

Report on the Lake Huron Restoration Regional Meetings *Alpena, Bay City, Port Huron, and Sault Ste. Marie, Michigan*

Keystone Policy Center



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Table of Contents

Introduction	3
Keystone Policy Center	3
Regional Meeting Outcomes	3
Participants	4
Background	4
Themes from Assessment Interviews	4
Section I: Updates on Great Lakes Water Quality Agreement and Lakewide Action Management Plan	6
Section II: Lake Huron Lakewide Action and Management Plan Process and Roadmap	8
Section III: Lake Huron Projects	9
Bay City, Michigan	9
Port Huron, Michigan	13
Alpena, Michigan	17
Sault Ste. Marie, Michigan	22
Section IV: Collaboration and leveraging efforts	25
Section V: Continued Engagement	26
Section VI: Conclusion	
Appendix A: Sample Agenda	29
Appendix B: Participant List	
Appendix C: Presentations	32
Multi-Meeting Presentations	32
Keystone Policy Center Presentation	32
Lakewide Restoration Plans	41
Great Lakes Coordination Program	51
Lake Huron and the Great Lakes Water Quality Agreement	60
The Lake Huron Lakewide Action and Management Plan	79
Bay City, Michigan – April 7, 2015	94
Coastal Natural Communities at Risk and Invasive Plants	94
Saginaw Bay Spawning Reefs; Pre-Restoration Assessment	118
Northern Saginaw Bay Restoration Initiative	127
Saginaw Bay Coastal Initiative (SBCI) Accomplishments 2006-2015	140
Monitoring and Assessment of Preyfish in Lake Huron	152
Michigan Sea Grant: Healthy Coastal Systems, Lake Huron	159
Port Huron, Michigan – May 12, 2015	181
Michigan Sea Grant: Healthy Coastal Ecosystems, Lake Huron	
Blue Water River Walk	
Saginaw Bay Optimization Decision Tool	
Alpena, Michigan – May 14, 2015	
Saginaw Bay Watershed Coordinated Monitoring and Research	
Great Lakes Coastal Wetland Monitoring for Protection and Restoration	257
Saginaw Bay Spawning Reefs; Pre-Restoration Assessment	
Our National Marine Sanctuaries	299
2012 CSMI Nearshore Fisheries Thunder Bay: Effects of Nutrient Rerouting on Fish Communities	
Northeast Michigan Restoration Projects	
Sault Ste. Marie, Michigan – May 27, 2015	
Planning for Watershed Restoration in the "Twin Soo's"	401

Introduction

Keystone Policy Center, in coordination with the U.S. Environmental Protection Agency and Michigan Department of Environmental Quality conducted four, one-day regional meetings in Michigan during spring 2015 to discuss restoration progress in the U.S. Lake Huron basin and to present plans for developing the Lake Huron Lakewide Action and Management Plan (LAMP) under the newly updated U.S.-Canadian Great Lakes Water Quality Agreement.

The meetings were an opportunity for Lake Huron restoration stakeholders to report on their organization's restoration activities over the last five years, share successes and lessons learned, discuss challenges, and help inform the development of the binational Lake Huron LAMP. The meetings were open to the public and intended to be of particular interest to those implementing U.S. Lake Huron restoration projects, supporting Lake Huron restoration activities, as well as local agencies and organizations interested in incorporating restoration projects into their work. See Appendix A for a sample agenda.

The four meetings, held in Bay City, Port Huron, Alpena, and Sault Ste. Marie, Michigan, were organized by the Keystone Policy Center, (www.keystone.org), an independent facilitation organization with more than four decades of experience providing collaborative services in environment and resource management arenas, in partnership with MDEQ's Office of the Great Lakes and the EPA's Great Lakes National Program Office. The meetings were funded by a grant from the EPA under the Great Lakes Restoration Initiative.

The Great Lakes Restoration Initiative (GLRI) was launched in 2010 to accelerate efforts to protect and restore the largest system of fresh surface water in the world, the Great Lakes. The GLRI builds on prior efforts of federal, state, and local entities; Indian tribes; businesses; public interest groups; interested citizens; and others to develop a collaborative and comprehensive approach to restoring the Great Lakes. Keystone Policy Center was awarded a GLRI grant to enhance stakeholder engagement in Lake Huron restoration.

Regional Meeting Outcomes

- Information exchange among those implementing and supporting U.S. Lake Huron restoration projects.
- Increased awareness of the nature and extent of restoration activities occurring in the Lake Huron basin and of opportunities for collaboration.
- Update on the process and timeline for Lake Huron's LAMP.
- Information from MDEQ regarding public/private partnerships and how to best get involved.

Keystone Policy Center

Keystone Policy Center brings together crucial teams of stakeholders who have diverse individual perspectives but recognize a common need to address urgent issues with lasting solutions. For more than 40 years, Keystone has helped leaders move beyond fixed positions toward collaborative, actionoriented approaches to problem-solving.

In an age of polarized debate on nearly every major topic in public policy, Keystone Policy Center offers a refreshing yet proven blueprint for progress. In more than four decades of designing effective conflict management strategies for complex, contentious issues, Keystone has built a portfolio of substantive work in energy, environment, education, health, and agriculture.

This report is prepared and issued by Keystone Policy Center to recap the information shared and summarize the discussions of the four meetings.

Participants

Participants in the regional meetings included individuals from a variety of organizations, including local, state, federal, and binational agencies; Indian tribes; universities; environmental NGOs; conservation districts; citizens advisory committees; community foundations; and interested citizens. See Appendix B for a list of participants.

Background

During the first phase of an EPA GLRI grant awarded under the category, *Facilitation of Lakenide Action and Management Plan Stakeholder fora*, Keystone conducted an assessment to learn about the nature and type of GLRIfunded and other restoration activity on the U.S. side of Lake Huron. The assessment was intended to inform the design and implementation of subsequent phases of Keystone's work with an overall focus of enhancing stakeholder engagement in Lake Huron LAMP priorities and activities. The assessment was conducted primarily via interviews with project implementers and had the following objectives:

- Explore options to leverage and raise the profile of existing efforts, including opportunities for networking, collaboration and information sharing.
- Discuss areas where potential future funding opportunities could help amplify existing efforts.
- Gather perspectives on the potential value-add that the development of a Lake Huron lakewide forum could play in fortifying the collective impact of Lake Huron restoration efforts going forward.

To gain insights about these three broad topics of inquiry from those implementing restoration projects, Keystone interviewed a cross section of grantees representing various organization types, regions on the Michigan side of Lake Huron, project focal areas, and funding levels. Information gained from their perspectives and experiences are summarized below.

Themes from Assessment Interviews

Interviewees had an array of suggestions that could serve to strengthen connections and amplify the efforts of government, civil society and private sector to restore the health of Lake Huron. The suggestions, summarized below, cover a range of topics, from capitalizing on learnings from projects, to bolstering the effectiveness and impact of work, to alignment and collaboration.

- Tell the good story and outcomes of both GLRI-funded projects and others working to restore Lake Huron, including lessons learned, technical information, data, best management practices, and methodologies. The good story from these efforts can and should include outcomes beyond ecological restoration if applicable.
- Create a venue/forum to exchange information, track, and monitor emerging threats and issues.
- Create a venue/forum for collective knowledge that supports enhancing projects and leveraging resources, such as grant resources, public/private partnerships, and other ways to amplify efforts based on lessons learned.
- Share How To's, such as fundamentals of public awareness campaigns, training delivery, volunteer recruitment, and grant administrative requirements (i.e. Quality Assurance Program, reporting, etc.).
- Provide grantees an understanding of strategic priorities and maximize opportunities to hear what local priorities are.
- Strengthen relationships between individuals and organizations working on Lake Huron to increase communication/coordination across resources and focal areas (such as across fisheries, wildlife, and bird projects) and across user and interest communities (such as sport fishing/recreation user groups and habitat/environmental groups).

During the intervening period from project award to completion of the assessment, EPA and Environment Canada concluded their discussions regarding the status of binational "forums" that were established prior to the recent

updates to the Great Lakes Water Quality Agreement between the United States and Canada. EPA and Environment Canada determined that formal binational consultation for the LAMP program would transition to government-led consultations. Accordingly, EPA funds would no longer be used to support binational forums. (Canada had already ceased funding the binational forums.) However, EPA's desire to increase the level of engagement and diversity of U.S. stakeholder participation remained unchanged. Keystone revised its plans accordingly and conducted the four domestic regional meetings as opportunities for U.S. stakeholders to report on their organizations' restoration activities over the last five years, share successes and lessons learned, discuss challenges, and learn about the developing plans for the binational Lake Huron LAMP.

Section I: Updates on Great Lakes Water Quality Agreement and Lakewide Action Management Plan

James Schardt (EPA Great Lakes National Program Office) and Bretton Joldersma (Michigan Office of the Great Lakes)

Mr. Schardt presented on the updated Great Lakes Water Quality Agreement as well as Lakewide Action and Management Plans (LAMPs). These meetings are a part of the initiation of planning for Lake Huron under the updated water quality agreement. Both the United States and Canada have a shared interest in working together to manage and protect the lake. Lake management occurs at all levels on both sides of the border; from federal and state agencies, non-governmental organizations, tribes, and the citizenry. He spoke to the similarities of the lake in Canada and the United States and the Binational Water Quality agreement's aim, "to restore and maintain the chemical, physical, and biological integrity of the Waters of the Great Lakes." James also discussed the three-year cycle of adaptive management that they employ that involves priority setting followed by implementation of work followed by reporting and assessment.

Mr. Joldersma next discussed the LAMPs that are required under the Water Quality agreement and the growing pressure — hence the need to balance interests — surrounding water resources. The management plans are developed in cooperation with state, federal and local partners and are necessary to protect the water resources that drive the state and local economies. The binational agreement is non-regulatory, although accountability, utilizing lessons learned from other lakes as well as coordination and cooperation are all central themes.



Photo Courtesy of Keystone Policy Center

Mr. Joldersma continued by discussing the role Michigan plays with regard to the Great Lakes Water Quality Agreement and LAMPs. Mr. Joldersma began by stressing the importance the Great Lakes have on global, state, and local economies as well as the inherent value to the people of Michigan. Bretton then discussed the importance of the LAMP for the State of Michigan and how the LAMP, partnerships and the community at-large will be part of the framework that works to protect Lake Huron.

Session I concluded with a discussion period including:

- What does Lakewide refer to?
 - Lakewide refers to the basin of Lake Huron as well as preventative work in the many watersheds of Lake Huron.
- Will the Saint Marys River be included in the Lake Huron LAMP?
 Yes, the Saint Marys River is included in the LAMP.
- How does this meeting fit into the three-year cycle?
 - This meeting is helping raise awareness about the Lake Huron partnership and the LAMP on the U.S. side. The LAMP for each Lake operates on a five-year cycle. The overall agreement is managed on a three-year cycle. In the fall of 2016, the overall three-year cycle will end and there will be a major

binational meeting called "the Great Lakes Public Forum" that will include updates on the state of the Great Lakes, reporting out on progress by the governments, and will then begin the next cycle by setting priorities for the next three years.

