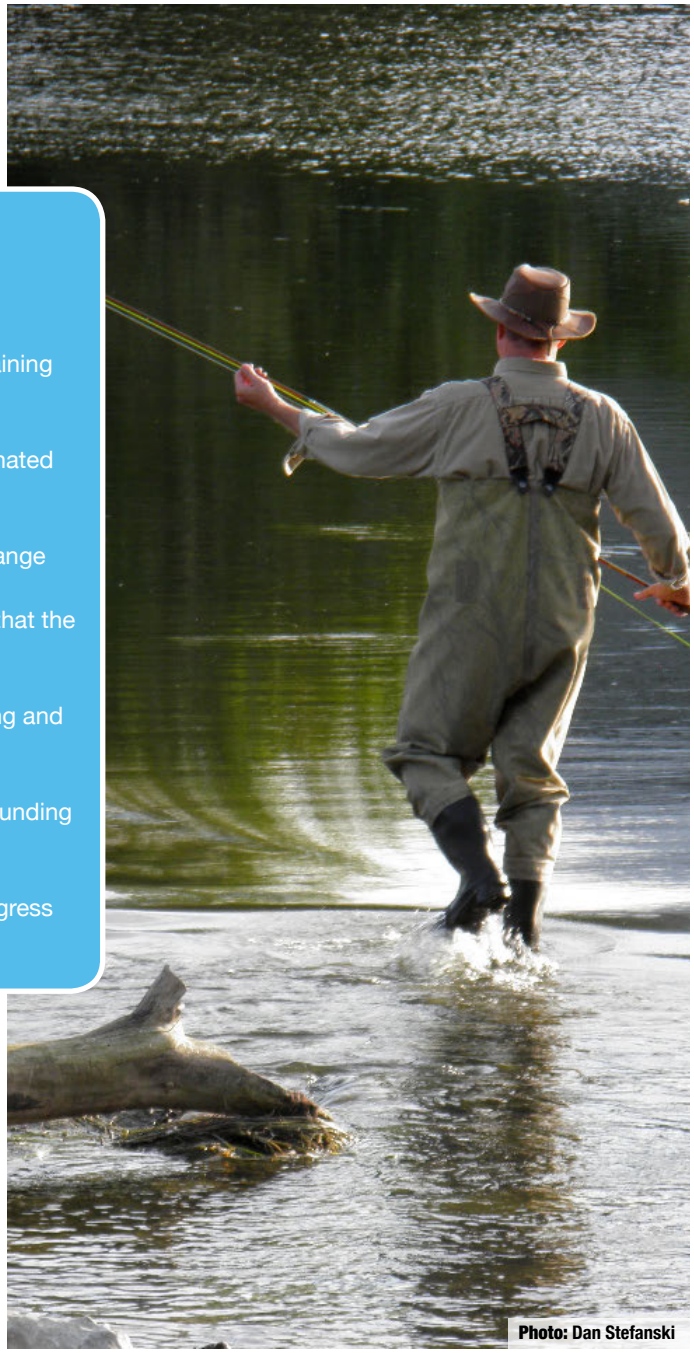


Photo: Dan Stefanski

Joe Buick fishes in the River Raisin AOC. The GLRI has funded sediment cleanups, dam removals and other restoration actions in this Lake Erie tributary.

Spotlight on the Detroit River International Wildlife Refuge

Dr. John Hartig
Manager
Detroit River International Wildlife Refuge

Gold LEED-Certified visitor center for the Refuge Gateway in Trenton, Mich.

What comes to mind when you think of Detroit – automobiles? Motown? Professional sports? Each of those answers may be true, but people are often surprised to learn that the Motor City is also becoming well recognized for conservation and outdoor recreation. The U.S. Fish and Wildlife Service and many collaborators have generated a long list of restoration successes and outdoor opportunities in the Detroit River International Wildlife Refuge, largely through public-private partnerships.

Ours is the only international refuge in North America, and one of only a few located in truly urban areas. The Refuge focuses on conserving, protecting and restoring habitat for 29 species of waterfowl, 23 species of raptors, 31 species of shorebirds, more than 100 species of fish and more than 300 species of birds.

