MICHIGAN STATE of the GREAT LAKES 2014

Department of Environmental Quality
PURE MICHIGAN

MICHIGAN OFFICE OF THE GREAT LAKES

Prepared by the Office of the Great Lakes, Michigan Department of Environmental Quality for the office of the Governor
Design and Editing by Michigan Department of Natural Resources Cover photo: NOAA
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www.michigan.gov/deqogl

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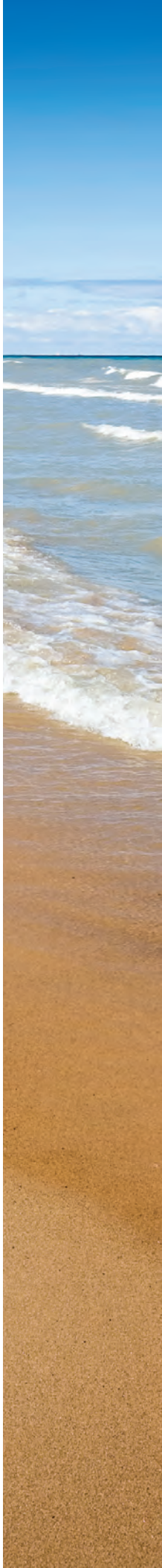


Governor's message

Gov. Rick Snyder

What a remarkable year 2014 was for our Great Lakes! From the stunning ice cover last winter to the incredible rise in water levels over just a few months last summer and fall, the lakes have been in the forefront of news much of the year. Extremes have a way of making the news, and yet every single day I think about how fortunate we are in Michigan to have so much fresh water. It should not take "news" for all of us to pause and reflect on what the Great Lakes mean to our state, since they are at the very core of our lives here in Michigan.

Consider for a moment what it would be like in Michigan if the Great Lakes were not here. No Great Lakes-based boating, no Great Lakes-based fishing, no Great Lakes-based industry, no Great Lakes-based shipping, no Great Lakes-based tourism, no Great Lakes scenery, no Great Lakes water supplies, no Great Lakes dunes, no Great Lakes coasts, no Great Lakes weather; in short, no one desiring to move here, live here, or visit here. It would not in any sense be Michigan!

But, the Great Lakes are indeed here, and with that come opportunity and responsibility. My administration has taken full advantage of that fact and the departments responsible for their care and prudent use are broadly engaged in protecting and enhancing all of their assets; boating, fishing, industry, shipping, tourism, scenery, water supply, dunes, and coasts.

A wonderful example of that care and effort is reflected in the remediation, restoration, and revitalization of historically two of the most seriously contaminated areas along the Great Lakes; White Lake in Muskegon County and Deer Lake in Marquette County. Those areas are now poised to grow as places where people want to live, work, and play, and as a state we are proud of the work concluded there.

We are also collaborating as a state with our neighbors in a shared appreciation. For example, as an outcome of the Great Lakes Governor's and Premier's Summit in 2013, the Council of Great Lakes Governors has led a successful effort to establish a written agreement among the states and provinces to cooperate on responses to new introductions of aquatic invasive species. Fortunately, to date, that agreement has not been needed since no such emergencies have arisen. However, it is reassuring to know it is in place and that we were able to come together as a region on that need. We will continue the important regional work through the Council, focusing on a host of Great Lakes issues including further work on preventing invasive species, improving water quality, increasing trade between the U.S. and Canada, and cultivating the Great Lakes maritime system.

Who among us can help but have a sense of wonder when we look out over a Great Lake. Rachel Carson wrote in A Sense of Wonder "You can still drink in the beauty and think and wonder at the meaning of what you see". From that sense of wonder arises a sense of stewardship that we need to foster for our Great Lakes. Our citizenry reflects that; as development of the state's Water Strategy nears completion and public release, the rich conversations that occurred among groups during the input process often started with the question: "Who loves the Great Lakes?" And, of course, all hands went up…as does mine.

Those many hands are hard at work right now implementing the Great Lakes Restoration Initiative. The federal and state partnership developed under the Initiative is accomplishing things never before dreamed of for restoration. Our challenge will be to sustain that work long-term with commitments and actions in our collective and collaborative reinvention of Michigan.

Many of the other articles you will read in this report come from our partners in conservation and restoration efforts. The Great Lakes represent so many things to so many people and the range and depth of the articles in this issue are a reflection. Every year when I look through these stories, I gain a sense of renewal from the energy, enthusiasm, and collective wisdom they represent. Michigan is in good hands when it comes to the Great Lakes.

Looking to 2015, I encourage every Michigander to spend a day at or on your favorite Great Lake. Whether you love that lake for boating, fishing, industry, shipping, tourism, scenery, water supply, dunes, or coasts, be a "tourist at your Great Lake" next year and enjoy these remarkable bodies of water with a renewed sense of wonder.

State of the Great Lakes Introduction

Jon W. Allan, Michigan Office of the Great Lakes

We are a Great Lakes people. Not many people can say that or truly know what that means. To those of us that live and play in the Great Lakes region, it means a great deal. It means a lot for our history here, for the sense of place that it provides, for the economic capacity that it engenders, and for the obligations to care for the Great Lakes. Whether we have been here a long time or have just come to the state and to the Great Lakes, we all share the sense of awe, sense of pride, sense of responsibility, and sense of capacity that the Great Lakes offers and affords.

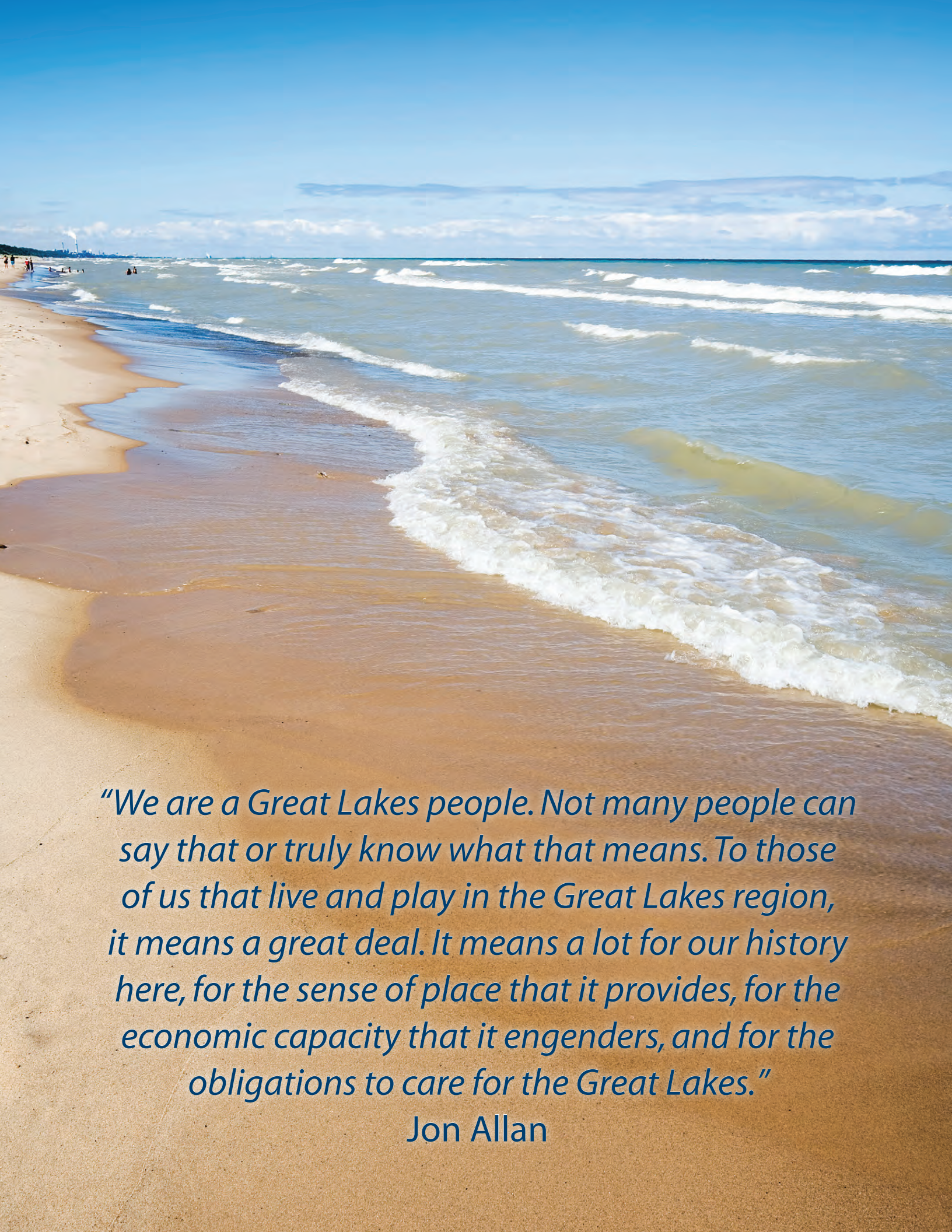
My mother's family came to this region in 1820, leaving the settled lands of western Massachusetts where they had been since the 1630s for 1,600 acres of northern Ohio hardwoods. My grandfather's family came here in the 1920s, following World War I. After years of brutal fighting in Europe for the British, my father came seeking peace and opportunity. Lorain, Ohio and the steel mills offered that to him and his family, and eventually to my family. My family members have been Great Lakes residents for a couple of centuries now – it is who we are. We all have these origin stories, of where we came from and how we got here – whether a long long time ago following the glaciers' retreat, from the woodland period, from the time before European settlement, from the time of extraction and industrialization, or as recently as last week. Regardless of our story, we all now live here, in this water-rich part of the world, and with that comes opportunity and obligation.

Over the years, we all saw great opportunity and jobs from the riches the Great Lakes offered, from timber harvest to factory production. However, we also saw a great deal of abuse of the very water and land systems that put food on the table and afforded an education. Much of the work of this State of the Great Lakes Report is about finding our way back to a more proper and measured use of the Great Lakes, a use that enables the creation of wealth, opportunity and prosperity, but one predicated on doing so within the limits that a healthy Great Lakes require. No longer do we accept as a given that economic output is an excuse for ecological abuse. We are still paying that heavy price all across the region and we will not go back to that system.

Given our long history with the lakes and shorelines, it still strikes me as odd that we are surprised that the lakes raise and fall with some manner of uncertainty. I often tell audiences that I can predict with great certainty what water levels will do; I guarantee that they will rise and fall over the next year and decade. I just don't know how much or when. In reality, we have to disabuse ourselves of the notion of "average." There is no average water level. Average is a statistical measure and a point on a graph that water levels move through from high to low and back again. Unlike the east and west coast, where water levels vary daily, ours are harder to see and understand. We build infrastructure and lives at the margins, assuming some notion of average and are shocked to see our docks out of the water or below water by the end of the season. Just this notion of movement of water, the movement of which is a healthy part of the hydrological cycle of the Great Lakes, forces us to see human systems at the margin of the lake, in harbors and ports, in a different way. Adding in the other variables of shoreline and precipitation and climate that are all around us, we have to think in terms of resiliency of system rather than fixedness.