- Why is there not currently a LAMP for Lake Huron?
 - There has not previously been a LAMP on Lake Huron due to a good working relationship between the United States, Canada, and Michigan under the Lake Huron Binational Partnership.
- How advanced are the discussions on engaging the communities and the public?
 - We are now trying to engage the restoration community through these regional meetings. There also will be a state-of the-lake conference this fall that will discuss research and science.
- To what degree will the final plan shape the "on-the-ground" management actions? Will it include recommendations or will it be more significant?
 - The LAMP will help determine where there are shared needs or concerns and help determine where the broader group should be moving. It will also help direct how the United States should be working with Canada to support a healthy lake. The LAMP is more at the strategic level but could highlight projects or locations requiring attention.
- Comment: An example of a binational group working well together is the St. Clair River Area Advisory Council.
- What changed to make the LAMP for Lake Huron a reality?
 - Basically, time. For many years lakewide coordination was fulfilled by the Lake Huron Binational Partnership program. Under the updated agreement, there is a recognition that a LAMP is needed for Lake Huron.
- There was a concern voiced about a nuclear power plant 75 miles away and their plan for a nuclear repository near the shores of Lake Huron: There is broad concern about the plant. It is going through a large consultation process and the public needs to participate in the comment period.
 - The U.S. federal government has limited direct power over the plans for this facility since it is within Canada's jurisdiction. U.S. federal agencies did actively participate in the Canadian consultation process. It is important that those who have opinions about the plans participate in the formal consultation process so that their comments can be considered by the Canadian government.
- What organizations in Canada will be involved in the LAMP?
 - Principally Environment Canada and the Ontario province; however, there is a role for many other groups including federal agencies, local governments, stakeholders and the public. Basically the same types of organizations as on the U.S. side.

Section II: Lake Huron Lakewide Action and Management Plan Process and Roadmap

James Schardt (EPA Great Lakes National Program Office)

Mr. Schardt reviewed the background and requirements of the Lake Huron Lakewide Action and Management Plan (LAMP) under the updated Water Quality Agreement. This session began with an overview of the 2012 Agreements' Annex 2 and Annex 10, which define the LAMP and the Cooperative Science and Monitoring Initiative (CSMI) respectively and the process to move them forward in the upcoming months. He explained that the Lake Huron LAMP process is being kicked-off with these four Lake Huron Restoration Regional meetings and that in the fall of 2015 there will be a binational meeting to discuss the state of the lake and information gaps which could be filled through binational coordination and monitoring. The LAMP looks at the state of the science and then sets up a plan that takes an ecosystem approach to protecting water quality. This ecosystem approach will most likely continue to contain strategies to manage chemicals, nutrients, habitats, and species and will be completed by the end of 2016. The plan will also continue the implementation of projects supporting the Lake Huron Biodiversity Conservation Strategy.

Mr. Schardt also discussed the five-year lake management cycle which includes:

- Year 1, 2017: Implementation of binational "Action Priorities" and monitoring field year to address "Science Priorities."
- Year 2 & 3, 2018 & 2019: Continued implementation of activities by lake partnership, tracking progress on individual projects.
- Year 4, 2020: Assess cumulative binational progress.
- Year 5, 2021: Refinement of binational plan.
- 2022-2027: Next five-year lake management cycle.

Questions and comments regarding the Lake Huron LAMP process and roadmap include:

- Once the LAMP is developed, will there be a public feedback period?
 - We are not yet completely sure what it will look like, but the Lake Superior LAMP process is currently working on its LAMP document and we will monitor how that process works. The fall state-of-the-lake meeting is a time to provide feedback on the health of Lake Huron.
- How do we keep continuity and consistency between the Cooperative Science and Monitoring field years regarding funding?
 We treat every field-year as new. Funding in a field year depends on the current science priorities.
- Comment: Many groups maintain long-term data sets, but as people leave, the momentum behind the data disappears. We need to incentivize groups to maintain certain data sets.
 - This is why the LAMP is important. It shows the importance of data and helps participants fit their work within the priorities. The LAMP will show the importance of the work and it will be documented in the five-year plan.
- Comment: All meetings with the lakes could be more about consensus on what data sets are important. This could also lead to us thinking differently about contaminants and measurements.
- Comment: There was a meeting on Lake Michigan involving agencies and universities which provided a forum to talk about the data sets and to discuss what is out there and pitch why we need continuous data.
- What role does the International Joint Commission play?
 - The International Joint Commission has a responsibility to provide independent advice to the two governments on the implementation of activities under the Agreement.

Section III: Lake Huron Projects

Participants at each of the four meetings reported on their restoration activities. Some were formal presentations and others were a verbal description of the restoration work they are undertaking, including successes, lessons learned, challenges, and opportunities. Summary descriptions of the activities reported at each of the four meetings follow. (Where relevant, the slideshows accompanying individuals' presentations can be found in Appendix C or by clicking on their names in the digital copies of this report.)

Bay City, Michigan, April 7, 2015

Mary Anne Evans - U.S. Geological Survey

This two-year project's goal is to synthesize existing knowledge to better understand ecological stressors on Great Lakes' bays and specifically Saginaw Bay. The project is a partnership between the United States Geological Survey (USGS) and MDEQ and is completing a statistical analysis to set a baseline that can inform reasonable expectations of impacts of restoration activities, inform comparisons across Great Lake bays and inform the trade-off decisions that can help set restoration priorities.



Photo Courtesy of Keystone Policy Center

Project staff established a baseline by looking at monitoring data from 100 bays and catalogued attributes to determine predictors of bay health. Their current focus is on water quality and they created nutrient and stressor response curves as well as a hypothetical bay based on statistics and attributes to create a baseline. Another overarching goal is to create a database with a user-friendly interface that includes response curves. For more information on the U.S. Geological Survey please visit: www.usgs.gov.

Phyllis Higman - Michigan Natural Features Inventory

The Michigan Natural Features Inventory is a grant-funded program that manages a comprehensive database on Michigan's vulnerable elements of biodiversity and tracks plants, animals and natural communities within Michigan. Their goal is to conserve native biodiversity, protect and restore natural communities, and maintain a reference system to learn from. Ms. Higman discussed several critically vulnerable natural communities occurring in Saginaw Bay, including Great Lakes marsh, interdunal wetland, lakeplain wet and wet-mesic prairie, lakeplain oak opening and wooded dune and swale. She identified ongoing and emerging threats to these communities and the urgency of addressing them. Saginaw Bay harbors some of the last remaining and most vulnerable lakeplain natural communities in the state, which are home to several federal and state endangered and threatened species.

She is actively involved in strategic planning and early detection for invasive species which includes the Midwest Invasive Species Information Network (MISIN). MISIN is a regional effort to develop and provide an early detection and rapid response (EDRR) resource for invasive species. Four invasive species of particular concern and in need of early detection response are water Hyacinth, Water Lettuce, Parrot feather, and European Frog-Bit. She is interested in working with local partners to develop innovative and strategic landscape-scale solutions for protecting and restoring the vulnerable natural communities in the Bay. Please report any observations of the invasive species to Ms. Higman and keep MNFI and MISIN in mind for future collaboration and coordination. For more information regarding Michigan Natural Features Inventory please visit: http://mnfi.anr.msu.edu.

Mike Jury - Michigan Department of Environmental Quality

The purpose of the Saginaw Reef Restoration Project is to complete a pre-restoration assessment of the Saginaw Bay fishery that includes a better understanding of the fish that are spawning in the Bay, the seasonal timing of that spawning, as well as the siting of artificial reefs that are less susceptible to sedimentation. The goal is to increase biodiversity and improve fishing.

The issue is that walleye and whitefish fisheries were in decline due to agricultural activities (sediments deposited on the reefs) and the introduction of alewives that eat the eggs of these fish. Fisheries have started to recover since the crash of the alewife population. However, past studies have shown that critical fish spawning is primarily occurring in the tributaries of the Saginaw River system. Restoring rock reefs within the inner Bay will help to diversify spawning habitat, fish populations, and contribute to a more stable and resilient Saginaw Bay fishery.

Partners on the project have been very important and include, Michigan Sea Grant, Bay County, USGS, MDEQ, Michigan Department of Natural Resources (MDNR), LimnoTech, Perdue University, and the U.S. Fish and Wildlife Service (USFWS).

The project is expected to be completed by spring 2016 and the project website is now live. Thus far they have completed fish counts, models of sedimentation distribution and transport and have found evidence that lake whitefish are using reefs for spawning. The artificial reefs that will be constructed are comprised of local gravel with dimensions of up to an acre in surface area and three feet in depth. More information can be found at: www.michigan.gov/deq.

The specific goals and anticipated outcomes of the project are as follows:

- Determine habitat suitability of remnant outer bay and proposed inner bay reef sites by assessing substrate conditions, water quality and potential egg predators.
- Evaluate reproductive usage by adult fish during both the spring and fall spawning periods.
- Assess the genetic and phenotypic characteristics of the Saginaw Bay walleye and lake whitefish populations.
- Develop and execute a plan to engage local stakeholders in Saginaw Bay reef restoration.

Josh Leisen – Huron Pines

To be successful for large scale restoration there is a need to bring in the right partners, and it often takes many partners.

> — Bay City, Michigan, Meeting Participant

Mr. Leisen explained that Huron Pines is a nonprofit organization whose mission is to conserve the forests, lakes, and streams of Northeast Michigan. The Northern Saginaw Bay Restoration Initiative is a program of Huron Pines and is a comprehensive effort to improve water quality, enhance wildlife habitat, and strengthen local communities. They accomplish this through a variety of projects and programs in cooperation and with funding assistance from the National Fish and Wildlife Foundation, Saginaw Bay Watershed Initiative Network, USFWS, Great Lakes Fisheries Trust, Michigan DNR, Great Lakes Restoration Initiative, and many others.

The Northern Saginaw Bay Restoration Initiative began with a project to update the Rifle River Watershed Management Plan, host public watershed planning meetings, and complete comprehensive natural resource inventories. They have also been working to restore and reconnect aquatic habitat by replacing perched, undersized, and misaligned road stream crossing structures with properly sized arch culverts or bridges that allow adequate passage for fish, flood water, woody debris, and sediment through the river system. Huron Pines and partners have also helped reduce non-point source pollution loads through streambank stabilization; implementation of agricultural BMPs; and by implementing stormwater best management practices. They often engage with homeowners in costsharing restoration, especially regarding streambank stabilization and invasive species removal.