The Refuge recently completed work on an "extreme makeover" of an industrial brownfield in Trenton, Mich., on the banks of the Detroit River. Our goal was to transform it into a gateway to the refuge, complete with a brand new, LEED-certified visitor center. The U.S. Fish and Wildlife Service, Wayne County, the International Wildlife Refuge Alliance, and more than 100 partners have worked for nearly a decade to restore this former brownfield site, now called the Refuge Gateway.

Not only will the visitor center serve nearly 7 million people who live within a 45-minute drive of the site, the project provides conservation benefits as well. It expands the ecological buffer of Humbug Marsh – Michigan's only "Wetland of International Importance." The project included the restoration of 16 acres of wetlands and 25 acres of upland habitat in an area that has lost 97 percent of its coastal wetlands. Workers also controlled invasive *Phragmites* along 2.5 miles of Detroit River shoreline and other invasive species on 50 acres of upland habitat.

The project is transformational for Metropolitan Detroit. It is helping change the perception of the Detroit River from "polluted rust belt river" to that of an international wildlife refuge that reconnects people to nature, improves quality of life, showcases sustainable redevelopment and enhances community pride.

Michigan's Blue Economy

John Austin
Director
Michigan Economic Center

Gil Pezza
Director, Water Technology Initiative
Michigan Economic Development Corporation

As the Great Lakes state, with rich natural water assets, Michigan's identity has been shaped by water. Water trade led to early settlement. Abundant water was key to growth of our signature industries. Our beautiful waterways make Michigan a very special place to live and work. We are also beginning to see Michigan firms, entrepreneurs and research institutions participate in the fast-growing global water technology sector, predicted to reach $1 trillion annually by 2020, providing the talent and innovations to solve global freshwater sustainability issues right here in Michigan.

Collectively, this fast-growing "Blue Economy" is important today, and a source of strength moving forward. The numbers are already impressive:

Water-dependent businesses: Michigan has 660,000 jobs and $49 billion in annual wages linked to water–dependent farming, manufacturing, mining and energy production.

Conduit for Commerce: Shipping, freight/commercial traffic and warehousing are responsible for more than 65,000 Michigan jobs and $3.3 billion in annual wages.

Quality of Life and Place: 3,000-plus miles of Great Lakes freshwater coast and 11,000 inland lakes, hundreds of rivers and wetlands translate into recreation, tourism, talent attraction, increased property values and local economic development in adjoining areas. Boaters spend $3.9 billion per year. Anglers contribute $2 billion. Coastal tourism from birding to beach visits is responsible for 57,000 jobs and $955 million in earnings every year. Communities that reorient to their water and reclaim their natural waterways as linchpins of economic development make themselves attractive places to live and work. Marquette, Traverse City, Muskegon, Detroit, Macomb County, Grand Rapids, Flint and more have community-based initiatives organizing around their waterfronts as vital parts of community placemaking.

Photo: Richard, Comstock Park

Great Lakes Restoration: Michigan's $163 million in federal Great Lakes Restoration Initiative projects, is leading to direct employment and long-term economic benefits from increased development and raised property values calculated at anywhere from 300 (Brookings) to 660 percent return on investment.

Emerging Water Technology Businesses: MEDC estimates there are more than 350 emerging water-related companies in Michigan beginning to exploit a nearly $1 trillion, growing global market for water cleaning, conservation, restoration, monitoring, infrastructure-building and engineering work. Rochester Hills-based Plymouth Technologies Inc., a company specializing in innovative solutions for industrial wastewater treatment, has launched a spin-off company called Valkyrie Environmental Water, which works with billion-dollar companies solving large municipal mining and power and groundwater issues. Detroit-based Parjana Distribution, Inc. has developed an infiltration technology for removing standing stormwater by injecting it back into the ground. Plymouth-based Algal Scientific has developed an advanced treatment technology and resource recovery system for process water.

Water research and education centers: Michigan's universities and colleges are growing their programs in water research and ecosystem management, solving global freshwater problems here in Michigan. The University of Michigan's new Water Center; Michigan Tech's Great Lakes Research Center, Michigan State University's Center for Water Sciences, The Annis Water Resources Institute at Grand Valley State University, The Great Lakes Storm Water Management Institute at Lawrence Technological University, The Urban Watershed Environmental Research Group at Wayne State University, Central Michigan University, Bay College, Delta College, Macomb, Oakland and Northwestern Michigan Community College water programs – all are attracting new students and top talent, millions for research, and contributing to new business creation. Michigan universities are researching cutting-edge technologies and best management practices. For example, Wayne State University is evaluating green infrastructure performance and researching BMPs for reducing phosphorus discharges.