This report lays out a storyline that highlights this historical arc from the legacy of contamination to the restoration of community and natural systems to new stories that tell what we can be when the drag of legacy contamination is cleared away, restored and re-employed. In my travels around the state and the region, I am regularly heartened that community after community are creating their own future, taking that which was given to them and improving on it. These stories are only a sampling, a small corner of the larger quilt; we could have highlighted so many others. They are symbolic and not exhaustive. They are illustrative. But the story they illustrate is growing richer each and every day. My favorite may be the speech that Randy Maiers gave at the Blue River Walk Grand Opening in Chapter V. In the great sweep of history, the opening of a mile or so of a river walk is a small thing … but it is in fact no small order or small thing that this represents. It was the work of a generation of people that care, and it symbolizes where we are and what the Great Lakes mean to us, to our communities and to our people; the ones that have been here and the ones yet to come. He calls the walk a precious gem and he is absolutely right. I like that metaphor.

We see the stringing together of many, many such precious gems and that creates such brilliance that is hard to escape. We will shed once and for all the "rust belt" moniker and will be known as a people that – of their will and pluck and desire and philanthropy – created their own new narrative, their own new storyline. This time, not a storyline forged from the felling of trees, but one based on the restoration of place and community, and the restoration of spirit. The Great Lakes will continue to serve us in myriad ways – economic, social, cultural and ecological. But we have the moral obligation to shape these uses in a way that builds value rather than deteriorates it over time. This is our charge and this is the work to which we set ourselves.



"We are a Great Lakes people. Not many people can say that or truly know what that means. To those of us that live and play in the Great Lakes region, it means a great deal. It means a lot for our history here, for the sense of place that it provides, for the economic capacity that it engenders, and for the obligations to care for the Great Lakes."

Jon Allan

Thunder Bay National Marine Sanctuary Expands

Russ Green
Deputy Superintendent/Research Coordinator
Thunder Bay National Marine Sanctuary

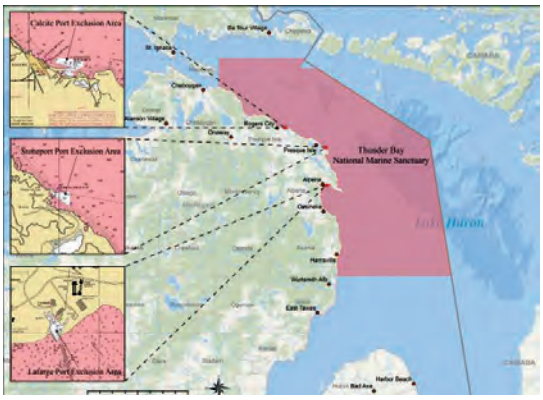
For over 12,000 years the Great Lakes and their connecting waterways have provided a natural highway extending over a thousand miles into the heart of North America. From Native American canoes to wooden sailing craft and steel freighters, thousands of ships have made millions of voyages across these inland seas. The last 150 years have been particularly explosive, transforming the Great Lakes into one of the world's busiest waterways.

However, with extraordinary growth comes adversity. Fire, ice, collisions and storms have claimed and estimated 6,000 to 8,000 shipwrecks across the five Great Lakes. In northern Lake Huron, along the northeast Michigan shoreline, the danger was compounded by rocky shoals, fog and intense vessel traffic. Over 90 shipwrecks have been located in this area, and there may be as many as another 100 yet to be discovered.

The historic shipwrecks in this area comprise nearly a complete collection of Great Lakes vessel types, from small schooners and pioneer steamboats of the 1840s to enormous industrial bulk carriers that supported the Midwest's heavy industries during the 20th century. Archaeologically and historically, these sites are dramatic evidence of the Great Lakes' pervasive influence in regional and national history, attracting numerous researchers each year. Well preserved by cold, fresh water, they are also world class recreational sites.

To preserve and protect these sites for current and future generations, the National Oceanic and Atmospheric Administration (NOAA) designated the Thunder Bay National Marine Sanctuary in 2000. The sanctuary is jointly managed by NOAA and the State of Michigan and builds on the state's unique underwater preserve program. In 2014, driven by broad public support, the sanctuary expanded from 448 square miles to 4,300 square miles. The process involved extensive cooperation with local, state and federal government agencies, the Chippewa Ottawa Resource Authority, the U.S. Coast Guard, the U.S. Environmental Protection Agency, public and private interests, and local Michigan communities.

Thunder Bay National Marine Sanctuary-Russ Green



Boundaries of Thunder Bay NMS- Russ Green

Sanctuary expansion reflects an ongoing commitment by the State of Michigan and NOAA to be both stewards of our nation's history and to find creative ways to leverage that history to build stronger communities. In Alpena, Michigan, for example, the sanctuary has collaborated on a number of heritage tourism projects including the Great Lakes Maritime Heritage Trail, which, with a 2014 grant from the Michigan Department of Transportation, will soon expand to include over 200 miles of coastline and help communities introduce tourists to Great Lakes history, ecology and local on-water recreational opportunities. Similarly, the sanctuary's Great Lakes Maritime Heritage Center welcomed over 90,000 visitors in 2014, helping to bring tourism dollars to the region. And in 2014, over 9,000 people encountered their first shipwreck through the windows of Alpena Shipwreck Tours' glass bottom boat Lady Michigan. For those a bit more adventurous, the sanctuary maintains moorings at 27 shipwreck sites to facilitate kayaking, snorkeling and diving.

2014 education highlights at the sanctuary include hosting the 13th Annual International MATE Remotely Operated Vehicle Competition. The event brought 59 teams from 13 counties and 18 states to the region to compete in underwater robotics. Additionally, the sanctuary continued to collaborate with Alpena Community College (ACC) to develop their Marine Technology Program. The program aims to train students for high tech jobs in the "Blue Economy," and in 2014 three ACC graduates began exciting careers at Oceaneering Inc., a world leader in underwater robotics, and the Michigan-based underwater robotics firm SeaView Systems.

Resource protection is a key component of the sanctuary's mission. On the water in 2014, sanctuary archaeologists worked with a wide variety of partners on projects ranging from fish habitat mapping with sophisticated sonar to technical diving to monitor deep water shipwrecks. Among others, partners included U.S. Fish and Wildlife Service, U.S. Coast Survey, Michigan DNR and DEQ, University of Michigan, Grand Valley State University and East Carolina University.

"Over the years, we all saw great opportunity and jobs from the riches the Great Lakes offered, from timber harvest to factory production. However, we also saw a great deal of abuse of the very water and land systems that put food on the table and afforded an education."

Jon Allan

"Given our long history with the lakes and shorelines, it still strikes me as odd that we are surprised that the lakes raise and fall with some manner of uncertainty."

Jon Allan

Areas of Concern through the Decades

Rick Hobrla
Area of Concern Program Manager
Office of the Great Lakes, MDEQ

Before reaching landmark success with this fall's delisting of White Lake and Deer Lake, the Area of Concern program evolved considerably over the years. Areas of Concern, or AOCs, were originally defined as "a geographic area that fails to meet the General or Specific objectives of the [Great Lakes Water Quality] Agreement where such failure has caused or is likely to cause impairment of beneficial use or of the area's ability to support aquatic life." The GLWQA between the governments of the United States and Canada is derived from the Boundary Waters Treaty of 1909 signed by the United States and by Great Britain on behalf of the Dominion of Canada. In addition to specifying how the governments would work cooperatively on rivers and lakes along the U.S./Canada border, the Treaty created the International Joint Commission, or IJC, a binational group charged with advising the governments on transboundary water issues.

The problems leading to the eventual identification of AOCs date back to the mid-1800s when the industrial revolution began to flourish within the U.S. An appetite for raw materials and a burgeoning manufacturing industry in combination with a general lack of pollution controls led to environmental problems that could persist for centuries. During this time, in Michigan, mining operations in the Upper Peninsula discharged mercury and copper into Torch Lake, tanneries contaminated White Lake with arsenic and chromium, and paper and lumber mills fouled the Kalamazoo River. Throughout the late 1800s and into the 1900s, these problems began to intensify with the need for weaponry to engage in world wars and increased demand for both consumer goods during times of peace. The manufacture and use of new chemicals such as DDT and PCBs in the '30s, '40s and '50s added to our toxic legacy.

By the late 1960s, Americans started to realize these practices were unsustainable and prodded Congress to pass a series of environmental laws, including the Clean Water Act in 1972. Beginning in 1973, the IJC's Water Quality Board regularly identified harbors, river mouths and connecting channels in the Great Lakes that had serious water pollution problems. The IJC consulted with the federal governments, the Great Lakes States, and the Province of Ontario in naming these sites. In 1974, the IJC originally identified a total of 69 of these "problem areas."

By the time the term "AOC" was formalized in the 1987 GLWQA, there were 42 such sites throughout the U.S. and Canada. Fourteen of the sites were located within or along the boundaries of Michigan. The GLWQA called for the governments to develop and implement Remedial Action Plans for each of these sites. Each Plan was to identify the specific problems of the AOC, specify a solution, and report on how the solution was implemented.

There was no specific timeline for implementing these Plans; many of the requirements included activities that carried a high price tag, such as dredging sediments, and little state or federal funding was available. As a result, progress was slow and interest in the AOC program waned.

The first big break for the AOC program came in 1997 when Michigan voters approved the Clean Michigan Initiative; which, among other items, included $25 million for sediment remediation projects in AOCs. The next milestone was passage of the federal Great Lakes Legacy Act in 2002. This legislation authorized $50 million per year to address contaminated sediment issues in AOCs. However, the program required 35 percent non-federal matching funds in order to access the money. Michigan had matching funds available, through the CMI, and, as a result, we were first in line to leverage Great Lakes Legacy Act funding. The Black Lagoon cleanup in the Detroit River was the first Legacy Act project funded.

The American Recovery and Reinvestment Act of 2009 provided another funding boost for some AOCs, but the program made a huge leap with the federal Great Lakes Restoration Initiative in 2010. This program provided the Great Lakes with $475 million in the first year and approximately $300 million annually in subsequent years. About a third of this total funding has been invested in Michigan's AOCs. As a result of this funding influx, Deer Lake and White Lake became the first and second Michigan AOCs to be officially "delisted," effective October 2014.

Michigan has twelve AOCs remaining. Some are nearing the critical target of delisting and others have far to go. However, after decades of work, the future of the AOC program in Michigan has never been brighter.

Charting a Course for the Michigan Coastal Zone Management Program

Ronda Wuycheck,
Coastal Manager, Office of the Great Lakes, MDEQ

Beginnings

The Federal Coastal Zone Management Act was originally passed in 1972 with the declaration that it is national policy to preserve, protect, develop, and where possible to restore or enhance, the resources of the Nation's coast for this and succeeding generations. The Act does not mandate state participation. Instead, the CZMA provides a framework around which state coastal programs are to be developed and incentives for participation. Two significant incentives include the federal funding to administer a state Coastal Zone Management Program and the opportunity to review and participate in the decision-making of Federal agencies through Federal Consistency reviews.