Huron Pines also has a robust outreach and education program and engages resource users through interpretive signs, outreach to schools, engaging with local businesses as well as targeted mailings, newspaper ads, booths at fairs, and radio ads. For more information regarding Huron Pines please visit: www.huronpines.org.

Laura Ogar - Bay County Environmental Affairs & Community Development

Ms. Ogar explained that the Saginaw Bay Coastal Initiative (SBCI) is a group of interested people, businesses, and local governments in the Bayfront communities of Arenac, Bay, Huron, Iosco, Midland, Saginaw, and Tuscola, collaborating with state and federal agencies for actions to improve the Saginaw Bay. This includes county commissioners and other elected officials, chambers of commerce, cities and townships, property owners, businesses, convention and tourism groups, and others who foster priority setting of environmental problems that affect local economies. They largely work on increasing access to the Saginaw Bay, shoreline quality issues (Phragmites treatment, beach improvements, muck removal), water quality, and sedimentation issues utilizing a topical working group structure. Laura shared the following SCBI highlights:

- The Habitat Workgroup Worked to ensure that restoration of the historic fish spawning reefs in the Saginaw Bay was included in Great Lakes Restoration activities and received a GLRI grant for the Phase 1 Pre-Restoration Assessment.
- The Phosphorus Workgroup drove local acceptance for a ban on (unnecessary use) of phosphorus on lawns around the Bay, worked to pass state law, and muck removal and demonstrations.
- The Combined Sewage Overflow (CSO) workgroup. Combined sewer systems are part of historical upgrades constructed to protect lakes and river systems; there has been more than \$700 million improvements in wastewater treatment updates, including retention treatment basins (RTB) and phosphorus removal. In the Saginaw River, no untreated sewage discharges occur during a CSO event. All CSO discharges receive primary and secondary (bacteriological) treatment. SCBI worked to modify the MDEQ reporting form to recognize RTBs.
- The Septic workgroup worked with coastal area health departments on a draft regional septic code and launched the Bay County Septic Revolving Loan Fund.
- The Tourism workgroup focused on marketing and quality of life; created the MiGreatBay website, Saginaw Bay BlueWays Trail map, and kayaking and canoe launch sites.

More information can be found at: www.baycounty-mi.gov/eacd.

Ed Roseman – U.S. Geological Survey, Great Lakes Science Center

Mr. Roseman explained that this program provides long-term monitoring and assessment of preyfish in Lake Huron in order to provide data and information to all stakeholders. The USGS has partnered with MDNR, Michigan Sea Grant, Ontario Ministry of Natural Resources and Fisheries, MNRF, Chippewa Ottawa Resource Authority (CORA), and the Great Lakes Fisheries Commission (GLFC). This project includes collecting data on size, abundance and distribution of important preyfish species that are used to detect changes and trends over time. They utilized two data collection methods; a lakewide acoustic survey for pelagic fish as well as a bottom trawls survey for benthic fish.

An annual report of survey results is available. Recent results show there has been a general downward trend in lakewide biomass, a recent resurgence of Bloater Chubs as well as a resurgence of walleye and lake trout coincident with the collapse of the alewives. Lessons learned include the value of collaboration with multiple partners in a transparent process and the value of long-term monitoring to identify ecosystem-scale changes on both sides of the border.

Other collaborators are welcome and encouraged. There is a need for data sharing and analysis, special sample collections and additional outreach and communications. Pictures and other project information can be found at www.glsc.usgs.gov.

Brandon Schroeder – Michigan Sea Grant

Mr. Schroeder provided a summary of the numerous and wide-ranging projects and programs of Michigan Sea Grant. Michigan Sea Grant helps translate the science and research to the community through educational resources, websites, fact sheets, posters, books, and maps. They also support the scientists and studies by providing outreach services and materials. They work in a number of arenas including, water stewardship, biodiversity conservation, fisheries habitat, citizen science, and youth as habitat conservation partners.

Michigan Sea Grant conducts applied research and data collection that addresses a variety of water stewardship and biodiversity issues including Saginaw Bay muck issues, beach quality, and threatened and endangered as well as invasive species issues. They facilitate various watershed projects working together across watershed boundaries. They also conduct a youth water stewardship program and partnered to convene an annual Regional Youth Watershed Summit. This also relates to their fisheries habitat work and other citizen science initiatives. Michigan Sea Grant studies the state of the fishery and is involved in the preyfish assessment described above. They facilitate citizens collecting water quality data including the presence of microplastics and they keep a water quality database called Great Lakes FieldScope.

Michigan Sea Grant engages the community in science as well as priority and goal setting. More information can be found at: www.miseagrant.umich.edu.

Ruth Shaffer - USDA, Natural Resource Conservation Service

Ms. Shaffer explained that the NRCS has a presence in almost every county in the state and that they are the boots on the ground for providing farmers and ranchers financial and technical assistance to voluntarily install conservation practices on their land. They receive funding through GLRI and leverage that funding for existing programs. The Michigan Agribusiness program provides continuing education to crop advisors. The Agricultural Conservation Easement Program (ACEP) provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits. Ms. Shaffer also discussed a nutrient reduction project in which they are partnered with USGS to install cover crops and reduce nutrient runoff into Saginaw Bay. For more information please visit: www.nrcs.usda.gov/wps/portal/nrcs/site/mi/home.

Sara McDonnell - University of Michigan Flint

Ms. McDonnell spoke to the University of Michigan Flint's education and outreach work. The University has completed a Watershed Management Plan for the Cass River, and takes part in the Cass River Watershed Committee that works to implement streambank stabilization on the River. They also facilitate citizen science and environmental monitoring aimed at reducing phosphorous run-off in the Kawkawlin River Watershed. For more information regarding the University of Michigan Flint please visit: www.umflint.edu.

Jim Galloway – Army Corps of Engineers

Mr. Galloway described the Corps construction and engineering focus and the work that they have completed under GLRI or with GLRI partners. Most of the Corps funding comes to them with a directive to complete a particular project and they therefore have little discretionary funds to direct toward restoration. They maintain Corps facilities that relate to navigation including running the locks and dredging. GLRI funds have been vital for their work on fish passages, technical assistance to Areas of Concern (AOCs), Sea Lamprey control, and reducing sedimentation to

Saginaw Bay. More information regarding the Army Corps of Engineers Great Lakes and Ohio River Division can be found at: www.lrd.usace.army.mil.

Tim Payne - MDNR, Wildlife Office, Lower Peninsula Region, Southeastern

Mr. Payne and his colleagues at the MDNR, Wildlife Office, work in concert with the USFWS and is very involved in land management. His region contains quite a bit of coastal wetlands and they utilize GLRI funding in their work to enhance wildlife values by creating, maintaining, and restoring these wetlands. They also have a dedicated program for managing Phragmites. For more information regarding the MDNR, Wildlife office please visit: www.michigan.gov/dnr/0,4570,7-153-10370---,00.html.

Port Huron, Michigan, May 12, 2015

Randy Maiers - Community Foundation of St. Clair County

The Community Foundation of St. Clair County was formed in 1944 and has been dedicated to building community capital through strategic application of philanthropic funds and the passion, dedication, and talents of county residents. The Community Foundation of St. Clair was gifted a mile of dismantled shoreline that had experienced more than 100 years of abuse and neglect. The foundation developed a master plan and in the process gifted the southern section of the shoreline to the County Parks, and in turn, the County Parks purchased an additional adjoining 2.75 acres of land to complete the region's first wetlands park. For the rest of the land, the foundation set the following guiding principles in order to complete the restoration activities: i) protect and preserve the shoreline; ii) ensure it is available to the public and is visitor friendly; and iii) never allow it to return to a private or restricted area.



Photo Courtesy of Keystone Policy Center

The foundation, in coordination with the community, has spent approximately four years working to restore the shoreline by including a walking path, an outdoor classroom, building reefs, adding access points to the water, and adding outdoor art to the river walk. Mr. Maiers mentioned that the greatest lessons learned by his organization throughout the project include the need for an anchor organization with the capacity to take on the long-term obligations, financial management, and personnel needed to complete the project.

Mr. Maiers described how they broke down the total bill for the project, projected at \$12 million, into smaller project-by-project chunks to make the funding more manageable. The St. Clair Foundation felt that when the community could get behind a piece of the project it would allow momentum to grow as the pieces came together. He emphasized that the project needed to be more than just habitat

restoration in order to get broad community support. The community needed to buy into the project to ensure that degradation did not happen again.

Next steps for the foundation include educating the public on how to leave parts of an estate in a will, increased community ownership of the project, and increase the funding of the endowment to ensure a lifetime of maintaining the river walk. More information about the Community Foundation of St. Clair County can be found at: www.stclairfoundation.org.

Katy Hintzen - Michigan Sea Grant

Michigan Sea Grant is an organization that is modeled after the land grant system with the mission of supporting research, outreach and education to enhance sustainable use of Great Lakes resources, benefiting quality of life, and the Michigan, Great Lakes, and national economies. Michigan Sea Grant works to supply education and outreach resources as well as fund university-based research such as integrated assessment projects, and improve awareness of coastal storm hazards, stormwater runoff, and risk reduction strategies. Several resources are publically available online at the Michigan Sea Grant Book Store.

Ms. Hintzen addressed the spawning reef assessment and restoration work in Lake Huron that they are working to accomplish. She then discussed the coastal storm hazards project in more depth, speaking to the timeframe of the project and the planning process. This planning process is comprised of talking to experts, communities, and decision makers to understand the base knowledge and needs of communities. Moving forward, Michigan Sea Grant will convene a steering committee to guide the process and the development of tools. For more information about Michigan Sea Grant please visit www.miseagrant.umich.edu.

Doug Pearsall - The Nature Conservancy

Mr. Pearsall explained that the Nature Conservancy's goal in Michigan is to protect and restore the natural systems and places critical to the well-being of nature and people in Michigan, and throughout the Great Lakes region, for generations to come. Mr. Pearsall then discussed the project between TNC, Saginaw Valley State University, and LimnoTech, that is aimed at improving ecological and socioeconomic values in Saginaw Bay and its watershed. This project involved developing an Optimization Decision Model, combining coupled watershed and bay models with stakeholder values, which was employed to address the following questions:

- 1) Where should agricultural BMPs be implemented to achieve ecological and socioeconomic goals?
- 2) How does conservation benefit people?
- 3) How should those benefits influence where we implement conservation?

The goals of the project include:

- 1) Strengthen the relationships and communications between Saginaw Bay Stakeholders
- 2) Share priorities for optimal BMP implementation
- 3) Increase the likelihood that producers will participate in MAEAP to meet shared ecological and socioeconomic goals

Mr. Pearsall discussed the key points of the project such as linking watershed actions to response in specific parts of the bay and how to best achieve goals of ecological and socioeconomic values.