Continuing to leverage our state's unique capacity for innovation amid our freshwater natural resources and sustainably fueling the "Blue Economy" is a key engine for our state.

The Lake Erie Crescent Innovation Cluster Initiative

Dr. John Warbach
Associate Director
Land Policy Institute
Michigan State University

Dr. Rick Foster
W.K. Kellogg Professor in Food, Society and Sustainability
Michigan State University

Dr. Scott Witter
Director
School of Planning, Design and Construction
Michigan State University

Throughout history we have invented and reinvented our relationship with the Great Lakes, with each other and with the world. Native Americans, European explorers, great navies, industrialists, freighters and recreational boaters each have cultivated unique relationships with the Great Lakes. As Gov. Rick Snyder and others have articulated, it is again time for reinvention.

This reinvention calls for reversing decades-long economic stagnation. It includes enhancing our quality of life and our economy through a clean environment. It includes transforming our cities into engines of prosperity through placemaking to attract the talented, innovative and entrepreneurial. The call for Michigan's reinvention echoes a call at the national level for strengthening our country by reinventing its economy around sustainability.

The Great Lakes region needs a new vision for how to create shared prosperity in which the lakes play an important role. Many Great Lakes cities have suffered from decades of decline, and in places, so have the lakes, themselves. However, the cities have useful assets left over from previous prosperity. We can and should use things like vacant land, existing roads, ports and other infrastructure to our collective benefit today. These places also boast creative and highly trained people as well as plentiful clean energy sources. The cities have access to the Great Lakes, providing close proximity to wildlife preserves, waterfowl flyway stopover sites, fisheries and clean beaches. We must build and rebuild green in order to preserve these benefits.

Reinvention efforts need to be conceived and organized regionally. The Great Lakes has regionally significant resources, including regional ecosystems. Industries benefit from the synergies of regional clustering. However, lifting our Great Lakes metro regions, states and Canadian provinces will require beginning at the corridor and site level.

A team led by Michigan State University is seeking, with the Lake Erie Crescent Innovation Cluster Initiative, to foster development of a vision and regional narrative that can be shared by the cities on Lake Erie, their metro regions, states and provinces. This vision will incorporate regional thinking about the common legacy, natural wealth, human capital, local, regional and global economic development and quality-of-life opportunities. It will be realized through the development of key innovation corridors and sites. Its purpose is to help places like Detroit, Toledo and Cleveland spark economic development projects in renewable resource industries. These are green industries that make products and export technology for renewable energy and clean water systems, sustainably grow food, and build attractive, livable and green neighborhoods and commercial districts.

MSU is working with Case Western Reserve University, the University of Toledo and Oberlin College to organize the Lake Erie Crescent Initiative. MSU will be working with other universities, government agencies (the Michigan Office of the Great Lakes and the Michigan Economic Development Corporation), foundations, community economic development groups, social and environmental organizations, and a national innovation financing group to find financing for renewable industry and green community development projects in the Lake Erie Crescent.

Invasive species:
Michigan moves from strategy to practice

Sarah LeSage
Aquatic Invasive Species Program Coordinator
Michigan Department of Environmental Quality

Aquatic invasive species cost the Great Lakes region an estimated $5.7 billion per year – and that's just the ones that are already here. To keep that number at "only" $5.7 billion, Michigan has focused not just on detection and management, but prevention as well.

Over the past several years, our state has approached AIS planning with a collaborative, "all hands on deck" strategy to best protect our Great Lakes. Now, with much of the planning complete, Michigan can devote more attention than ever to on-the-ground implementation.

Photo: Matt Ankney

European frog-bit removal

This year, Michigan's Departments of Environmental Quality, Natural Resources, Agriculture and Rural Development, and Transportation collaborated on a comprehensive update of the Aquatic Invasive Species State Management Plan. This guidance will form the foundation of our future actions to prevent, detect and manage AIS.