Michigan's CZM Program was established as a state/federal partnership between the Michigan Department of Environmental Quality and the National Oceanic and Atmospheric Administration in 1978. As a networked program, the central focus of the MCZMP is to improve the administration of existing state shoreline statutes (such as the Submerged Land Act and Sand Dunes Act); provide substantial technical and financial assistance to local partners for creative coastal projects; and improve governmental coordination to reduce time delays, duplication, and conflicts in coastal management decision-making.

Current

In 2010, the MCZMP was placed in the Office of the Great Lakes of the MDEQ. This placement has proven to be a noteworthy change for the overall program focus, particularly in the areas of stewardship and technical assistance. Prior to 2010, the MCZMP was housed within the regulatory division that administrated the state's shoreline statutes. While the enforceable policies are critical to the success of the MCZMP, they regulate only parts of the entire 3,200 miles of Michigan's coastline. Since the change, the MCZMP has made significant strides improving program administration and enhancing the capacity for addressing emerging issues facing our coastal communities and partners by adjusting to topic-based specialties.

This past spring, NOAA conducted a programmatic evaluation of the MCZMP. The findings of these evaluations are to be considered by NOAA in making future financial award decisions concerning the coastal programs. The evaluation focused on three target areas: program administration, leadership for state initiatives, and program direction and vision.

During the evaluation, NOAA found that the MCZMP has implemented several improvements in grants management and a program change backlog. NOAA also noted that the MCZMP is very effective at providing leadership at the state level on a number of statewide initiatives. The areas of leadership include improving beach safety through understanding and raising awareness of dangerous currents; incorporating climate change considerations into wetlands management; and enhancing public access through development of state water trails.

The evaluation team concluded that these efforts provide a model for bringing together partners, science, and outreach to improve management of important coastal zone management issues. This has resulted in more than updates to enforceable policies—it has impacted the way these coastal zone issues are understood, messaged, and implemented within the broader coastal management community. The MCZMP leadership is valued by partners despite challenges including implementing state regulations and working with local governments on application barriers, such as a lack of available best practices. These comprehensive approaches are a decidedly transferable model for both the region and other coastal states outside the Great Lakes basin. NOAA recommended that the MCZMP continue to seek creative ways to balance the support of regulatory functions with the development of stewardship activities and technical assistance for coastal partners.

With the growing interest in regional and national water trails, Michigan is providing a model for both the region and the nation. By targeting resources to water trail planning, mapping and marketing, the MCZMP is addressing current and emerging statewide priorities. In a survey of coastal partners, the water trails initiative and public access efforts were cited as a top accomplishment by two-thirds of respondents.

Future

As a networked program, it is challenging to find the most effective balance between support for enforceable policies and technical and financial assistance to coastal partners. Federal resources provide a unique opportunity to focus on the world's longest freshwater coastline. The MCZMP recognizes it is a considerable responsibility to ensure that it effectively uses NOAA funds to protect and improve the extraordinary natural wonders that comprise our coastline. The MCZMP is well-positioned in OGL to promote wise management of the cultural and natural resources of Michigan's Great Lakes coastline by fostering healthy and productive coastal ecosystems, resilient coastal communities, and vibrant and sustainable coastal communities. Charting the new course for the MCZMP involves filling the gap between the regulations and the stewardship and community engagement of our most precious natural and cultural resources.

Why We Should All Care that Great Lakes Water Levels Change

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Urban and Regional Planning Program
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Guy A. Meadows
Great Lakes Research Center
Michigan Technological University

Shoreland property owners should care that Great Lakes water levels change over time because, if they do not, they are apt to invest substantial time, effort, aspirations, and money in building homes and businesses on what are, in reality, shifting sands. State and local officials should care because when those sands shift and take developed properties into the lake, the general public is often left taking on the responsibility and covering the costs for responding to the catastrophe, reimbursing property owners through government-subsidized insurance, and cleaning up the debris. Beyond bearing those costs, the state's citizens should care even more because, when near shore properties are built—and especially when hardened structures are erected to protect them—the lakes respond by scouring away the "public trust beaches" that all enjoy and that exemplify the Great Lakes State itself (Norton et al., 2011).

The conflicts that arise on Great Lakes shores are typical of the conflicts that arise in many coastal settings around the world. The fact that Great Lakes water levels rise and fall over time make the Great Lakes shoreline dynamics unique. These dynamics make efforts to manage Great Lakes shoreline development compelling and challenging (Norton et al., 2013).

Great Lakes Shoreline Dynamics

There are two unique aspects of Great Lakes shoreland dynamics that make management especially challenging, one related to the remorseless movement of shoreline landward and the other to the deceptive way in which that process happens (for more details, see Norton and Meadows, 2014). First, the Great Lakes are geologically young, with substrates comprised mostly of erodible sands and gravels. As a result, Great Lakes shorelines in most places are slowly eroding landward, moving at the rate of about one foot per year on average. This phenomenon is akin to the contemporary effects of climate change on the ocean coasts, but it happens in the Great Lakes because of erosional processes rather than the inundation of shorelands from rising sea levels.

Dan Welihan, Cheboygan

Second, while the Great Lakes are not tidal, lake water levels do naturally oscillate on roughly seasonal, decadal, and multi-decadal timeframes. These fluctuations result primarily from natural variations in the hydrologic cycle, exacerbated by daily and weekly vacillations as the lakes slosh back and forth (called seiches) and as water is pushed landward by high winds during storms. These changes in lake water levels lead to corresponding changes in the place where water ends and shoreland begins, yielding in many locations dramatic shifts in shorelines back and forth–landward and lakeward–-over seasons and decades.

The near-term consequences of these shifts can be immediate and severe, especially when shorelines shift dramatically landward during a storm. Over time, however, the process is deceptive–and all the more difficult to manage–-because it happens so slowly. Standing water levels on Lake Michigan, for example, can oscillate some six feet vertically over decades, yielding corresponding shifts in the shoreline by tens to hundreds of feet. Further, when water levels are low for extended periods, and thus shorelines shift lakeward, the lakes tend to push offshore sand from sandbars up onto the beach. The net effect is the appearance of beaches that are broad and apparently growing for long periods of time. Nonetheless, in reality these beaches are ephemeral, quickly eroded away as water levels again rise–-as they always do—sometimes dramatically through single storms. While global climate change creates increased uncertainty about how lake water levels will respond on average, this pattern of dramatic shifts in water levels and corresponding dramatic shifts in shorelines is expected to increase.

So, Why Worry?

As noted, many of the risks and consequences of shoreland area management on a Great Lakes shore are typical of coastal area management challenges along ocean coasts throughout the U.S. and the world, given some universals (see generally Kaufman and Pilkey, 1983; Cicin-Sain and Knecht, 1998; Beatley et al., 2002; Crossett et al., 2004).

Why We Should All Care that Great Lakes Water Levels Change *Cont.*

Many people want to vacation, if not reside, as close to water as possible. Growing levels of wealth, improved building technologies, and public policies during the last half century have facilitated such nearshore development, especially in the form of vacation homes rented out for income. Growing faith in technology (often combined with lack of familiarity with long-term coastal dynamics) has similarly prompted property owners to want to build larger and more luxurious structures closer to the water, relying on the promise of coastal engineering to protect those structures. Finally, land use management at the local level combined with telling shoreland property owners they cannot build, has yielded a fragmented and permissive regulatory system, one that allows many shoreland owners to build substantial structures in improvident nearshore locations.

All of these phenomena are heightened and made more pernicious along a Great Lakes shore because of the ways in which Great Lakes shoreline dynamics can lure property owners into a false sense of security. Not only do shoreland property owners have to resist the temptation to build in harm's way, but that temptation is greater because of the way Great Lakes beaches inflate when water levels are low. And state and local officials have to plan for mitigating catastrophic events in the face of political pressures, not to stand in development's way while facing near-term uncertainties about lake level fluctuations and expectations by shoreland property owners looking to build.

To date, the predominant responses by property owners and public officials have been to build and then watch structures fall into the lake, build and then harden the shore to protect those structures, or attempt to set structures back and move them as the shoreline approaches. The first option is highly problematic and unsatisfying, and the third option has yielded limited success. A substantial amount of Michigan's Great Lakes shorelines has been developed, and much shoreline armoring has been constructed to protect those properties (although exact numbers are hard to come by). Great Lakes water levels have already started to rise following an extended period of all-time lows, and they are likely to continue climbing or at least to stay relatively high for the foreseeable future. As they do so, considerable properties will be put at risk and substantial portions of Great Lakes beach will be scoured away because of shoreline armoring, at least until water levels again fall.

Shoreland property owners, public officials, and the citizens of the State of Michigan face some compelling and difficult policy decisions about how best to manage the state's Great Lakes shores. Appreciating and understanding that Great Lakes water levels change and affect shoreline dynamics will—hopefully—better inform the decision-making process, create a means for prudent decisions, and allow for happier long-term outcomes.

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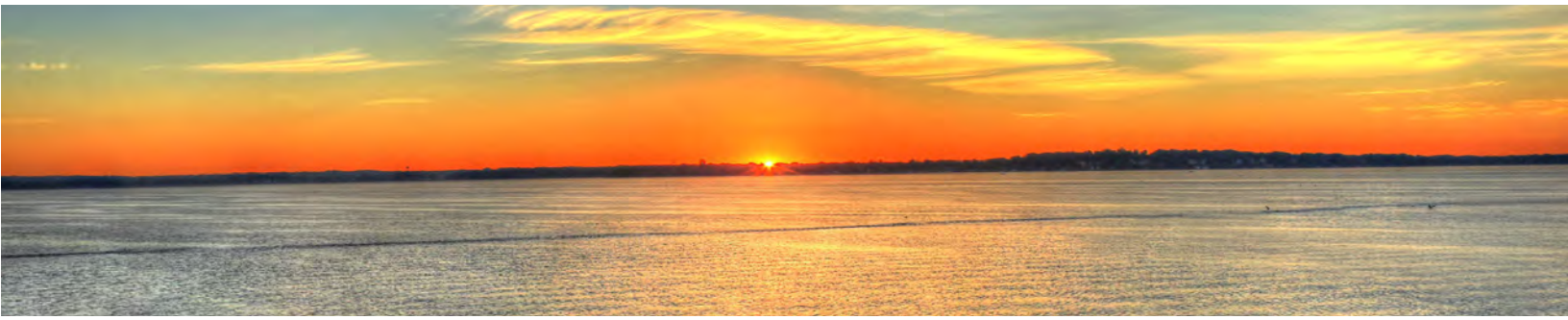