Finally, Mr. Pearsall said that hearing challenges and concerns from the community around compatibility of socioeconomic and economic goals can help inform the approach the group takes. This front-end outreach also encourages increased participation from landowners and can help highlight areas that need additional education, local input, and tools. The project team is on schedule to wrap up their work by the end of 2015. More information about The Nature Conservancy can be found at www.nature.org.

Mark Brochu - St. Clair County Parks

Mr. Brochu gave a presentation on the restoration of a brownfield site in St. Clair County that has been transformed into a wetland. The project has run into more difficulties than expected due to the large amount of contamination. Due to this contamination, there is a required eight-inch clay liner. Moreover, additional testing in other areas where possible mitigation should occur had to occur before any mitigation-activities could occur. Another aspect that made

this challenging was the fact that this land is in a migratory flyway which the county takes into account in the planning and implementation process.

The County has diverted stormwater from a direct deposit into the river, to the wetland as a source of water and since the start of the project, they have seen species arrive. The county will continue to monitor the wetlands, the quality of the stormwater, and the vegetation and invasive species. The Parks Department has an MOU with the city to shut off the stormwater flow if it is harming the wetland, and the county hopes that eventually other groups will take on monitoring invasive species and other aspects of the wetland health. The construction of the wetland was funded by a \$1,039,500 National Fish and Wildlife Foundation grant that paid for the professional services and construction costs.

The St. Claire County Parks and Recreation Commission operates six parks throughout St. Clair County as well as works in partnership with several other local groups that provide programming within the St. Clair County Parks System. For more information about the St. Clair County Parks can be found at www.stclaircounty.org/office/parks.

Sherri Faust - Friends of the St. Clair River

The Friends of the St. Clair River are involved with 10 fish and wildlife habitat restoration projects along the St. Clair River shoreline. Ms. Faust mentioned that removing several beneficial use impairments for the St. Clair River Area of Concern has been one of the more successful high profile projects completed. For more information on the Friends of the St. Clair River please visit www.scriver.org.

Ruth Shaffer - USDA, National Resources Conservation Service

Ms. Shaffer gave a brief overview of NRCS's role in Lake Huron restoration projects similar to her presentation at the meeting in Bay City. NRCS partners with conservation districts funds incentive programs to implement restoration and conservation projects, runs a conservation easement program, and is part of a regional conservation partnership program with the goal of putting more boots on the ground to inform local communities. NRCS has a presence in almost every county in the state and they help provide farmers and ranchers with financial and technical assistance to voluntarily install conservation practices on their land. NRCS receives funding through GLRI and they leverage that funding to help accomplish existing projects. Ms. Shaffer also discussed NRCS involvement in purchasing the agricultural rights to easements and helps convert the easements into wetlands. NRCS maintains the easement of the property after the wetland is established. The goal of the project is to ensure the easement will remain as a wetland in perpetuity. Following Ms. Shaffer's presentation, a fellow participant asked who monitors the compliance on the long-term easements. Ms. Shaffer answered stating that NRCS has contractor

There is a need for a clearinghouse for all the data that is created, then we can use the data for other uses in addition to the question at hand.

> — Alpena, Michigan, Meeting Participant

agreements with private firms for some monitoring and other easements will be monitored by local field offices. For more information please visit: www.nrcs.usda.gov/wps/portal/nrcs/site/mi/home.

Cynthia Rachol - U.S. Geological Survey

Ms. Rachol spoke briefly on the work USGS is doing with monitoring stations and flow during heavy rain events with the goal of implementing BMPs for farmers and landowners. Monitoring station sites were chosen based on phosphorous loads, however, the USGS is looking at nutrients, sediment, and chloride for all samples. Concentration data is available to the public, but data that is specific to a farmer or landowner is not publicly available until USGS

and its partners have had a chance to discuss the data. Ms. Rachol mentioned that all implementation of BMPs will stem from the conservation district in the farmer/landowners geographical area. For more information about the USGS please visit www.usgs.gov.

Todd Wills - Michigan Department of Natural Resources

The Michigan Department of Natural Resources (MDNR) Alpena Fisheries Research Station in the upper northeast region of Michigan is continuing their work on a long-term fishery assessments in Lake Huron and is evaluating habitat projects in Thunder Bay and Saginaw Bay, Lake Huron. MDNR works on these projects with its state, federal, provincial, and academic partners. For more information regarding MDNR in Northeast Michigan please visit www.michigan.gov/dnr.

Matthew Child – International Joint Commission

The International Joint Commission (IJC) is a binational organization created by the Boundary Waters Treaty, signed by the United States and Canada in 1909. The IJC prevents and resolves disputes between the United States and Canada under the 1909 Boundary Waters Treaty and pursues the common good of both countries as an independent and objective advisor to the two governments. Under Annex 2 of the Great Lakes Water Quality Agreement, the IJC is assigned a role to provide "advice and recommendations" on each LAMP after it is issued. For more information on the IJC please visit www.ijc.org/en.



Photo Courtesy of Environmental Protection Agency, Great Lakes National Program Office

Kay Cumbow - Citizens for Alternatives to Chemical Contamination

Citizens for Alternatives to Chemical Contamination (CACC) is a grassroots environmental education and advocacy organization dedicated to the principles of social and environmental justice, pollution prevention, citizen empowerment, and protection of the great lakes ecosystem. Ms. Cumbow mentioned Citizens for Alternative to Chemical Contamination's concerns about the Bruce Nuclear Generating Station, the Western Waste Management Facility and the proposed permanent deep underground nuclear waste site, all on the shores of Lake Huron near Tiverton, Ontario — as well as the Blind River uranium refinery at the northern tip of the lake. CACC also has concerns regarding toxics and other pollution in Lake Huron, originating from Michigan.

CACC would like to see our communities put much greater efforts into sustainable energy (such as energy efficiency, wind, and solar) and sustainable lifestyles. CACC and their partners would like to stay involved and will likely participate in other meetings regarding the LAMP. They look forward to hearing more about science and implementation at the fall state of the lakes meeting. More information on CACC can be found at http://caccmi.org.

Alpena, Michigan, May 14, 2015

Andrea Ania - U.S. Fish and Wildlife Service

Ms. Ania presented on the four projects that USFWS has or will work on in the Lake Huron region involving multiple partners and communities. The first project (completed in 2009) provided funding for a fish passage project in which USFWS had partnered with MDNR to monitor the walleye passage through the rocks. The second project is the

Frankenmuth Rock Ramp Project in which USFWS is working with Central Michigan University and Michigan State University to start construction later in 2015. Ms. Ania mentioned that the goal is to provide fish passage to 73 miles of upstream habitat while retaining impoundment for riverboat and recreation and that the data monitoring meets the U.S. Army Corps of Engineers requirements.

The third project, completed in 2013, involved research to determine if fish transfer contaminants between aquatic and terrestrial communities. Finally, the fourth project that Ms. Ania highlighted, was the prioritization of dam removals within the Saginaw Bay watershed based on spawning walleye populations of Saginaw Bay. This project was completed in 2012 and partners included MDNR, Michigan State University, Central Michigan University, City of Frankenmuth, and the U.S. Army Corps of Engineers. Ms. Ania also mentioned other collaborative research and sampling projects, including effects of a rock-ramp structure on summer fish assemblages in the Shiawassee River and



Photo Courtesy of NASA

testing trophic guild classifications in temperate river fish communities using stable isotopes.

Challenges USFWS has experienced on these projects include low spring flow, access to the river, building and maintaining a structure versus dam removal, and challenges with certain fish species that need more space between rocks to move upstream. Also, USFWS managed unanticipated expectations from kayakers, who had hoped the structures would provide whitewater kayaking opportunities. Moreover, Ms. Ania mentioned lessons learned by USFWS including expect delays, build in more time to collect pre- and post- data, technology and good samples are needed, and collaboration is key because sampling can be used for multiple projects and partners can rely on each other's tools and knowledge. Future work for the USFWS in the region includes a publication on the survey of fish communities upstream of a dam prior to rock-ramp installation, a presentation at the American Fisheries Society and working with Central Michigan University on continued monitoring in the watershed of the fish passage program. More information can be found at: www.fws.gov.

Questions and comments following Ms. Ania's presentation include:

- Was there concern about the sea lamprey upstream of the dam?
 - The Sea Lamprey Control Program was consulted and involved in the planning process.

Matthew Cooper - Institute for Great Lakes Research, Central Michigan University

Mr. Cooper began his presentation by discussing the Great Lakes Coastal Wetlands Consortium formed in 2000. He then presented on the five-year work being led by Central Michigan University to sample and monitor more than 1,000 coastal wetlands with the goal of applying data to understand impacts on wetlands and help to prioritize and improve restoration projects. Mr. Cooper mentioned some groups who are doing restoration and conservation efforts that were being supported by the data collected, including the Michigan Department of Natural Resources, Ducks Unlimited, Minnesota Pollution Control Agency, New York State Department of Environmental Conservation, Fond du Lac Environmental Program, and the Wisconsin Department of Natural Resources.

Central Michigan University, Institute for Great Lakes Research, has partnered with many agencies and universities, including the Natural Resources Research Institute at the University of Minnesota-Duluth, University of Notre Dame, University of Wisconsin (Green Bay, River Falls, and Superior), Grand Valley State University, Lake Superior State University, Michigan Department of Environmental Quality, the College at Brockport, the University of Windsor, Environment Canada, and Bird Studies Canada. Challenges faced by the project team include dated maps of wetlands and access to wetlands especially in the Georgian Bay region. Also, fluctuating water levels of the Great Lakes, which is critical for maintaining wetland ecosystem health, can make monitoring wetlands a challenge. However, Mr. Cooper did mention that the models were built to allow changes in water levels. For more information on the Institute for Great Lakes Research please visit www.cmich.edu/colleges/cst/iglr/Pages/default.aspx.

Questions following Mr. Cooper's presentation include:

- Are coastal restoration processes utilizing the data?
 - Yes, basin-wide processes for four years, with a number of the projects starting with the first round of funding. There was not a lot of pre-data, but we were using benchmark sites from around the Great Lakes basin, and especially areas like Saginaw Bay where we have sampled wetlands for nearly 20 years.
- Could information gathered be used to guide where restoration could happen later?
 - Yes, we are working with the Upper Midwest and Great Lakes Landscape Conservation Cooperative (UMGL LCC), whom funded a prioritization support tool. Also, the data gathered, combined with geospatial data, can be used to create an interactive tool.
- Is this work connected to the Great Lakes Initiative, Thunder Bay Study?
 - No, it is not connected.
- Are there ever instances in which discharges or other impacts show evidence of expanding coastal wetland area?
 - There are no examples from our work of degradation creating more wetland area. There are cases where nutrient loading increases macrophyte growth or macrophyte density, but it is more of the exception than the rule.