The plan paints a comprehensive roadmap, illustrating the breadth of the problem from organisms in trade to ballast water to direct waterway connections. It will inform how we approach regulation, public education, monitoring and research needs. Approved in June by the Federal Aquatic Nuisance Species Task Force, the plan covers all types of aquatic invasive organisms, including plants, animals and even diseases.

MDEQ, MDNR and MDARD recently completed a companion document, the "Response Plan for Aquatic Invasive Species in Michigan," which serves as an interagency decision support tool. It outlines steps to follow after receiving an AIS report and guides us in determining when a response is appropriate and which approaches we should consider.

These planning efforts will translate into coordinated action in a variety of on-the-ground efforts focused largely on early detection and response. Michigan's AIS strategy encourages timely responses to new invasions and discoveries. Finding the first colonies of an invasion enables a more efficient use of resources to control the organism in small areas before it can spread. This requires strong stakeholder engagement, cost-effective methods and science-based decision-making.

For example, DEQ's Water Resources Division this year began incorporating AIS surveillance into routine monitoring activities, most recently in wadeable stream and river surveys. DEQ also partnered with the Michigan Clean Water Corps and Michigan State University to increase participation in the Exotic Plant Watch program designed for volunteer monitoring in inland lakes.

In addition, DNR Wildlife Division is leading response efforts to control European frog-bit, an invasive plant with limited distribution in Michigan. In a pilot-program partnership with Michigan Natural Features Inventory, MSU and local partners, the team verified new reports of frog-bit, conducted on-site assessments and designed response plans. The program has now launched control measures including physical removal (1,500 pounds removed beginning in mid-September) and trial treatments with herbicides. This exercise will test Michigan's response plan and refine our state's ability to effectively detect and manage AIS.

Finally, bighead and silver carp remain a significant threat to Michigan waters. DNR Fisheries Division tested preparedness this fall in the form of "dry-run" and field-based exercises. After analyzing a variety of Asian carp invasion scenarios, fisheries technicians and biologists took to the water to test gear and the effectiveness of techniques in a large-scale operation on the St. Joseph River. As a result, managers and biologists are better informed on how to respond to logistical field challenges should bighead or silver carp reach Michigan waters.

Michigan's extensive planning efforts are guiding actions for AIS prevention, detection and management. It is our intention to minimize the effects of these invaders on Michiganders, our economy and our quality of life. Thanks to the efforts of a great many, today Michigan is better prepared than ever before to protect our people and our Great Lakes from the threat of AIS.

Collaborative planning in 2014 for systems-level monitoring and accounting of basin water resources

Kathryn Buckner
Council of Great Lakes Industries

Tim Eder
Great Lakes Commission

Dr. Jennifer Read
University of Michigan Water Center

Dr. Paul Seelbach
Great Lakes Commission

In June of 2013, the Council of Great Lakes Governors resolved to develop and implement a comprehensive, systemic program for water resources monitoring and accounting to support the Great Lakes-St. Lawrence Water Resources Compact and Agreement, and other related bi-national efforts such as the Great Lakes Water Quality Agreement.

Photo: Bill, Kawkawlin

Existing monitoring efforts have arisen piecemeal over time to address very specific management and basic science questions, and are neither well-coordinated nor comprehensive. A multi-sector assessment is needed to understand and frame the scope and scale of the entire Great Lakes system. The effort will consider existing water resources management efforts in order to define what must be monitored – i.e., measure what you manage. Monitoring efforts need to be evaluated in the context of this comprehensive framework to understand information gaps and better coordinate.

To achieve this, a collaborative workgroup is being formed with representative expertise across water sciences, water uses, water values and Basin geography. We will develop a program framework and recommend action steps designed to directly support water resource management and use decisions across multiple sectors. The workgroup will not rethink the entire Great Lakes monitoring system, but will "zoom out" to envision and consider the entire water resources system (this is now possible due to recent technical efforts and advances in powerful spatial technologies), establish a comprehensive framework, and then "zoom back in" to align and coordinate key pieces.

The "zoomed out" water resources system will include the varied regional geography of groundwater, inland waters that ultimately form tributary watersheds, Great Lake nearshore and offshore zones, and human-use systems. Existing regional efforts, such as the State of the Lakes Ecosystem Conference, the work of the International Joint Commission to define high-level indicators and the new GLWQA Annex Committee process, will be honored and will inform the development of the framework.