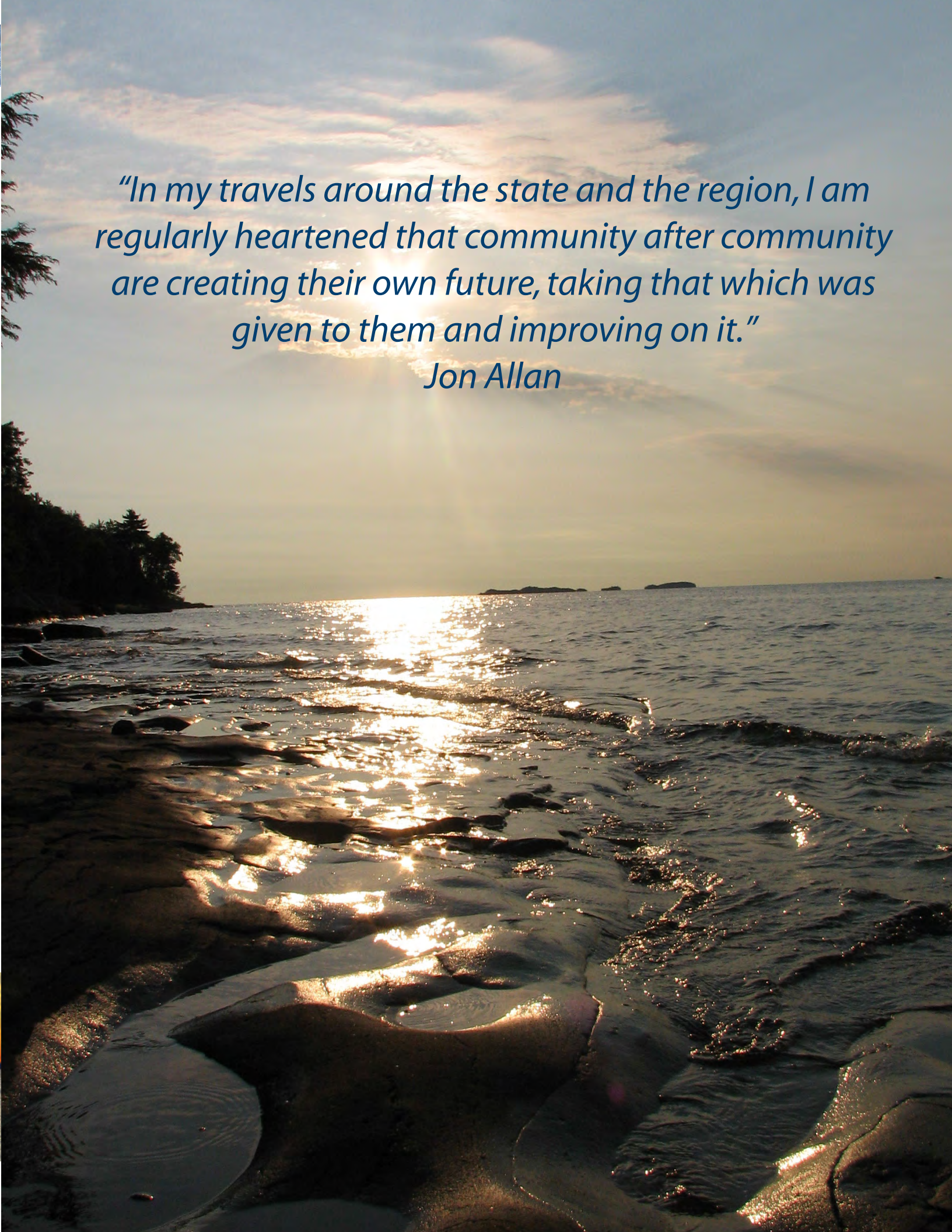
"In my travels around the state and the region, I am regularly heartened that community after community are creating their own future, taking that which was given to them and improving on it."
Jon Allan

Coordination in the Deer Lake Area of Concern

Stephanie Swart
Lake Superior Lake Coordinator
Office of the Great Lakes, MDEQ

For 30 years Deer Lake, Carp Creek, and the Carp River in Marquette County sat on a list. A list that declared them "toxic hotspots," and pointed at historical contamination and fish that could not be eaten without worry of health problems. But, just last month, with the flourish of a pen, the U.S. Environmental Protection Agency took it off that list. Incredible. After 30 years of coordination by local, state, and federal partners, all of that time and effort was lauded and the site became just another gorgeous lake in the Upper Peninsula.

Stephanie Swart

Deer Lake was originally listed as an AOC because of a 1981 Michigan Department of Community Health "do not eat" fish consumption advisory which indicated that all fish in Deer Lake, Carp Creek, and the Carp River were too heavily contaminated with mercury to be safe for consumption. Historic mining practices resulted in mercury contamination to the Deer Lake basin from Ropes Creek and Carp Creek. There were also problems associated with a wastewater discharge from Ishpeming that overenriched the lake.

As a result of the mercury inputs, Cleveland-Cliffs Iron Company (now Cliffs Natural Resources) entered into a consent judgment with the State of Michigan in 1984, and later an amended consent judgment in 2006. After the consent judgment was written, Michigan Department of Natural Resources aquatic biologist Elwin "Red" Evans assisted in implementation of a drawdown of Deer Lake to eradicate fish and minimize human and wildlife exposure. In addition, Evans contributed to the consent judgment and was one of the authors of the original 1987 Remedial Action Plan, or RAP, for the AOC.

Two initial public information meetings were held after the RAP was written, one in 1986 and one in 1987. Around 1997 the Public Advisory Council, or PAC, for the AOC was created, with Scott Chilman as the inaugural chairperson. Chilman was a local lawyer and lived on Deer Lake; he was unflappable and well respected within the community. After he died in 2004, Jerry Ely, from Northern Michigan University, took up the reigns of PAC Chair. In 2007, Deer Lake residents Diane Feller and Pete Nault joined as Chair and Vice Chair respectively. Since the start of the PAC, both the Deer Lake residents and others in the community have displayed determination, patience, and vigilance seeking the restoration of Deer Lake.

During the development of the amended consent judgment with Cliffs Natural Resources, George Pelkola, a contractor for 10 years with the Michigan Department of Environmental Quality, was instrumental in researching information about mercury fulminate in blasting caps and the mercury processes used a Ropes Gold Mine. The role of the MDEQ in the Consent Judgment was coordinated by Steve Casey out of the Marquette District Office. The result was a more detailed judgment with the mining company and a clear pathway for the cleanup of Deer Lake. Additionally, Doug Knauer, another contractor working at the site, and collaborators put in a significant amount of time and effort to determine the effects of restoration efforts on the long-term recovery of fish contamination in the Deer Lake AOC.

Finally, Jered Ottenwess, former City Manager of Ishpeming was instrumental in coordinating a Great Lakes Restoration Initiative grant for the final piece of the AOC puzzle, from running budgets to organizing contractors. Without Ottenwess' patience and attention to detail, in no way would Partridge Creek have been diverted from the mines underneath Ishpeming, thus finalizing the last mercury source control action to take place before the Deer Lake AOC could be delisted. Upon Ottenwess' departure from Ishpeming, Mark Slown maintained the momentum and saw the project through completion.

All of the people mentioned here, along with many other individuals from the federal, state, and local governments and community of Ishpeming have contributed immense amounts of time and effort to get the Deer Lake site where it is today – a gorgeous lake on the outskirts of a close-knit Upper Peninsula town that is no longer an Area of Concern, but a destination for boaters, paddlers, and angling enthusiasts seeking a unique and thriving fishery in the northern reaches of our state.

Michelle Bruneau

The White Lake Area of Concern

John Riley
Area of Concern Coordinator

John Riley

In 1985, the Great Lakes Water Quality Board, advisor to the International Joint Commission, created a list of 42 Great Lakes Areas of Concern (AOCs), with the input of the Great Lakes states and provinces. The list specified only water bodies that were contaminated to such a degree that they posed a threat to the chemical, physical or biological integrity of the Great Lakes themselves. In 1991, Presque Isle Bay in Pennsylvania became the 43rd and final AOC to make the list.

In the autumn of 2014, nearly 30 years after the AOCs were designated; the U.S. Environmental Protection Agency, or EPA, announced that both Deer Lake and White Lake were officially removed from the international list of Great Lakes AOCs. These are huge milestones for the State of Michigan, given that only two AOCs in the U.S. (Presque Isle Bay and Oswego River, NY) and three in Canada were restored until now.

The time it takes to restore these areas belies the complexity of the problems that led to their AOC status in the first place. The issues can be geographically diverse and they are very expensive to fix.

Hooker Chemical manufactured chlorine, sodium hydroxide, and hydrochloric acid on its 900-acre property in Montague, starting in 1954. Until February 1977, the plant also manufactured hexachlorocyclopentadiene (C-56), a toxic chemical used in pesticide production. The plant closed in 1983 and was demolished in 1996. Organic wastes were improperly disposed of on 50 of the 900 acres, and the disposal contaminated ground water and surface water on and off the site with chlorinated organic chemicals, according to EPA tests.

In 1979, the State of Michigan filed suit against Hooker to compel cleanup. Pursuant to a Consent Judgment, Hooker removed most of the waste on the surface and disposed of it in a concrete vault on site. Since that time, Hooker has been pumping and treating ground water with carbon to prevent contamination from migrating off-site.

The former Whitehall Leather Company also contributed greatly to water quality problems in White Lake. First open for business in 1865, the tannery was responsible for mercury, chromium, arsenic and other contaminants fouling the waters and sediment in "Tannery Bay," adjacent to the facility. Bales of scrap leather were used to provide additional usable land at the facility by encroaching into the lake. Whitehall Leather closed its operations in 2000 and the facility was demolished in 2007.

Contaminated sediment remediation began in Tannery Bay in 2002, to remove heavy metals, scrap hides and other contaminants that were deposited into the lake adjacent to the facility. Following demolition of the tannery facility, upland contaminant removal on the site took a couple years to complete. The E. I. du Pont de Nemours and Company, or DuPont, another local chemical manufacturer, also contributed to chemical contamination on land and in groundwater adjacent to White Lake. Manufacturing operations ceased in the mid-1990s and facility demolition was completed within about two years. However, the DEQ continues to monitor groundwater at the site to this day and cleanup efforts continue.

The delisting of White Lake would not be possible at this time without the infusion of federal funds provided by the Great Lakes Restoration Initiative (GLRI), which began in 2010. GLRI funding was directly responsible for over $2 million in habitat restoration projects and over $3 million in contaminated sediment removal in the White Lake AOC. These were the final on-the-ground projects to occur that made delisting a reality. In fact, these projects were icing on the restoration cake. Contaminated sediment removal from the lake near the former Hooker Chemical property concluded in 2003 and contaminated sediment removal from the former Whitehall Leather Company concluded in 2011.

Restoring the White Lake AOC took incredible collaboration between local community members that formed the White Lake Public Advisory Council, the White Lake Association, the White River Watershed Partnership, local elected officials, the Muskegon County Conservation District, the Muskegon County government, the cities of Whitehall and Montague, the White Lake Area Chamber of Commerce, Grand Valley State University's Annis Water Resources Institute, local and regional contractors and engineers, the Michigan departments of Environmental Quality, Natural Resources, and Community Health, the U.S. EPA's Great Lakes National Program Office and Superfund program, the U.S. Fish and Wildlife Service, the National Oceanographic and Atmospheric Administration, the Great Lakes Commission, and many others. The MDEQ's Office of the Great Lakes would like to express its deepest gratitude to each of these organizations, but especially to each of the individuals that worked so hard for many years to help White Lake achieve this historic level of restoration.