Dave Fielder - Michigan Department of Natural Resources

Mr. Fielder began with a brief background on the initial period of declining walleye harvest due to habitat degradation and effects of invasive species and the MDNR walleye recovery plan. He addressed the importance of the off-shore reef spawning habitat. Mr. Fielder said the premise of the project is the recovery of walleye and that they are seeking to achieve sources and population structure, not just increased numbers. There is also the belief that the plan would benefit other species such as lake whitefish, lake trout, and cisco. Objectives of the study included:

- 1) Determine habitat stability of remnant outer bay and proposed inner bay reef sites by assessing substrate conditions, water quality, and potential egg predators.
- 2) Evaluate reproductive usage by adult fish during both the spring and fall spawning periods.
- 3) Assess the genetic and phenotypic characteristics of the Saginaw Bay walleye and lake whitefish populations.
- 4) Develop and execute a plan to engage local stakeholders in Saginaw Bay reef restoration.

Throughout the project, the team will complete sedimentation and hydrodynamics model predictions to refine reef placement, complete evaluations in the spring and fall, take gillnet collections (spawners) and egg collections (spring pumping and fall traps), complete genetic analysis, complete microzone water quality monitoring, and complete visual inspection and side-scan habitat mapping. Finally, Dr. Fielder thought that the final report from the project and study will be out in July 2016.

MDNR partnered with organizations such as USFWS, LimnoTech, Bay County Michigan, USGS, Sea Grant Michigan, Department of Environmental Quality, and Purdue University to make this project possible. Following the presentation a participant asked when the reef will be built. Mr. Fielder responded that reef building would begin after the completion but would depend on funding. Such work could begin in 2016 or 2017. More information about MDNR can be found at: www.michigan.gov/dnr.

Russ Green - NOAA Thunder Bay National Marine Sanctuary

Mr. Green provided welcoming remarks at the beginning of the day and gave a presentation on NOAA's marine sanctuaries and, more specifically, the work being completed at the Thunder Bay National Marine Sanctuary. Thunder Bay has been working on protecting shipwrecks in the waters off the Alpena shores and along the shores of Lake Huron. The sanctuary provides divers and boats for continued research and preservation. The sanctuary has also been

involved in reef habitat restoration with the goal of mitigating degraded spawning habitat and to create two acres of new spawning habitat to increase reproduction of reef-spawning fishes in Thunder Bay. Partners for the work done by the sanctuary include Grand Valley State University, the Naval Post Graduate School, the University of Michigan, Stout University of Wisconsin, and Great Lakes Environmental Research Laboratory. More information regarding the NOAA Thunder Bay National Marine Sanctuary please visit http://thunderbay.noaa.gov.

Jim Johnson – retired, Michigan Department of Natural Resources

Mr. Johnson addressed three projects, The Lower Food Web changes, Fisheries Response to Food Web Change, and lake trout spawning reef restoration. The first project, The Lower Food Web, was based off the decline in the food available to fish since the increase of zebra and quagga mussels in Lake Huron. The project partners found that there has been a decline in pelagic All of this work is so important and valuable and when the lake is impaired and impoverished, businesses will be impaired and impoverished.

> — Bay City, Michigan, Meeting Participant

nutrients and plankton, loss of nearshore spring plankton bloom, nearshore plankton bottleneck for larval fish, and the nutrient signal from Thunder Bay River is rather weak.

The second project, Fisheries Response to Food Web Change, found there were extremely low abundance indices in Thunder Bay for most fish species due to the mussel invasion and the species dependence upon small zooplankton for food. Mr. Johnson explained that this was because of the diminished spring algae bloom caused by the mussels



Photo Courtesy of Environmental Protection Agency, Great Lakes National Program Office

and cladophora. Areas within Lake Huron that are less nutrient rich are especially vulnerable, pelagic algae is being replaced by benthic colonial algae which is less efficient vector of nutrients, and the release of nutrients from decaying cladophora is during the late-season, rather than early-season, when the first-feeding fry least need it. However, Mr. Johnson did believe that there were signs of change for the better stating that mussel biomass may be declining and that beaches along the coast are cleaner.

The third project, reef restoration, has revealed a surprisingly slow rate of mussel colonization of newly installed rock reefs in Thunder Bay, suggesting dreissenid colonization rates are much slower than during the early years of their

invasion. A robust population of round gobies may be contributing to this slow rate of mussel infestation. The reefs are being used by both whitefish and lake trout for spawning.

Conclusions from the three projects include; (1) natural, degraded reefs do not attract lake trout spawning, (2) lake trout adults are attracted to the new reefs, but it took time, (3) lake trout spawned on new reefs, but erratically but egg survival on the new reefs was much higher than on the native reefs, (4) whitefish spawn everywhere (reef habitat not limiting them), but were lured off degraded reefs, (5) reproduction of most nearshore fish species declined after the mussel invasion, (6) lake whitefish are especially affected, (7) cause appears to be low prey availability for fry after hatch, (8) the foodweb continues to change – declines in mussels, rise in gobies, reduction in beach wrack, and (9) nutrient loading is low, probably not a future problem for Thunder Bay. More information regarding MDNR can be found at: www.michigan.gov/dnr.

Finally, Mr. Johnson had some recommendations for future work including:

- Investigating destination of nutrients released from mussel dieback and beach wrack recirculation.
- Continue to monitor whitefish reproduction.
- Nutrients end up on beaches, manage the loading carefully.
- Long-term monitoring of reef use and fry production from the new reefs.
- Long-term monitoring of aging of the new reefs (sedimentation, colonization by dreissenids, and structural stability). Project partners included Central Michigan University, the Environmental Protection Agency, USGS Great Lakes Science Center, NOAA, Department of Environmental Quality, USFWS, and University of Vermont.

Following Mr. Johnson's presentation, participants had the following questions and comments:

- Over the years productivity has gone down, there is less debris and cladophora on shores. Will that change the old reefs?
 - We are still studying that, the Thunder Bay National Marine Sanctuary will could carry on with some of the monitoring between the grants.
- Grand Traverse Bay has had similar issues with the decline of plankton and the decline of fish, but in Lake Michigan whitefish are doing better, which could be a result of different depths and wave patterns.
- The difference of Lake Michigan and Lake Huron is that the deep water in Lake Michigan gets near the shore to replenish nearshore nutrients and there is a southern current that comes up the coast.

Jennifer Muladore – Huron Pines

Huron Pines is a 501(c)(3) nonprofit working to conserve the forests, lakes, and stream of Northeast Michigan. They also coordinate large-scale, high-impact, and long-term habitat restoration and enhancement projects, they pull together private-public partnerships in order to take a collaborative approach to solving problems, and they promote Michigan's natural assets and link them to economic and community development opportunities in order to improve the quality of life in the region.

Ms. Muladore presented on the major programs Huron Pines focuses on including, River Restoration, Invasive Species Management, Land Stewardship, Kirtland's Warbler Initiative, Huron Pines AmeriCorps, and Community Enrichment.

Ms. Muladore described the watershed restoration projects stating that Huron Pines works for holistic restoration of watersheds and sub-watersheds by removing aquatic passage barriers, stopping and preventing erosion, invasive species control, stormwater management, and community engagement. Huron Pines is also involved in Land Stewardship in which they coordinate projects on lands of all sizes and types of ownership to meet overarching goals for ecosystem resiliency and a variety of human uses. Projects include erosion control, aquatic buffers, stormwater management, wildlife habitat, pollinator gardens, forest management, etc.

Ms. Muladore, spoke specifically about the invasive species work stating that through the Cooperative Weed Management Area Partnership, Huron Pines works with all landowners on coastal and inland sites to fight priority invasive species like phragmites, Japanese knotweed, garlic mustard, Japanese barberry, and European frog-bit. Finally, Ms. Muladore spoke to the role Community Engagement plays in the work of Huron Pines, which includes working closely with community leaders, students, and volunteers to increase the capacity for on-the-ground projects initiated and sustained locally throughout Northeast Michigan. For more information about Huron Pines please visit www.huronpines.org.

Bill Freese - Huron Environmental Activist League

Mr. Freese gave a brief presentation on the concerns and activities of HEAL. He first spoke of the old quarry in Alpena which was filled with highly acidic cement kiln dust. Newtons Creek which runs through and from the quarry and local areas flows into Thunder Bay of Lake Huron. The waters of the creek have been posted as unsafe by the department of health because of the high level of acidity. Mr. Freese also spoke to the high concentrations of mercury of tests from the lakeshore cement kiln dust pile which exceeds (by almost 770 times the GSI limit) that groundwater running into Thunder Bay. Moreover, Mr. Freese mentioned another quarry outside of Alpena which has been tested and is known to have a high level of radiation and also is a catch-and-release fishing area. Finally Mr. Freese spoke to the coal ash coming to Alpena from Canada and the issues it brings to Lake Huron and the Alpena area.

Chris May - The Nature Conservancy

Mr. May gave a brief overview of the restoration work that The Nature Conservancy does — not only in the Alpena area, but also in Northeastern Michigan. Mr. May stated that in the past, TNC relied on protecting the environment, but recently the focus has been on economic viability and tourism such as trails and ecotourism. TNC works with a variety of partners to complete projects on invasive species management, trespass issues, illegal hunting, and defining land for specific uses. There are currently eight preserves and eight easements in greater northeast Michigan that TNC is working on, but specifically for Alpena, the work has mainly been focused on coastal and shoreline work as well as using grants to manage invasive species. For more information on The Nature Conservancy please visit: www.nature.org.

A participant followed Mr. May presentation with a comment concerning monitoring methylated mercury because of the effect it can have on the food web.

Sault Ste. Marie, Michigan, May 27, 2015

Mike Ripley - Chippewa Ottawa Resource Authority

The Chippewa Ottawa Resource Authority (CORA) was established to ensure the conservation and wise utilization of the natural resources reserved to the tribes in the Treaty of March 28, 1836 including Northern Lake Huron. The tribes include the Bay Mills Indian Community, the Grand Traverse Band of Ottawa and Chippewa Indians, the Little River Band of Ottawa Indians, the Little Traverse Bay Bands of Odawa Indians, and the Sault Ste. Marie Tribe of Chippewa Indians. Much of the work of CORA focuses on fishery management, fishery enhancement, and fish monitoring. Mr. Ripley spoke to the history of the St. Marys River Area of Concern (AOC) and the beneficial use impairments (BUIs) due to over



Photo Courtesy of NASA

100 years of industrial activities, destruction of the St. Marys Rapids, municipal development and hydrological alterations. More recent regulation of point source pollution, upgrades to municipal sewer systems and sediment remediation on the U.S. side have led to remarkable improvements to water quality and removal of some BUIs. Habitat restoration projects such as the Little Rapids Restoration Project planned for the near future will hopefully lead to further improvements to fish and wildlife BUIs.