The workgroup will:

- Formalize a spatial framework (smart map) for water resources information so all parties can work at a common table
- Consider interrelated aspects of both water quantity and water quality
- Focus on key management questions and the specific information supply chain needed to answer these
- Envision ways to actively engage water users and stakeholders in this enhanced process of monitoring, accounting for, and valuing the region's unparalleled water resources

The workgroup will report to the Governors and Premiers by the end of March, 2014.

Bridging the basin: Michigan's Great Lakes Coordination Program

Michelle Selzer and Matt Preisser
Lake Coordinators
Office of the Great Lakes, MDEQ

Our state has been the epicenter of Great Lakes restoration and protection over the last several years. Since 2010, Michigan has received more than $163 million through the federal Great Lakes Restoration Initiative to support a range of activities including remediation of contaminated sediments, prevention of aquatic invasive species and restoration of important fish and wildlife habitats.

These activities have been spread across more than 350 projects, touching nearly every corner of our state. Nearly 50 organizations have played leading roles in this effort, including federal, state and local agencies, tribal governments, academic institutions and non-governmental organizations, supported by at least as many secondary partners. These projects implement the hundreds of priorities identified in dozens of individual issue- or place-based plans and strategies.

In this world of limited resources, constrained budgets and considerable scrutiny, the importance of strategically targeted and complementary activities has never been higher. Given such a vast landscape and large number of players, how does one ensure that our efforts are effectively coordinated and non-duplicative?

This is the riddle the Great Lakes Coordination Program attempts to solve. As the newest program area of the Michigan Office of the Great Lakes, the GLCP seeks to "sort through the noise" and guide public and private actions in a highly strategic and coordinated manner.

As a non-regulatory body with regulatory familiarity, the GLCP is uniquely positioned in state government to identify and bring together the broad network of partners on a wide variety of restoration and protection activities. It is a unique program in state government, with the core function of fostering coordination and communication among diverse actors to achieve common outcomes for the Great Lakes.

Photo: Brian, Fowlerville

While many of our efforts involve working with the other federal, state, provincial and tribal jurisdictions on basin-scale issues, we recognize that implementation of priority actions often occurs at the state or local level, and thus seek to create and strengthen collaboration among groups within our state. Our focus is to identify, prioritize and implement the priorities identified in the Lakewide Action and Management Plans for lakes Erie, Huron, Michigan and Superior, as well as other Michigan-specific planning documents prepared at the state, regional and local levels.

To accomplish our task, we represent Michigan on Great Lakes committees, track and report progress by public agencies and private organizations, identify and assemble novel partnerships, bring key information to the planning and decision tables, support the development of sound project concepts and funding proposals, and highlight success stories.

We address a range of priority activities including habitat restoration, aquatic invasive species prevention and management, green infrastructure, and implementing the biodiversity conservation strategies developed for each of the Great Lakes. Due to our programmatic flexibility, a key strength of the GLCP is our ability to fill gaps and seek out new opportunities, including investigating emerging issues that may not yet have an established basis in statute or bureaucratic history.

To reflect the unique needs of each of the Great Lakes, the GLCP was organized with a lake-to-lake focus. Michelle Selzer covers the Lake Erie and Lake Huron basins, while Matt Preisser covers the Lake Michigan and Lake Superior basins.

Our goal is to achieve key environmental, social and economic outcomes for our lakes and communities by positively influencing programs and policies for the betterment of Michigan's Great Lakes. In a world that is becoming increasingly interconnected and complex, our hope for our small program is to help push the needle in the right direction. Our work will be, in effect, everlasting.