Eat Safe Fish in Michigan

Michelle Bruneau, Kory Groetsch, and Jennifer Gray, *Michigan Department of Community Health*

Joe Bohr, *Michigan Department of Environmental Quality*

Michigan's natural resources not only include acres of wilderness and gorgeous lakes and rivers, but also the people who choose to work and live in this amazing Great Lakes state. To protect the health of those people and all others who eat fish from our Great Lakes and more than 11,000 inland lakes, rivers, and streams, the Michigan Department of Community Health (MDCH), the Michigan Department of Environmental Quality (MDEQ), and the Michigan Department of Natural Resources (MDNR) have partnered over many decades to collect and process fish, analyze the filets for contaminants, and provide consumption recommendations based on the best available science.

Since the start of the MDCH Fish Consumption Advisory Program, or MFCAP, in 1970, Michigan agencies have processed and analyzed contaminants in more than 18,000 edible portion samples of 30 species of fish from 314 inland lakes and 85 impoundments. In addition, since 1981, Michigan agencies have regularly sampled and analyzed sport fish from Michigan waters of the Great Lakes and connecting channels. They have also collaborated with the other Great Lakes states to ensure consensus in the region with regard to contaminant analysis and fish consumption recommendation practices.

Prior to 1986, fish tissue monitoring was conducted primarily to address specific problems; since that time the monitoring has been conducted more broadly in an effort to evaluate the status of contaminant levels in fish statewide. Although not every fish species from every waterbody in Michigan is tested every year, Michigan has analyzed contaminants in fish from an average of 30 inland lakes and impoundments annually since 1986.

MDCH and MDEQ are also cognizant of emerging contaminants and have recently expanded the MFCAP to include perfluorinated compounds, such as perfluorooctane sulfonate, which has recently been found in sites associated with fire suppression training that used aqueous film-forming foam.

People who want to minimize their consumption of these chemicals can use Michigan's Eat Safe Fish Guides to quickly determine how much fish is safe based on their body weight and serving size – their MI Serving – a complex dose calculation made simple. Technically focused individuals can access the actual data, read the chemical-specific reference dose health assessments, and follow the step-by-step processes behind the development of the fish consumption recommendations at www.michigan.gov/eatsafefish (Reports).

The MFCAP recently overhauled both the science behind the consumption guidelines and the communication and outreach efforts thanks to funding provided by the U.S. Environmental Protection Agency's Great Lakes Restoration Initiative, or GLRI. Since the start of the GLRI funding, MDCH, MDEQ, MDNR, and

Michelle Bruneau

their partners have educated more than 70,000 people in the state of Michigan on ways to choose and eat safer fish while still enjoying Michigan's greatest liquid assets – our many sparkling lakes and rivers. Bright, engaging brochures distributed by MDCH encourage fish consumption while teaching consumers - in three easy steps - how to reduce their exposure to certain chemicals commonly found in fish.

The Eat Safe Fish in Michigan brochures have been distributed to local health departments, state parks, fishing license retailers, and at multiple fishing-related events around the state by myriad partners. Regional booklets – called the MDCH Eat Safe Fish Guides – are available in a digital format that is easy to save to a smartphone and pull up whenever needed, as well as in a print version which is mailed by request to anglers around the state. These booklets are broken down on a county-by-county basis and waterbodies are listed alphabetically to aid the angler in finding fish consumption guidelines. The guidelines include fish species, chemicals of concern, sizes of fish, and the MI Serving recommendation that anglers can customize to their and their family members' specific body sizes.

In addition to the contaminant analysis of filets that is used to populate the MDCH Eat Safe Fish Guides, Michigan has been monitoring temporal trends of fish contaminants since 1990, analyzing whole fish on a regular basis from 22 fixed stations. As of now, more than 3,500 samples have been analyzed.

Michigan hopes to be able to continue to develop innovative fish consumption communication methods, promote scientific transparency, and further partnerships in the Great Lakes region for many more decades to come.

The River Rouge Then and Now

Noel Mullett
Wayne County Department of Environment- Watershed Division

In the 1994 State of the Great Lake Report, Congressman John D. Dingell wrote a guest column describing Rouge River restoration efforts and progress. In the article, he noted that no single point of the Great Lakes contamination was worse than the Rouge River and that although progress had been made removing point-source pollution much more work and money was needed. (At his request, the General Accounting Office estimated the cleanup cost for the Rouge to comply with the Clean Water Act would exceed $1 billion and possibly rise toward $2 billion.) Congressman Dingell went on to note that as local and state officials began work on the Rouge Remedial Action Plan, or RAP, it was clear they would require major federal funding. This funding began in 1990 with Congress approving the first Rouge River National Wet Weather Demonstration Project ("the Rouge Project") grant. The article concluded with the statement "While the Rouge will never again be pristine, we have an obligation to ours and future generations to make sure it can be a safe and accessible community resource and that teamwork, strong commitment and leadership were already demonstrating that regional cooperation is not only possible it is what is needed to get the job done."

Looking back to 1994, I was new to the Rouge Project and focused on learning what the issues were, what messaging was important, and what activities were needed to restore the Rouge. Three statements I remember hearing and believe remain significant today are:

A river is a reflection of the communities through which it flows.
What happens to the land determines the quality of the water.
Incrementalism with a vengeance.

After 22 years of the Rouge Project delivering over $350 million in federal funding and leveraging more than $191 million in local funding, it is a pleasure to report that the reflection of the Rouge is better and though there is a ways to go, what is happening to the land is improving…incrementalism is happening with a vengeance and there is a regional green infrastructure vision.

In 1998, the Rouge communities voluntarily applied for Michigan's watershed based storm water permit. In 2006, the Alliance of Rouge Communities, or ARC, was formed to provide watershed-wide cooperation and support to meet water quality permit requirements and restore beneficial uses of the Rouge.


Michael Precious

Rouge water quality improvements include:

- Downstream dissolved oxygen levels are meeting the state standard for a warm water fishery 98 percent of the time vs. 43 percent in 1994;
- Multiple species of water quality sensitive aquatic insects have been identified and may be expanding their range;
- Johnson Creek has been designated a cold water stream;
- Fish consumption advisories have been lifted in segments of the Middle Rouge; and
- The use of the Rouge as a community recreational amenity continues to increase with Friends of the Rouge hosting annual canoe trips, boat tours and monthly "Explore the Rouge" events.

Pollution control and river restoration projects included:

- 88 Combined Sewer Overflow/Sanitary Sewer Overflow control projects;
- 47 storm water projects;
- 48 riparian corridor management projects;
- 71 public education and involvement;
- 23 projects to enhance recreation along the river; and
- 106 watershed management/analysis projects.

Two of three Rouge watershed counties adopted and are implementing ordinances requiring time of sale septic system inspections and have aggressive post-construction storm water management regulations for new and redevelopment projects.

The Rouge Project federal grants ended in June 2014 and it is hard not to feel Rouge restoration efforts stand at a crossroads. One path is uphill but represents the continuation of the collaborative water resource-based approach forged through the RAP and realized by the Rouge Project; the other, while easier, leads backward to an approach focused on mere permit compliance rather than what works best for the resource. Hopefully the state and all the local communities will remember the Rouge is a reflection and continue to find ways to tangibly (i.e. financially) merge the collaborative resource-based approach with the new individual storm water permit; and through permit administration incentivize the use of green infrastructure practices (incrementalism with a vengeance) to control, eliminate, and manage CSOs, SSOs, and storm water.

From Resilience to Revitalization: Planning for Stronger Communities

Whitney Waara
Executive Director
LIAA

Michigan's Great Lakes communities are ever evolving, adapting, innovating, and responding to challenges. The numerous forces at work — including climate variability and increasing storminess, fluctuating lake levels, dynamic shoreline processes, and shifting sources of prosperity — require these communities to be resilient. On the heels of some of the worst economic turmoil the state has ever seen, and with ever more obvious signs of the impact of the changing climate, Michigan's Office of the Great Lakes is helping to build the capacity of coastal communities to account for forces beyond their own control, adapt to the inevitable and often unpredictable challenges these forces bring, and prosper in the face of change.

Planning for Resilient Communities in Michigan

Resilience is the ability to recover from adversity or change. Adaptation, in turn, allows us to prevent further harm from significant change, cope with the challenges, and make the most of the new conditions. Communities with a strong capacity to adapt can go beyond merely surviving the challenges that come with change; they can thrive.

Through statutes such as the Michigan Planning Enabling Act (P.A. 33 of 2008), local governments are the primary conveners of public discussions concerning community development and civic life in Michigan. Local governments create and host a wide array of citizen-driven processes for land-use planning, economic development, and community problem solving. Engaging in a community planning process with resilience in mind helps communities to cut big, unwieldy problems down to size.

Communities interested in becoming more resilient assess their vulnerabilities and make action plans to reduce their sensitivities and exposures to hazards of all kinds. For example, local governments can improve building standards to reduce heating and cooling challenges posed by severe temperature swings; adapt storm water practices to better manage more intense rain events; and preserve ecosystem services, such as coastal wetlands, to combat shoreline erosion and inundation.

In the context of municipal planning and development, some of the most important characteristics of community resilience are:

- strong and meaningful social relations;
- social, economic, and environmental diversity;
- innovation and creative problem solving; and
- extensive use of ecosystem services.

One fortunate side effect of preparing for resiliency is that these characteristics also improve community life, help attract and retain residents and visitors, and often support stronger economic conditions. In other words, taking the steps to be better prepared for challenges can actually lead to growth and vitality.

Planning processes can help deepen the community's overall connectivity among organizations and individuals, fostering the social ties that keep a region strong. This network allows community partners to step in and act when and where they are needed, and keeps services and communication lines open even if part of the network has become incapacitated. Local investments, consumption of locally produced products, and locally owned businesses all help to diversify the community's economy, giving it greater resilience.

Resilience in Action

In 2014, working with the nonprofit LIAA, the greater coastal communities of Monroe, Ludington, Grand Haven, St. Joseph, and East Jordan all worked to incorporate resilience thinking into their municipal master planning process. Their efforts are addressing a wide range of shared concerns such as improvements to transportation corridors, waterfront protection and revitalization, efforts to build and diversify the local economy, and new ways to manage the impacts of climate variability. For example, Monroe linked its master planning process to the development of its new River Raisin National Battlefield Park and the revitalization of formerly industrialized wetland areas where the river meets Lake Erie. Planning with resilience in mind will not only allow these communities to be prepared for the worst, it also creates the conditions that will allow them to work toward their best.

From Resilience to Revitalization: Planning for Stronger Communities *Cont.*

As in Monroe, resilience planning can prompt communities to consider their strengths and find creative ways to protect and leverage the assets they already have. Projects supported by OGL are working at the nexus between shoreline processes, coastal wetland management, and policy development to empower local governments to make informed decisions about their coastal resources.

Of course, Great Lakes communities are blessed with access to the world's greatest freshwater resource, and playing to this strength can be a powerful tool for community revitalization. Over the past year, OGL has helped dozens of coastal communities to plan and develop water trails for nearly every mile of Michigan's Great Lakes shoreline, as well as for dozens of connecting inland waterways. The project website includes digital maps, informational videos, shoreline photos, a trip planner, and more. The project now includes 2,485 miles of water trails along Michigan's Great Lakes coasts and 1,384 miles of water trails on inland waterways. In fact, "Trail Town" efforts are also underway in many communities across the state to leverage recreational trails as economic drivers.