Mr. Ripley then spoke to the Sault Area Watershed plan that was written by Chippewa/East Mackinac Conservation District and approved by the state of Michigan. All state approved watershed plans use the same template that include topics such as: definition of critical area, prioritizing pollutants, sources and causes, determining objectives and BMPs, identifying existing projects, programs and ordinances, and involving the public. Consistency in watershed plans allows the state to fund implementation projects. He then addressed the concerns around Ashmun Creek and Mission Creek in Sault Michigan. Concerns include replacing culverts, degraded water quality, erosion, high levels of pathogens and development in headwaters. Next steps for these projects include:

- Answering questions such as how much and how fast water flows through the area, which areas contribute the most water and contaminants, and what is the most effective way to stabilize banks.
- The need to do groundwork like permissions, permits, and update estimates.
- The need to protect bio-reserve from development and provide access for non-motorized recreation.

Mr. Ripley then discussed similar impairments to the urban tributaries of Sault Ste. Marie, Ontario. These creeks, including Bennet, East and West Davignon, form waterfalls as they flow off of the Canadian shield and at that point have high water quality however water quality is seriously degraded as the creeks flow through the city, receiving runoff from streets and parking lots and eventually getting channeled through the Essar Steel plant. In addition, much of the west side of the city was built in the flood plains of the creeks, including Fort Creek, leading to serious problems of flooding during rain events. The solution by the Conservation Authority, which has claimed to have an exemption from the Canadian Fisheries Act, was to build concrete channels which destroyed fish habitat and further

degraded the water quality. In response, Fisheries and Oceans Canada drafted a watershed plan in the mid-1990s that called for restoration of natural flows, increasing buffer zones along streams, adding riffles, ponds, and fish passage structures along with recreational opportunities, but the plan was never approved or adopted by the city and Conservation Authority.

Mr. Ripley ended his presentation with mention of the plans to complete a deep water port at the steel mill on the Canadian side. He raised concerns about dredging highly contaminated sediment in the area, invasive species, and development of transportation infrastructure. He also noted the port could be good for the area if the site is cleaned up and restored properly. For more information about CORA please visit www.1836cora.org.

Questions for Mr. Ripley following his presentation included:

- Does Ontario use a similar watershed plan template?
 - No, there is not a similar process in Ontario; however, Michigan's template would be ideal here. Watershed restoration has not been a high priority in Sault, Canada.
- Has the paper mill been removed?
 - Some of the industrial facilities have been removed but others have been turned into a music conservancy and performance centers.
- Who cleans up the contaminants in Canada once a site has been sold?
 The buyer cleans up the site.
- Has there been movement on the Canadian side to look at the contaminated sites?
 - Yes, there are studies being completed and a sediment plan is in the works; BPAC has urged the governments to create a sediment management plan that will prevent the disturbance of contaminated sediments when future dredging takes place.

Ron Kinnunen – Michigan Sea Grant

Mr. Kinnunen gave a brief overview of the work Michigan Sea Grant is currently involved with in Lake Huron and Lake Michigan. Michigan Sea Grant is working with various groups to explore the reintroduction of cisco in parts of Lake Huron and Lake Michigan. He briefly described the different morphotypes of cisco, the different needs in areas throughout the lakes and the concerns they are addressing before reintroduction can occur. Moreover, Kinnunen talked about Viral Hemorrhagic Septicemia (VHS), an infectious fish disease, and the effects VHS has on different fish species in Lake Huron. Michigan Sea Grant has worked with the Michigan baitfish industry to prevent the spread of this virus by It's nice to hear about all the good work being done and get out of silos.

—Port Huron, Michigan, Meeting Participant

implementing Aquatic Invasive Species-Hazard Analysis Critical Control Point (AIS-HACCP). In the past Kinnunen has addressed the Lake Huron Citizens Fishery Advisory Committee's desire to bring more cisco back to Lake Huron and reviewed spawning techniques that he has used in the field to secure fertilized cisco eggs.

A participant asked if there was funding to reintroduce trout and salmon to the area and Kinnunen replied that planting salmon in Lake Huron is no longer a priority because of the lack of forage fish and thus some of these resources in the future may be used to reintroduce a native fish such as cisco. More information can be found at: www.miseagrant.umich.edu.

Roger Greil - Lake Superior State University, Aquatic Research Laboratory

Mr. Greil gave an overview of the work done at the Aquatic Research Laboratory especially related to the Atlantic Salmon hatchery. The hatchery is a partnership between Lake Superior State University, Department of Natural Resources, and the local electric hydro power plant Cloverland. The hatchery is used by the university to train undergraduate students in all aspects of hatchery duties from collecting the adults for brood to stocking 1½ years later. The results of the hands on training with students is the production and stocking of these fish, which has created a very successful fishery where these fish have been caught in all of the great lakes. For more information regarding the Aquatic Research Laboratory please visit: www.lssu.edu/arl.

Ben Bowen - Bay Mills Indian Community

Mr. Bowen gave a brief overview of the work being done by the Bay Mills Indian Community, including the monitoring of the fisheries and the nutrients of the stream. For more information please visit: www.baymills.org.

Section IV: Collaboration and leveraging efforts

Bretton Joldersma (MDEQ)

Bretton described the Michigan Office of the Great Lakes role and their Great Lakes Coordination Program. The Michigan Office of the Great Lakes assists with policy development and implements programs to protect, restore and sustain the Great Lakes. Their mission is to ensure a healthy environment, strong economy and a remarkable quality of life with respect to the Great Lakes.

The Great Lakes Coordination Program was created to be an effective catalyst for actions to protect and restore the world's premier freshwater ecosystem, ensuring environmental integrity and supporting healthy, economically viable communities. They lead state agency efforts and collaboration among local, regional, and international partners to improve



Photo Courtesy of Keystone Policy Center

stewardship and sustainability of the Great Lakes. Bretton explained that they concentrate on social, economic and environmental drivers and are involved with many programs and efforts that align with their mission. Their process follows the 4-Ps of identifying projects, based on priorities, identifying players and finally adding value and participating. He said that projects that are identified as a priority, are collaborative, and align with various plans tend be competitive for funding opportunities.

Questions and Comments Include:

- Is there similar work being done on the Canada side in preparation for the LAMP?
 - The Canadians have had ongoing dialogues with their stakeholders. This was a U.S. kick-off meeting to get back in touch with U.S. restoration stakeholders.
- Has the office engaged with the Lake Huron citizens fishery group?
 There has been informal engagement to inform water quality.
- Is this the typical meeting format for the future?
 It will be more binational and more focused on the plan moving forward.
- Does the binational partnership group still meet?
 - No, it is being replaced by this process and LAMP. The Lake Huron Binational Partnership was renamed the Lake Huron Partnership. The Lake Huron Partnership maintains the same basic function however it will be slightly restructured to be consistent with the other lakes and the 2012 GLWQA.
- Is there an opportunity for discussions to align priorities or is there an approach already in place to set their priorities?
 This is what the LAMP should do. It is collective impact, direction, and consensus building.

Section V: Continued Engagement

Conversation ensued at each meeting regarding how the results of various GLRI-funded and other projects are being used and suggestions for making results, data and final reports more accessible. The conversation also included a brainstorm on the best ways to stay engaged with stakeholders and how to best share information on the development of the LAMP, continued engagement ideas. General themes follow.

Ideas for continued engagement and additional partnerships included:

- What is the best way to keep people engaged in the LAMP?
 - Hearing everyone's stories at today's meeting was very helpful.
 - Face-to-face meetings.
 - o Email.
 - o Meetings of the Heal our Waters Coalition hear the good work we're all doing.
 - o Broadcast, Detroit public TV, and then interviews, Great Lakes Week.
 - Webinars of these meetings that are videotaped.
 - o Newsletters.
 - Bay 3 TV tape meetings and rebroadcast.
 - Set another meeting after these four where the EPA/OGL report back on what we they cumulatively heard.
- Send information out to all locals regarding restoration meetings and the LAMP. There are 83 counties in Michigan. Send out information to the chairs of the Board to the Counties.
 - There may need to be a public meeting in addition to the state of the lake;
 - Other groups that should be invited to meetings regarding Lake Huron Restoration and the LAMP.
 - o Michigan Fisheries Division, local divisions.
 - Association of Conservation Districts (ACD).
 - o Lake Huron Citizens Advisory Commission.
- On a case-by-case bases, the EPA Great Lakes National program office can help set up webinars that highlight projects, successes, and models that are relevant across the Great Lakes.

Additional participant comments included:

- Having data, an executive summary or final report catalogued on a website is really important and should be a requirement of all grantees. Bretton and Jamie indicated the information is available by working with the grantee and/or reaching out to either of them. There also is a map-based system that catalogues the projects.
- There is a disconnect between the large amount of money being spent and the value the public is getting from it. There is a need for a section on the GLRI website that's organized topically.
- The general public doesn't know how this money is being spent and what the successes are. There is a need to package these and promote outcomes.
- Public support for GLRI is dwindling and this could affect the LAMP participation.
 - Create a database that could be accessed by all interested parties to inform research and other restoration work.
- Monitoring is very important but it takes money away from project implementation.
 - Many of the larger projects are still monitoring and so there aren't results yet; and,
 - There also may not be enough money to monitor results.

Takeaways and around-the-room final remarks:

- There is a need to address discharges and aquatic invasive species.
- Lake Huron is a huge economic resource and that resource needs to be protected.
- There is a need for regional planning that targets local priorities.
- It is nice to hear about all the good work being done get out of silos.
- This was a very informative meeting.
- These four meetings are great and should get diverse participation.
- All of this work is so important and valuable and when Lake Huron is impaired and impoverished, businesses will be impaired and impoverished.
- Hopefully this will support great partnerships.
- Glad Lake Huron is not the forgotten lake anymore.
- Everyone's attendance will help create opportunities to collaborate and leverage.
- This meeting was timely, please keep everyone informed regarding the binational meeting.
- The zebra mussels which concentrate a lot of the contaminants and the sturgeon living off of them could lead to many problems.
- The interest in the Lake Huron area could provide an opportunity to reinvent and renew initiatives.
- The meetings help open up the discussion about Lake Huron.
- The meetings provided a nice learning opportunity.
- Where the benefits are realized are not always where actions are taken.
- The meetings helped make new connections.
- There is a need to engage upstream communities.
- There should be more collaboration with non-traditional partners.
- Participants indicated an intent to stay involved and participate in other meetings regarding the LAMP.
- Because of collaboration with partners such as MDNR, Ontario, and the EPA, the meetings broached the issues of lake trout and a spike in mercury and PCP's. Initially it was assumed it had to do with the size and how fast they were growing, but times are changing and it could be more about the cumulative contaminants in the fish and how it affects them in the future.
- Information covered during the meetings should be presented to people who could not attend.
- In relation to data sharing and communication, it would be helpful to know who is using the data and for what purpose. How can we share results and get input back and forth?
- There is a challenge of restoration projects on the coast. There is competition for funding, we need to prioritize and understand the broader scale and one-offs to get groups to fight for the funding.
- There is a need for a clearinghouse for all the data that is created, then we can use the data for other uses rather than the question at hand.
- Input to the local communities is an asset and investment in the lake.
- CORA represents a few tribes in and around Michigan and Lake Huron and has a huge concern with the pipeline going under the straits of Mackinac carrying oil into Ontario. It is over 60 years old. Simulations done by the University of Michigan water systems have shown that if the pipeline broke, due to the current, it would be a major catastrophe in both Lake Huron and Lake Michigan. Mackinac Island is right in the path of any oil spill. The recommendation from the tribes and partners is to remove the pipeline. CORA and its members believe that less oil is needed because laws and technology are leading to higher efficiency and the use of less fossil fuels. We need to plan for the future. The Michigan Oil Task Force will make recommendations this summer.