To learn more about the GLCP, visit www.michigan.gov/deqogl

The Great Lakes Information Management and Delivery System: Informing the logistics of the conservation enterprise

Dr. Scott Sowa
Director of Science
The Nature Conservancy Great Lakes Project

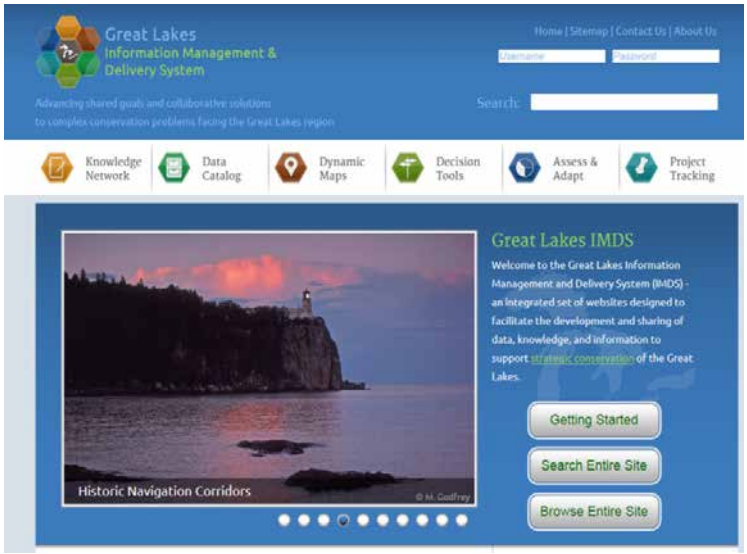
One of the toughest challenges in conservation lies in the huge scope and complexity of natural systems. Add to that the complex social and governance dimensions of conservation with so many public interests and resource management agencies and you may find a full-blown "wicked problem" – a vexing puzzle that requires a revolution in thought and action to solve. Business enterprises solve wicked problems as a part of their day-to-day existence. Conservationists can soon take a page out of that playbook with the landmark Great Lakes Information Management and Delivery System.

Landscape-scale conservation refers to problems like addressing the estimated 150,000+ barriers in the Great Lakes that impair our fish populations by blocking their movements, or strategically implementing conservation practices across tens of millions of acres of urban and agricultural landscape to minimize nonpoint source pollution.

The answer lies in the methods used by companies like Starbucks and McDonald's to deliver French fries, lattes, packaging and all the other necessary supplies to tens of thousands of locations in hundreds of countries around the world. Logistics coordinate taking a potato from the ground in, say, Idaho or Michigan, through processing, freezing, delivery, frying, wrapping, and finally onto your tray at the restaurant, wherever it may be.

In particular, these businesses invest heavily into building "information supply chains" that seek to get the right information to the right people in the right format at the right time so they can effectively communicate and coordinate in an independent yet interconnected manner to achieve true collaboration.

We have found that logistics – essential to running a global business – are largely ignored in the world of conservation, even though collaboration is key to its success. The conservation community must start thinking and functioning like a conservation enterprise with much more emphasis on addressing the logistics of landscape-scale conservation.



IMDS, in development by The Nature Conservancy, U.S. Geological Survey and the Upper Midwest & Great Lakes Landscape Conservation Cooperative with a broad network of partners, could help us change the way we look at conservation. Its purpose is to get the right information to the right people, in the right format at the right time to support strategic conservation.

IMDS has six complementary modules to engage and provide information to everyone with a stake in Great Lakes conservation, enlisting these individuals as part of the solution. **The Knowledge Network** module houses articles, videos and other information resources that provide context to each landscape-scale issue. For example, removing some dams could cause more harm than good by releasing contaminated sediments built up behind the barrier or allowing invasive sea lamprey to expand their range.

The Data Catalog, Dynamic Maps and **Decision Tool** modules provide a home for and a means of marketing the many products of the science community, putting them at the fingertips of resource managers in an integrated and more useful manner. The goals featured in the **Assess and Adapt** module and the information on proposed, in-progress and completed conservation projects in the **Project Tracking** module provide a means of comparing projects that will foster healthy competition of ideas and provide a place where proposed conservation actions can be more thoroughly and objectively evaluated.

IMDS goes where no information system has gone before towards integrating the data, knowledge, and information to help us collaborate effectively to address the many landscape-scale conservation issues we face in the Great Lakes.

Funding supporting initial development of the IMDS was provided by the U.S. FWS, the UMGL LCC, the U.S. EPA's Great Lakes Restoration Initiative, Fred Keller and TNC's Great Lakes Fund for Partnership in Conservation Science and Economics. Please contact Scott Sowa at ssowa@tnc.org or 517-316-2255 for more information.

Department of
Environmental Quality
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MICHIGAN OFFICE OF THE GREAT LAKES