This holistic approach to community resilience—minimizing weaknesses, playing to strengths, and building the capacity to adapt to ever-changing circumstances—will continue to play an important role in the vitality of Michigan's Great Lakes communities for decades to come.

"We will shed once and for all the "rust belt" moniker and will be known as a people that – of their will and pluck and desire and philanthropy – created their own new narrative, their own new storyline. This time, not a storyline forged from the felling of trees, but one based on the restoration of place and community, and the restoration of spirit." Jon Allan

Sustainable Small Harbor Management Strategy

Don Carpenter
Lawrence Technological University

There are over 80 small public harbors and marinas throughout the State of Michigan administered by the state, county, and local units of government. These harbors are a critical component of the state's "Blue Economy" with economic impacts from Great Lakes recreational boating in the billions of dollars. Unfortunately, a decade-long trend of lower water levels, combined with increasingly severe economic constraints have resulted in decreased recreational boating and strained local economies. Most significantly, state and federal funding for public harbor maintenance is increasingly limited. And, by 2015, public harbors will be required to develop five-year master plans in order to receive financial support from the Waterways Commission of the Michigan Department of Natural Resources. Therefore, research is needed to inform both the development and the content of these plans as harbors seek a more sustainable future.

The Sustainable Small Harbor Management Strategy project entails developing an approach for small harbors to become economically, socially, and environmentally sustainable. A key feature includes documenting the value these small harbors provide to boaters, anglers, property owners, and businesses and identifying potential revenue streams for the future. Project findings will inform the development of a toolkit of best practices, resources, and funding opportunities to support small harbor planning.

The research is being conducted by Lawrence Technological University, Environmental Consulting & Technology, Inc., David Knight LLC, and Veritas Economic Consulting along with representatives of sponsoring government agencies. Funding for the project is coming from a unique collaboration of agencies including Michigan Sea Grant, Michigan Department of Natural Resources, Michigan Department of Environmental Quality Office of the Great Lakes, and Michigan State Housing Development Authority. Finally, a state-wide Advisory Board has been engaged to guide the project and edit documents that pertain to the challenges small harbors may face. The Advisory Board is comprised of key partners and stakeholders including policymakers, managers, harbor masters, industry representatives, and lobbying organizations. As such, there is a tremendous amount of experience and organizational capacity being applied to the complex issues surrounding small harbors.

The final outputs of the Sustainable Small Harbor Management Strategy project will be:

- Documentation of the key barriers to the financial sustain ability of small harbors;
- A sustainability toolkit for small harbors, including four case studies on how an economic model was developed and applied by communities and additional applications of the sustainability process to two other harbors; and
- A summary report, presentations, webinars, case study fact sheets, and a website that will assist communities in their master planning efforts.

Representative communities for the case studies were selected on a criteria system that included diverse location, harbor type (small shallow draft), harbor position relative to the community type (suburban, city, downtown), population size, current organizational capacity, and economic condition. Four communities – New Baltimore, Pentwater, Au Gres and Ontonagon – were identified for in-depth analyses and development of an economic model. These four harbor communities are engaged in a year-long collaboration process with visitation to each community at least four times during the project to determine community assets, organization, economic conditions, and vision. The goal of the small harbor community engagement is to facilitate regular stakeholder involvement and feedback which builds trust in and support for the project. This will allow the project team to quickly gain consensuses and reduce the time to implement a sustainability plan. The meetings within the communities will inform the toolkit and provide a roadmap for other communities to participate in a similar process. Finally, two additional communities, where place-making activities have been completed, will be selected for application of the toolkit and economic model. The toolkit application process will document how the tools developed could be applied by others small harbor communities.

The Sustainable Small Harbor Management Strategy hopes to alleviate some of the pressure on small harbor communities throughout Michigan by providing a toolkit by which they can use to plan and promote their communities.

Information gathered and analyzed for each harbor includes:

- Organizational and leadership charts of the harbor and community;
- Harbor statistics such as boats berthed, launched, demand, etc.;
- Employment data and other related census data;
- Master planning efforts (existing or in progress) or special assessment districts;
- Zoning for harbor and downtown/adjacent land areas;
- Existence of community foundations who could provide financial support for future efforts;
- Recent planning or improvement grants received;
- Specific challenges the harbor is experiencing (regulation, policy, laws, water levels, maintenance, etc.);
- Economic information (budget for community, bud get for harbor operations, funding mechanisms, grants received, etc.);
- Existing tourist information (flyers, magazines, etc.) and existing tourist way finding signage; and
- Aerial photograph/maps and GIS data.

Michigan's Blue Economy and the University Research Corridor

Jeff Mason
Executive Director
University Research Corridor

Britany Affolter-Caine
Program Manager
University Research Corridor

Michigan's history and quality of life is tied to water, and the three universities that make up Michigan's University Research Corridor, or URC – Michigan State University, the University of Michigan, and Wayne State University – are creating cutting-edge technology and innovation to solve challenges related to water.

The three URC universities received nearly $300 million in awards for water-related research and outreach from 2009 to 2013, as a clear indication of innovative thinking. The 2,100 awards that researchers received have led to advances in a wide variety of areas, such as managing invasive species, monitoring water quality, and optimizing water use in agriculture. While much of the URC's work affects the Great Lakes region, it has a global scope as well.

Global efforts include:

- At Michigan State University, a research team of "water detectives" at the Center for Water Sciences and its Center for Advancing Microbial Risk Assessment is developing new genetic analytics to study waterborne health threats.
- At the University of Michigan, the new $9 million Water Center is guiding efforts to protect and restore the Great Lakes by reducing toxic contamination, combating invasive species, protecting wildlife habitat, and promoting coastal health.
- At Wayne State University, a multidisciplinary team of medical and engineering researchers are developing an automated, on-ship, rapid-testing system that will be able to reveal the presence of live organisms in treated ballast water within minutes.

The URC schools also are drawing on innovative research to promote economic development within the state and globally by working with other education, government, and business leaders to enhance Michigan's role in the "Blue Economy."

The "Innovating for the Blue Economy" report the URC commissioned from East Lansing-based Anderson Economic Group and released in May indicates that Michigan ranked fourth in the nation in the percentage of jobs associated with industries related to water. Overall, one in five Michigan jobs – 718,700 – is tied to having high quality and plentiful water. Water is an important economic driver in Michigan, whether it's being used for Great Lakes shipping, advanced manufacturing, agriculture, fishing, or more than 80 other water using industry subsectors where Michigan workers are employed.

While most of Michigan's water-related jobs are in water-enabled industries such as agriculture, mining, and manufacturing, about 138,000 are in core water products and services creating water treatment facilities and solving water quality and quantity issues. That is why the URC universities are engaged not only in research on the Great Lakes, inland lakes, streams, and wetlands that make up the Great Lakes basin, but also on water systems across the United States and around the world.

The URC researchers are making important contributions to interdisciplinary research and working with other Michigan research centers such as Michigan Technological University's Great Lakes Research Center, Grand Valley State University's Robert B. Annis Water Resources Institute and Northwestern Michigan College's Great Lakes Water Studies Institute. They also collaborate with work conducted through the Council of Great Lakes Governors, the Great Lakes Restoration Initiative, and the International Joint Commission.

And the research pipeline is flowing. The URC universities produce more than 3,400 graduates each year who are prepared to analyze and find solutions to water-related issues in academia, government, and the private sector. Nearly 40 percent of those graduates earned advanced degrees. The three URC universities offer 68 undergraduate and graduate degree programs in water-related areas such as engineering, agriculture, public health, natural resources, and business.

With a fifth of the world's freshwater resources within its borders, Michigan has a crucial role to play in the "Blue Economy." The URC is working to position the state as a knowledge wellspring for the world's most precious natural resource.

Water Risk Exposure and Financial Performance: Can Market Signals Drive Corporate Behavior and Environmental Performance?

Dr. Peter Adriaens
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Equarius Risk Analytics, LLC;
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Good corporate environmental practices have marketing value. Such practices and services can captivate and motivate some consumers. However, real data from capital markets – the flow of money and investment within and to corporations for investments and growth – now indicate that environmental performance can also directly and importantly affect overall corporate risk, financial performance, and decision making.

The use of Environmental, Social and Governance (ESG) data – or how the firm performs in these areas beyond financial performance – has been on the rise, predominantly due to the rapid growth of an investment philosophy referred to as 'Responsible Investment'. This type of large-scale institutional investing seeks to integrate the environmental, social, and corporate governance insights and behaviors in investment decisions and portfolio allocations. In 2014, the total assets now under management in this realm are estimated at 45 trillion dollars.

A shortcoming for Responsible Investing is that information interrelating ESG performance with financial performance tends to be difficult for investors to understand. Without a deeper and improved appreciation of cause and effect, the economic advantage of companies operating in water rich basins such as the Great Lakes cannot be fully known. Business in a water rich area like the Great Lakes may in fact present investors with a better way to manage water risk, but to date there have been no tools to understand this phenomenon. Secondarily, if water risk can be responsibly and thoughtfully managed within the operations of a business, then cannot this positively translate to access to low cost capital, improved credit risk rating, investment desirability, attractiveness, and overall total shareholder return?

Since 2010, the types of data collected to support ESG-based investment decisions are becoming more fine-scaled. No longer can we only see the overall performance of a broad swath of companies in the aggregate, but now we can see into specific sectors and firms with clarity. We are beginning to understand for instance how corporate culture, ethics, and environmental performance interact and drive better decision-making within the firm and ultimately firm performance. Earlier this summer, a series of articles on corporate water risk in The Financial Times cited Global Water Intelligence, a market analysis firm, who indicated that firms have now committed 84 billion dollars just in the past three years alone to conserve, manage, or obtain water – to manage water risk. Not in a generation has water meant so much to companies. Indeed, voluntary water risk disclosures by corporations to their investors are growing quickly. Water matters and it matters more than ever.

Typically, physical risk (access to water, supply durability, water quality) and regulatory water risk (permitting and compliance) assessments use well established risk tools and procedures such as the World Resources Institute's (WRI) Aqueduct tooland other basic water footprint tools. Focusing solely on physical and operational risk presents challenges to fully understand whether and how water impacts risk-adjusted pricing of stocks and, in turn, asset valuation. Without this critical link it is nearly impossible to get corporations to fully concentrate on water issues, let alone quantify the benefits gained by a company operating in the Great Lakes region versus areas with more challenging water access or quality issues.

A critical challenge for policy makers, corporate and capital markets actors is that they all may have different objectives and will try to optimize performance accordingly. For corporations, water quantity and quality affects plant operations and, in turn influences risk management, hedging and capital investment strategies. For equity analysts and investment portfolio managers, stock volatility risk (the likelihood of an increase or decrease in stock price and thus the overall value of the firm) in part influences where and how much money is invested between one firm and another. The link between portfolio allocation decisions and stock risk pricing and water risk management is that understandable market signals should be able to influence long-term capital investments. The problem is that until recently there was no way to connect water risk and overall stock performance.