Section VI: Conclusion

The four Lake Huron Restoration Regional Meetings gathered an impressive amount of information from community leaders, experts across numerous topic areas, and members of the public. The feedback gathered and descriptions of restoration activities underway provide a series of possible avenues for leveraging and amplifying efforts to restore the health of Lake Huron.

The meeting takeaways underscore the strong and diverse interest in Lake Huron's long-term health. This community engagement provides a strong foundation for government agencies and their partners as they move forward with the binational Lake Huron Lakewide Action and Management Plan and other restoration efforts.

Appendix A: Sample Agenda



Lake Huron Restoration - Regional Meeting

Port Huron Area Great Lakes Maritime Center 51 Water Street, Port Huron, Michigan May 12, 2015

AGENDA

Please note, all times approximate

10:00 A.M.	Informal introductions and welcome		
10:30 A.M.	Agenda review and project background		
10:45 A.M.	Session I: Updates on Great Lakes Water Quality Agreement and lakewide management		
11:15 A.M.	Session II: Success, lessons learned, challenges, and opportunities for Lake Huron restoration		
12:30 P.M.	Lunch		
1:15 P.M.	Session II (con't): Success, lessons learned, challenges, and opportunities for Lake Huron restoration		
2:00 P.M.	Break		
2:15 P.M.	Session III: Lake Huron Lakewide Management Plan (LAMP) process and roadmap		
3:00 P.M.	Session IV: Collaboration and leveraging efforts		
4:00 P.M.	Wrap up and adjourn		

Appendix B: Participant List

Lake Huron Restoration – Regional Meetings

First	Last	Affiliation
Andrea	Ania	U.S. Fish and Wildlife
Ben	Bowen	Bay Mills Indian Community
Mark	Brochu	St. Clair County Parks
Matthew	Child	International Joint Commission
Matthew	Cooper	Central Michigan University
Кау	Cumbow	Citizens for Alternatives to Chemical Contamination
Kristina	Denison	Chippewa Luce Mackinac Conservation District
Roger	Eberhardt	Michigan Office of the Great Lakes
Mary Anne	Evans	USGS-GLSC
Sheri	Faust	St. Clair Health Department
Dave	Fielder	Michigan Department of Natural Resources
Jane	Fitzpatrick	East Michigan Council of Governments
Bill	Freese	Huron Environmental Activist League
Jim	Galloway	U.S. Army Corps of Engineers
Russ	Green	Thunder Bay National Marine Sanctuary
Roger	Greil	Lake Superior State University
Shelby	Hiestand	Michigan Department of Natural Resources
Phyllis	Higman	Michigan Natural Features Inventory
Brad	Hill	Partnership for Saginaw Bay Watershed
Katy	Hintzen	Michigan Sea Grant
Rick	Hobrla	Michigan Office of the Great Lakes
Cindy	Johnson	City of Alpena
Jim	Johnson	Retired – Michigan Department of Natural Resources
Michael	Jury	MDEQ-Saginaw Bay District
Jeff	Kart	International Joint Commission
Michael	Kelly	The Conservation Fund
Ron	Kinnunen	Michigan Sea Grant
Scott	Koproski	U.S. Fish and Wildlife Services
Frank	Krist	Lake Huron Citizens Fisheries Advisory Committee
Josh	Leisen	Huron Pines
Kristen	Lyons	Friends of the St. Clair
Randy	Maiers	Community Foundation of St. Clair
Chris	May	The Nature Conservancy
Sara	McDonnell	UM-Flint Outreach
Jennifer	Muladore	Huron Pines

First	Last	Affiliation
Laura	Ogar	Bay County Environmental Affairs & Community
		Development
Carey	Pauquette	Saginaw Chippewa Indian Tribe of Michigan
Tim	Payne	MDNR-Wildlife SE Region
Doug	Pearsall	The Nature Conservancy
Cynthia	Rachol	U.S. Geological Survey
Mike	Ripley	Chippewa Ottawa Resource Authority
Ed	Roseman	USGS Great Lakes Science Center
Brandon	Schroeder	Michigan Sea Grant
Ruth	Shaffer	USDA-Natural Resources Conservation Service
Heather	Shaw	Saginaw Chippewa Indian Tribe of Michigan
Rich	Sullenger	City of Alpena
Todd	Wills	Michigan Department of Natural Resources
James	Schardt	EPA's Great Lakes National Program Office (Staff)
Bretton	Joldersma	Michigan's Office of the Great Lakes (Staff)
Suzan	Klein	Keystone Policy Center (Facilitator)
Matt	Mulica	Keystone Policy Center (Facilitator)
Brooke	Trainum	Keystone Policy Center (Facilitator)

Appendix C: Presentations

Multi-Meeting Presentations Keystone Policy Center Presentation



Agenda

- Session I: Updates on Water Quality Agreement and lakewide mangement
- Session II: Successes, lessons learned, challenges, and opportunities for Lake Huron restoration
- Session III: Lake Huron LAMP process and roadmap
- Session IV: Collaboration and leveraging efforts



Brief Introduction of Keystone Policy Center

- Independent 501c3 organization, headquartered in Keystone, CO
- 40th year Convening & facilitating
- consensus-building, structured conversations, multi-stakeholder dialogues in environment, energy, agriculture, health and education realms
- www.keystone.org

Example projects

- Landscape-level cross-jurisdictional resource management initiatives
 - Landscape Conservation Cooperatives
- Multi-stakeholder national policy dialogues <u>Field to Market: Alliance for Sustainable Agriculture</u>
- Informing federal / state regulatory schemes
 - <u>Colorado master leasing plan</u>



Project overview

- GLRI grant
- Enhance stakeholder engagement (U.S.) on Lake Huron restoration
- Assessment
- Regional meetings


Guidelines for Today

- Participate in good faith, and in an effort to promote collective learning and good communication.
- Be honest, open-minded, and respectful when offering and listening to differing points of view. Disagree judiciously and respectfully.
- Respect time commitments in the agenda; maintain focus on the issues and objectives at hand.
- Be mindful of comment length and the importance of encouraging participation from everyone in the group. Agree briefly.
- Be respectful regarding use of smart phones and other technologies.



Themes from assessment

- Enhanced interaction among projects and agencies
 - Acknowledge accomplishments and success
 - Feedback mechanisms
 - Monitor emerging issues
 - Understand priorities



Themes (con't)

- Enhanced interaction amongst Lake Huron grantees, local restoration projects, and others concerned with health of the Lake
 - Share lessons learned
 - Leverage collective knowledge
 - Broaden network of collaboration
 - Share 'how tos' that support efforts



Contact Us

Suzan Klein Senior Facilitator <u>sklein@keystone.org</u> 612-326-4345

Matt Mulica Associate Facilitator <u>mmulica@keystone.org</u> 303-531-5511

More info can be found at: www.keystone.org/LakeHuronRestoration Bretton Joldersma, Lake Coordinator, Office of the Great Lakes

Lake Huron Facts

Lake Huron Facts	
Length	206 miles
Breadth	183 miles
Average Depth	195 feet
Maximum Depth	750 feet
Surface Area	23,000 sq. miles
Volume	850 cubic miles
Retention Time	22 years
Drainage Basin	51,700 sq. miles
Shoreline Length (including islands)	3,830 miles
Watershed Population	3.2 million (2006)

Lake Huron has high ecological value

Lake Huron is 2nd largest Great Lake by surface area (5th globally) and 3rd largest by volume

Lake Huron has 30,000 islands...total shoreline is longest of all the Great Lakes

Lake Huron has the largest drainage basin of the Great Lakes...making the land-water interface that much more important.

Globally, Manitoulin Island is the largest island in a fresh water system

Saginaw Bay & Georgian Bay are the two largest on the Great Lakes (Georgian Bay is large enough to among the world's 20 largest lakes)

Thunder Bay National Marine Sanctuary is the only US designated marine sanctuary in the Great Lakes

 Fathom Five National Marine Park (Bruce Peninsula) was Canada's first National Marine Conservation Area

LAKEWIDE MANAGEMENT PLANS



Bretton Joldersma Lake Coordinator Office of the Great Lakes



Lake Huron Restoration Meeting – Port Huron May 12, 2015

Lakewide Management Plans



Annex 2 – Lakewide Management

The Parties, in cooperation and consultation with...

State and Provincial Governments,

Tribal Governments, First Nations, Métis,

Municipal Governments,

watershed management agencies,

other local public agencies,

and the Public,

... shall undertake the following lakewide management actions...

Growing Pressure on Water Resources

World-wide population

- Areas in urgent need of water supply and sanitation
 - 2.5 billion people lack access to safe sanitation
 - Nearly ½ of world population will live in high water stress by 2030
- Water for ag accounts for 70% of global freshwater withdrawals
- Significant pressure on water resources as populations grow & increased conflict

Pacific Institute and Vox Global survey (2013)

- 80% of U.S. companies state that water availability is a key issue
- 63% said water issues affect their future location decisions
- 50% report water scarcity may impact growth and profitability

Water Risk

 Global Risks report from the World Economic Forum, ranked water as third greatest risk to the global economy

Lakewide Planning is Important Economically

- Great Lakes Region is the 4th largest economy in the world!
- Michigan continues to expand agriculture:
 - 2010-2015 ag exports doubled to \$3.5 billion
 - Top 5 export markets: Canada, Mexico, Japan, South Korea, & China (2013)
 - Ag industry contributes \$100 billion annually to the MI's economy
- In 2011, recreational hunting, fishing & other wildlife activities attract visitors who spent \$5.9 billion on trip-related expenses

Sources: MDARD press release 2/18/2015 Michigan Farm Bureau Agriculture Facts webpage (3/31/15) MDNR's Economic Impact webpage (3/31/15)



Lakewide Planning is Important Environmentally







Lakewide Planning is Important Socially



We are great lakes people



"We are a Great Lakes people....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, 2014 State of the Great Lakes Report





Questions and Comments

Bretton Joldersma Lake Coordinator Office of the Great Lakes Mich. Dep't of Environmental Quality joldersmab@michigan.gov Phone# (517)284-5048

Great Lakes Coordination Program

Bretton Joldersma, Lake Coordinator, Office of the Great Lakes

MICHIGAN OFFICE OF THE GREAT LAKES: GREAT LAKES COORDINATION PROGRAM



Bretton Joldersma Lake Coordinator Office of the Great Lakes



Lake Huron Restoration Meeting – Port Huron May 12, 2015

Michigan Office of the Great Lakes

The Office of the Great Lakes assists with policy development and implements programs to protect, restore and sustain our Great Lakes.