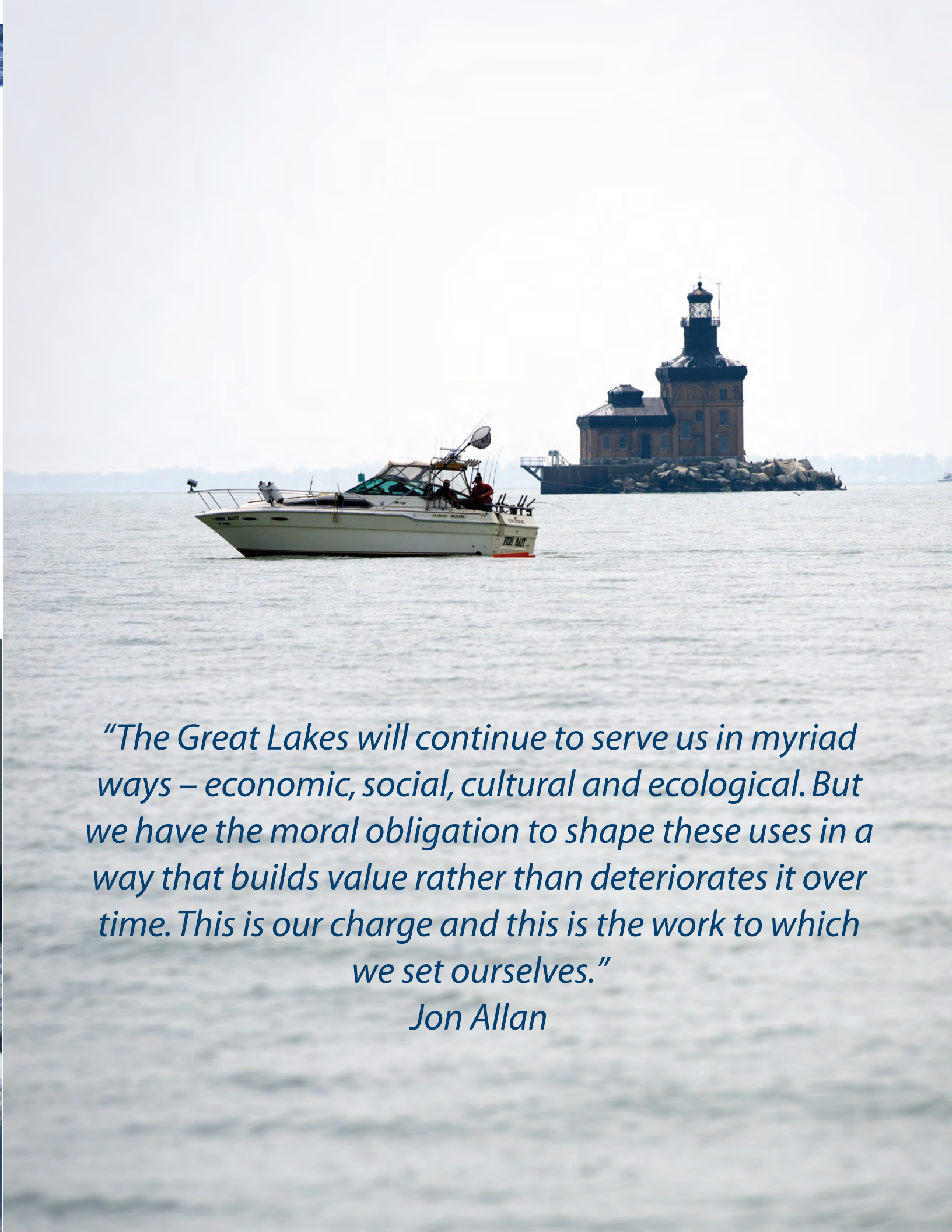
Equarius Risk Analytics, a Michigan-based financial risk firm is proposing a solution to address this gap by structuring financial risk metrics for water risk-exposed companies. New water risk metrics are based on corporate financial data and stock performance measures, and informed by operational data.

Water Risk Exposure and Financial Performance: Can Market Signals Drive Corporate Behavior and Environmental Performance? *Cont.*

The rationale is as follows: if the objective is to demonstrate that water risk directly impacts corporate financial performance, and thus it sends a signal to inform companies how better to reallocate resources to manage risk, then it is important to understand the market side first. Typically, stock risk is represented by a metric that assesses the ups and downs (volatility) of any given stock price. This measure is a standard type of financial analysis called Value-at-Risk (VaR). However, such volatility analysis only quantifies the overall stock volatility due to all risks and not just risks related to water. The specific impact of water needs to be teased out of the total risk picture.

Equarius Risk Analytics has developed a new approach to quantify water risk called the waterVaR. The risk is calculated by taking into account the impact of water on corporate revenue, and productivity of the company's physical assets. This approach can now account for nearly twenty percent of total stock volatility and can impact future portfolio allocations of water-exposed stocks.

The Great Lakes will continue to be a major strategic resource for the state. The precise financial benefit of our water resources related to risk management and corporate performance needs to be fully understood and clearly articulated to companies locating in this region and to investors looking for favorable investments. Understanding how companies can use and leverage water to strengthen corporate performance in a wholly responsible manner and how that differentiates us from water poor areas can have great benefits to firms, communities, and the overall regional economy for decades to come.



"The Great Lakes will continue to serve us in myriad ways – economic, social, cultural and ecological. But we have the moral obligation to shape these uses in a way that builds value rather than deteriorates it over time. This is our charge and this is the work to which we set ourselves."

Jon Allan

Water Trails in St. Clair County

Lori Eschenburg
St. Clair County Planning Commission

The St. Clair County Metropolitan Planning Commission and the St. Clair County Parks and Recreation Commission, or PARC, received a grant in 2010 from Michigan's Office of the Great Lakes Coastal Zone Management Program to create a water trail website, which developed into the Blueways of St. Clair. The Blueways of St. Clair is comprised of 16 water trails across nine bodies of water, complete with maps and points of interest such as places to camp, shop, and eat. Each water trail has information about conditions and suggestions on where to put in and take out. There are 55 mapped public water access points in St. Clair County. Each page of the website features links to the Customs and Border Patrol website, U.S. Coast Guard, St. Clair County Marine Patrol and the National Weather Service. The Blueways of St. Clair website has won several awards, such as the 2012 Innovation in Regional Planning award, and was the pilot project for the Michigan Great Lakes Water Trails websites.


Lori Eschenburg


Lori Eschenburg

The Blueways program was the impetus for our most popular Blueway – the Island Loop Route – becoming the very first National Water Trail in the State of Michigan. The National Water Trail Program highlights exemplary water trails around the nation that meet seven best management practices: recreation opportunities, education, conservation, community support, public information, trail maintenance, and planning. The 10-mile route passes through four different bodies of water, past two museums, the oldest lighthouse in Michigan, and under the Blue Water Bridges next to Canada. Another unique feature of the Island Loop National Water Trail is its three handicapped accessible kayak launches, making paddling recreation accessible to those with disabilities. PARC will supply an Americans with Disabilities Act-compliant kayak/canoe launch to any municipality in the county that will maintain it. We now have five ADA-compliant kayak/canoe launches in the county, with more planned for the summer of 2015. So, the next time you visit St. Clair County, bring your kayak, canoe, or stand-up paddleboard.

Visit the Blueways of St. Clair website at www.bluewaysofstclair.org.

Lori Eschenburg

Ripples of Learning for Great Lakes Stewardship

Shari L. Dann, Ph.D.
Associate Professor and Extension Specialist
Department of Community Sustainability
Michigan State University

Our state is rich with Great Lakes shorelines and water resources. Networks of unique tributaries, rivers, lakes, wetlands, and natural and human assets connect our communities.

Yet, a recent discussion held during a Michigan State University teacher professional development program provides a wake-up call for K-12 systems in our Great Lakes State. Teachers in under-resourced, rural and urban areas of mid-Michigan report only a small proportion of their students have ever been to one of the Great Lakes. Of that small number, the most-visited locale was Cedar Point!

In this context, the central question is how can we foster a strong sense of place – connected to local watersheds as well as to the larger Great Lakes region – and enhance stewardship of these resources over a person's lifetime.

Just as networks of water connect us all, so, too do networks of excellent educators and community partners providing exemplary Great Lakes learning. Several shipboard education initiatives take thousands of students on a Great Lake. The Great Lakes Stewardship Initiative of the Great Lakes Fishery Trust supports nine hubs of K-12 professional development through place-based education and the Cranbrook Institute of Science's Freshwater Forum shares education resources statewide.

Some areas of the state, however, have little or no access to such Great Lakes programs. A new research project starting under the partnership of three state universities (MSU, Grand Valley State University, and Michigan Technological University) and supported by Michigan Sea Grant will provide an assessment of K-12 Great Lakes literacy in Michigan. Many pathways to involvement in this research will allow for dialogue and integration of multiple perspectives of education leaders, teachers, conservation partners, and all sorts of Great Lakes enthusiasts.

One question that will be addressed is: What are the influences in Michigan that foster (or limit) K-12 systems to influence positive youth development in Great Lakes literacy? Bodies of research indicate educators experience obstacles that are challenging to navigate within today's K-12 and community systems. But many teachers can thrive in providing pathways to learning about the Great Lakes for their students and communities.

Teachers well-connected to the networks of educational support and professional development do a fine job of integrating Great Lakes literacy into the classroom, sometimes against major obstacles of having to "cover" an ever greater amount of learning in subjects other than science. However, we know from evaluation and research conducted by Michigan and Great Lakes regional scholars that these aspects of literacy are not enough to foster lifelong stewardship toward the Great Lakes. Research shows that particular types of learning experiences foster understanding of our Great Lakes ecosystems and the economic and social values of this vast global resource. Much more than knowledge-based learning is needed if our overarching goal is to foster an ethic of care toward the Great Lakes. And, it takes real commitment on the part of entire K-12 and community systems to help learners become personally engaged in lifelong activities that lead to stewardship of our lakes' watersheds.

The story of how education and stewardship are related is a complex one. We know from researchers that many factors foster long-term stewardship; learning systems need time to help students grow in awareness of Great Lakes issues, develop a sense of personal investment in these issues, understand consequences of sometimes difficult choices among human actions that affect ecosystems, and, in general, develop a sense of "ownership" of their Great Lakes resources. Also important is helping students learn skills related to choice-making, and developing a lifelong sense of competence or "empowerment" regarding their abilities to work with others to make positive change.


Shari Dann

Our front-line practitioners – teachers, educators, and their community voluntary partners – know the things that researchers have shown to influence stewardship of the Great Lakes. These brave, creative souls know how water fascinates young and old alike. They know how an outdoor experience and a real-world context for learning spark the imagination and attention of even the most challenged of learners. Finally, our teacher leaders know that to make a lifelong difference in a young person's ability to live actively in the world requires a sense of place, a sense of belonging so deep that the young person believes fully that they can make a difference for their community and our precious Great Lakes landscapes.

As Aldo Leopold writes, we "….wish for the land what we all wish for our children – not only a chance to make a living but also a chance to express and develop a rich and varied assortment of inherent capabilities, both wild and tame."

Muskegon Lake Restoration Celebration Speech Transcript

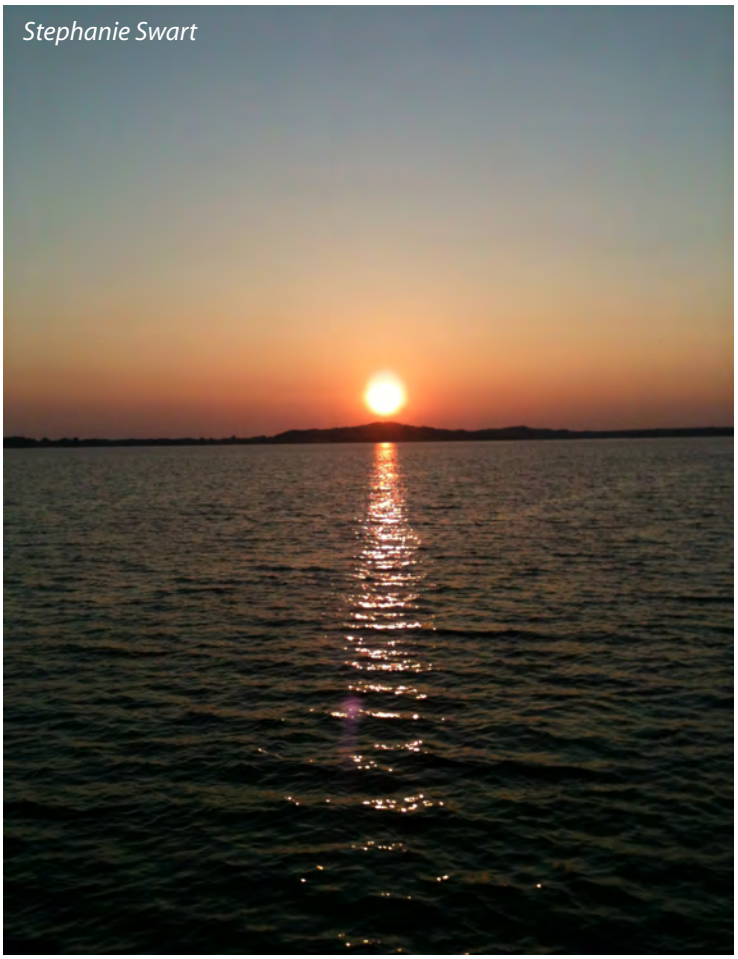
Stephen Gawron
Mayor
City of Muskegon
August 2014

So, who recognizes the result of 15 projects covered under the American Recovery and Reinvestment Act, three under NOAA's Great Lakes Habitat Restoration Program, and four under the Great Lakes Legacy Act? I do, and any other Muskegon kid that grew up here. In the '60s and '70s, we could enjoy alewife die offs on the Lake Michigan beach; no more shoulder-to-shoulder perch fishing on the pier; wading in a murky stew looking for log ends with mill marks from the lumber era; and boating through blue, green, and rust colored ooze being discharged into the harbor. We could enjoy parked rail cars along the water adjacent to transient camps littered with refuse and liquor bottles from Brewery Hill to Lakeside and enjoy the broken cement and wood rip rap shoreline expanded from lumber and industrial fill, from a less enlightened era in the 200-year history of western man on Muskegon Lake.

What do we see today? We see progress in addressing the sins of the past. We see a recreation of garden earth. We see life itself, our lives, as we are wholly dependent on the waters lapping this shore. We are violently reminded of this over the past weeks with the occurrence on Lake Erie, not a separate body in some far off region, but an extension, an integral part of the world's largest fresh water resource – the Great Lakes. If 1970 has returned to Lake Erie, as one of the grandfathers of its 1970s clean up contends, then we know further what we see, beyond the visual and into the obligation. We need never to consider we have arrived, finished, or truly completed at a project's end. We must be challenged to create a legacy of process, a continuing care and stewardship of this resource for our very survival.

There was a starting point on the road to this celebration, but there can never be an end point. The celebration needs to continue in our appreciation of and our caring for this resource, this place, this people, Muskegon and Michigan and our brethren beyond. And, to all you through your hard work and vigilance your love, thank you. Thank you from this kid from Muskegon who remembers the muck and now wades out into the water.


Stephanie Swart


Stephanie Swart

Blue Water River Walk Grand Opening Speech Transcript

Randy Maiers
CEO/President,
Community Foundation of St. Clair County
June 7, 2014

I've been in the Foundation business since 1997, going on 17 years this summer. And I've learned that when people ask me what I do, if I don't have time to really explain our work, I give them my short answer, which is simply I help people give away money to improve our community. But, the truth of the matter is that when we're doing what's really important, when we find that sweet spot, that perfect place and time when we're really making a difference for the good of our community, it's never about the money.

In this line of work I've found that great things never start with money. They start with an idea, a vision, a passion, a desire to change the status quo, a desire to leave a mark, to make a difference.

And so we are gathered here today along the majestic blue waters of the mighty St. Clair River to celebrate the results of a vision, of a desire to make a difference. And whether you believe these natural assets are a gift from God, or Mother Nature, or the Big Bang, we are here because a single person, Dr. James C. Acheson, decided he could make a difference.

We are here to celebrate and launch the next lifecycle of this shoreline and this beautiful stretch of river. And while I know we have people here today who may view this as a habitat restoration project, or a clean-up project, it is so much more than that.

What we are really doing is just allowing this precious gem to continue to serve and enhance the economic prosperity of our region. The site we are standing on today has been serving mankind since the first native people lived and thrived here hundreds of years ago.

This river, this land has served the needs of men, women and children since the first human saw her beauty. For hundreds of years, she has served us without complaint. Beginning in the late 1800s and continuing on for more than 100 years, she sacrificed almost everything to sustain America's industrial growth.

But by the late 1990s, she was tired and worn. After more than a century of bearing the burden of America's industrial revolution, she bore the scars of labor. She showed the wounds of the timber industry, of shipping, of railroad, and of our selfish economic prosperity; every tree, every bush, every native plant had been stripped away. Fish and wildlife struggled to survive here. As the dawn of the 21st century drew closer, she was left abandoned, abused and neglected, not a single tree stood standing on her once proud shores to provide shade and shelter.

Yet she did not complain. She simply waited, waited for the power and will of a single man to light a spark, waited for the boy who grew up on the south side of Port Huron, waited until Jim Acheson made a decision whose impact he surely couldn't have imagined or predicted.

And make no mistake; money certainly does play a major role. It makes a lot of things possible. In the early part of this century, Dr. Acheson spent millions of dollars to purchase the land you sit or stand on today; millions to clear away the remnants of the railroads and scrap yards and cement plants.

But, in 2009, he had his team at Acheson Ventures approach the Community Foundation of St. Clair County with a daunting proposal. He asked us to consider taking over the care and restoration of almost one mile of shoreline. His team had come to the point when they knew that money alone would not rally the public and private sectors to finish this restoration. He offered to donate the entire shoreline to the Community Foundation.

When the Board of the Community Foundation finally agreed to accept the gift, we had no real money to start work. We hadn't yet asked any donors for help. We hadn't approached any state or federal agency for support. We literally didn't have a single dollar set aside for this project. But, we had something more important than money, something more valuable. We had hope and desire and passion. We believed in a vision. We believed in the power of the human spirit and we found new friends.

Blue Water River Walk Grand Opening Speech Transcript *Cont.*

Our first federal partner was the United States Fish and Wildlife Service, who gave us $250,000 for our pilot phase. Then we went to the National Oceanic and Atmospheric Administration and the Great Lakes Restoration Initiative, and we told NOAA we needed another $2.1 million to finish the restoration component. NOAA said "No," our first rejection. "We can't give you $2.1 million," they said. "But we can give you $2 million."

Then the Michigan Department of Transportation offered us a challenge grant to build our trail and our first corporate partner, Michigan Mutual, came on board. Then Dr. Nasr, and the Kusch's, and the Samman's, then more donors, big and small, joined in until we had enough to build the trail. Then our St. Clair County Parks and Recreation Commission said they would join us and take the lead in building a brand-new county wetlands park on the southern end of our property. Then DTE said we'll help you remove those old utility poles.

And, at some point down the road, we knew we wanted to restore and re-open this beautiful old railroad ferry dock, but we didn't have any money. Then Catherine Houghton, Mino Duffy Kramer, Robert and Linda Smith, Clinton and Barbara Stimpson, and other donors came to us and said, "Let's not wait, let's do it now."

We knew we wanted permanent pieces of public art along our shoreline and our donors and our Blue Water Arts Committee said, "Let's not wait," and then something magical happened. The mighty St. Clair River smiled, and this majestic stretch of shoreline re-awakened.

We are here to give thanks to the majestic blue waters of the mighty St. Clair River. We are here to thank her for centuries of service dedicated to the prosperity of mankind. We are here to return a long overdue favor. We are here to celebrate the power of the human spirit, of belief, of perseverance. This treasured natural asset is now ready to continue her support of our economic growth and prosperity, but, in a new way, in the "Blue Economy" way, in tourism, recreation, boating, placemaking, and quality of life.

Dan Welihan

Links to Learning More

Michigan's Office of the Governor –
www.michigan.gov/snyder

Michigan's Office of the Great Lakes –
www.michigan.gov/deq/0,4561,7-135-3306_29338---,00.html

Thunder Bay National Marine Sanctuary –
thunderbay.noaa.gov/

Michigan's Area of Concern Program –
michigan.gov/deq/0,4561,7-135-3313_3677_15430---,00.html

Michigan's Coastal Zone Management Program –
www.michigan.gov/deq/0,1607,7-135-3313_3677_3696---,00.html

Urban and Regional Planning Program, University of Michigan –
secure.rackham.umich.edu/academic_information/program_details/urban_and_regional_planning/

Great Lakes Research Center, Michigan Technological University –
www.mtu.edu/greatlakes/

Great Lakes Water Levels –
http://www.glerl.noaa.gov/data/now/wlevels/levels.html
http://www.lre.usace.army.mil/Missions/GreatLakesInformation/GreatLakesWaterLevels.aspx
http://www.ijc.org/en_/Great_Lakes_Water_Quantity

Michigan Department of Community Health, Eat Safe Fish –
www.michigan.gov/eatsafefish

Alliance of Rouge Communities –
www.allianceofrougecommunities.com/

LIAA –
www.liaa.org/

University Research Corridor –
urcmich.org/

Ross School of Business, University of Michigan –
michiganross.umich.edu/

Blueways of St. Clair –
www.bluewaysofstclair.org/

Great Lakes Literacy –
www.miseagrant.umich.edu/explore/about-the-great-lakes/

Department of Community Sustainability, Michigan State University –
www.csus.msu.edu/

City of Muskegon and Muskegon Lake Watershed Partnership –
http://www.muskegon-mi.gov/
http://muskegonlake.org/

Community Foundation of St. Clair County, Blue Water River Walk –
www.stclairfoundation.org/riverwalk


Department of
Environmental Quality
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