OGL's mission is to ensure a healthy environment, strong economy and a remarkable quality of life with respect to our Great Lakes.



Great Lakes Coordination Program

Mission:

To be an effective catalyst for actions to protect and restore the world's premier freshwater ecosystem, ensuring environmental integrity and supporting healthy, economically viable communities.

What We Do:

We lead state agency efforts and collaboration among our local, regional, and international partners to improve stewardship and sustainability of the Great Lakes

Why:

So that the Great Lakes will continue to enhance the quality of life for current and future generations.



Great Lakes Coordination Program

Lake Coordinator Roles:

- State reps to LAMPs and other GLWQA committees
- Participate on internal work groups (e.g., Michigan AIS Program)
- Contribute to specific projects (i.e. implementation of priorities)
- Provide technical support on Great Lakes issues
- Investigate, champion emerging issues
- Identify funding opportunities & help with grant applications
- Serve as liaisons to other DEQ divisions/offices
- Track chemical, physical, and biological trends
- Prepare reports (e.g. MI's State of the Environment and State of the Great Lakes reports)
- Assist with planning of conferences & workshops
- Develop outreach materials



Lake Coordinators and the 4 P's

The 4 "P's"

- Identify & track projects
- Identify restoration & protection priorities
- Identify existing players/partnerships
- Determine where OGL can add value & <u>participate</u> in the process to strategically guide the use of resources



Collaboration & Leveraging Efforts

- Are there current/future opportunities for collaboration and leveraging efforts to protect and restore Lake Huron?
 - Projects?
 - Meetings/conferences?
 - Other efforts to advance priorities?
 - Opportunities to work with or engage existing forums, stakeholder groups, etc. ?



Questions and Comments

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- Globally, Manitoulin Island is the largest island in a fresh water system
- Saginaw Bay & Georgian Bay are the two largest on the Great Lakes (Georgian Bay is large enough to among the world's 20 largest lakes)
- Thunder Bay National Marine Sanctuary is the only US designated marine sanctuary in the Great Lakes
- Fathom Five National Marine Park (Bruce Peninsula) was Canada's first National Marine Conservation Area

Lake Huron and the Great Lakes Water Quality Agreement



Port Huron, Michigan U.S.A May 12, 2015















Great Lakes Water Quality Agreement of 2012

The "Parties" to the Agreement

United States of America



Canada



Preamble of the Agreement

RECOGNIZING that, while the Parties are responsible for decision-making under this Agreement, the involvement and participation of State and Provincial Governments, Tribal Governments, First Nations, Métis, Municipal Governments, watershed management agencies, local public agencies, and the Public are essential to achieve the objectives of this Agreement;



Signing of Amended Agreement



"... to restore and maintain the chemical, physical, and biological integrity of the Waters of the Great Lakes."


Basinwide, Issue-Based Coordination

- Chemicals of Mutual Concern
- Nutrients
- Discharges from Vessels
- Aquatic Invasive Species
- Habitat and Species
- Groundwater
- Climate Change Impacts
- Science





Lakewide Management Plans



Questions about the Great Lakes Water Quality Agreement?





Geographic-Based Programs

- Areas of Concern (9 in Canada, 5 shared, 24 in U.S.)
 - Implement in partnership with State and local governments.
- Lakewide Action and Management Plans for each Great Lake (5 total)
 - Assessment of cumulative effects of environmental programs.
 - 5-year cycle of implementation, monitoring, and adaptive management.



The Lake Huron Lakewide Action and Management Plan



Alpena, Michigan U.S.A May 14, 2015



• Opportunities for coordination and participation



Agreement of 2012

- Annex 2: "The Parties shall document and coordinate these management actions through the development of Lakewide Action and Management Plans for each Great Lake... every five years."
- Annex 10: "In addition to ongoing science and monitoring... the Parties shall implement a cooperative science and monitoring initiative for each of the Great Lakes on a five-year rotational basis."



Agreement of 2012

- Annex 2: "The Parties shall document and coordinate these management actions through the development of Lakewide Action and Management Plans (LAMP) for each Great Lake... every five years."
- Annex 10: "In addition to ongoing science and monitoring... the Parties shall implement a cooperative science and monitoring initiative (CSMI) for each of the Great Lakes on a five-year rotational basis."



Upcoming events

- This spring: kick-off the Lake Huron Partnership in the U.S. with these Regional Meetings...
- Fall 2015: binational meeting to discuss the "state of lake" and information gaps which could be filled by the binational coordinated monitoring. Presentations by:
 - Researchers on the latest Lake Huron science.
 - Binational implementers of restoration activities.
 - People interested in Lake Huron.



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 - Binational implementers of restoration activities.
 - People interested in Lake Huron.

Hopefully this includes everyone this room!





The Plan

While the "Science Team" is figuring out monitoring ...

- Development of the first "Lakewide Action and Management Plan" for Lake Huron under the updated Water Quality Agreement.
- An ecosystem approach to water quality, including:
 - Chemicals
 - Nutrients
 - Habitat and Species
 - ... and more
- For completion by the end of 2016.



Chemicals • Continuing decrease in chemicals in environment, including chemicals that bioaccumulate in fish Concentration (ppm) Year

Nutrients







Habitat and Species

- Implementation of projects that support the Lake Huron Biodiversity Conservation Strategy
 - Developed in 2010 by more than 400 individuals from over 100 agencies and organizations in Lake Huron.

Tributaries

Coastal Wetlands



5 Year Lake Management Cycle

- Year 1, 2017: Implementation of binational "Action Priorities" and monitoring field year to address "Science Priorities"
- Year 2 & 3, 2018 & 2019: Continued implementation of activities by Lake Partnership, tracking progress on individual projects.
- Year 4, 2020: Assess cumulative binational progress.
- Year 5, 2021: Refinement of binational Plan.
- 2022-2027: Next 5 year lake management cycle.



Questions about the Lakewide Action and Management Plan?





Bay City, Michigan – April 7, 2015

Coastal Natural Communities at Risk and Invasive Plants

Phyllis Higman, Michigan Natural Features Inventory

Coastal Natural Communities at Risk and Invasive Plants





Phyllis Higman, Michigan Natural Features Inventory Bay City LaMP Meeting; April 7, 2015

Michigan Natural Features Inventory

Maintains the most comprehensive database on Michigan's vulnerable elements of biodiversity

GIS based database:

- ~ 18,000 <u>element occurrences</u> (EO's)
- endangered, threatened, special concern spp.
- high quality natural communities





420 plants

<u>302 animals</u>

77 natural communities



Deliver highest quality information that contributes to conservation biodiversity, focusing on the diversity of ecosystems native to Michigan & vulnerable species.

- Ecology > GIS Program Conservation Education
- Botany
 - Zoology
- Conservation Planning

Our work is grant funded. We have 17 full time staff and seasonal staff as grants allow. www.msue.msu.edu/mnfi





Natural Communities

Assemblage of interacting plants, animals, and other organisms repeatedly occurring across the landscape under similar environmental conditions; predominantly structured by natural processes.



Natural Community Classification

Palustrine

- Marsh (9)
- Wet prairie (5)
- Fen (5)
- Bog (2)
- Shrub wetland (3)
- Forested wetland (8)

Terrestrial

- Prairie (5)
- Savanna (6)
- Forest (7)

77 natural communities

- Palustrine/terrestrial
 - Wooded dune and swale (1)

Primary

- Dunes (2)
- Sand/cobble shore (4)
- Bedrock lakeshore (4)
- Bedrock grassland (1)
- Bedrock glade (4)
- Lakeshore cliff/bluff (5)
- Inland cliff (4)
- Subterranean Sink
 - Karst (2)



Global and State Ranks

- S5, G5: Most secure
 - Secure globally and in Michigan
- **S5, G1:**
 - Globally imperiled, but secure in Michigan
- **S**1, G5:
 - Globally secure, but imperiled in Michigan
- S1, G1: Most imperiled
 - Imperiled globally and in Michigan

Palustrine

Marsh

- Submergent marsh S4, GU
- Emergent marsh S4, GU
- Great Lakes marsh S3, G2
- Inland salt marsh S1, G1
- Coastal Plain marsh S2, S2
- Intermittent wetland S3, S3
- Northern wet meadow S4, G4G5
- Southern wet meadow S3, G4?
- Interdunal wetland S2, G2?

Palustrine

Wet Prairie

- Wet prairie S2, G3
- Wet-mesic prairie S2, G2
- Wet-mesic sand prairie S2, G2G3
- Lakeplain wet prairie S2, G2
- Lakeplain wet-mesic prairie S2, G1?

Savanna

Lakeplain oak opening – S1, G2?

Palustrine and Terrestrial

Wooded dune and swale – S3, G3

Lakeplain Prairies

- Species-rich prairie on seasonally wet ground of glacial lakeplains
- Sands, sandy loams, silty clays often over a clay layer
- Saginaw Bay, St. Clair River
 Delta, and near Lake Erie
- Seasonal flooding, cyclic changes in Great Lakes water levels, beaver flooding, and fire

<complex-block>



Less than 1% remaining today Mostly converted to agriculture






Eastern fox snake State threatened S2, G3

Eastern prairie fringed orchid State and federal endangered S1, G2

Sullivant's milkweed State threatened S2, G5

Great Lakes Marsh S3, G2

- Herbaceous wetland on GL shores and major connecting rivers
 - deep marsh-submerged plants
 - emergent marsh
 - sedge-dominated wet meadow inundated by storms
- Strongly influenced by water level fluctuations









Threats

- Fragmentation
 - Development
 - Roads, etc.
- Aquatic barriers:
 - dams
 - stream-road intersections
- Terrestrial barriers
 - Roads
- Hydrologic alteration
 - Water withdrawal

- Nutrient enrichment
 - Point source pollution
 - Non-point source pollution
- Suppression of natural processes
 - Fire, flooding, etc.
- Loss of upland buffers
- Invasive species
- Climate change



Climate Smart Principles

Act with intentionality

Manage for change NOT persistence

Reconsider goals not just strategies

 Integrate adaptation into existing work (in a meaningful way)

> Bruce Stein, Patty click, Naomi Edelson, Amanda Staudt; NWF, NPS, USFS, NOAA, USGS EPA





Saginaw Bay Spawning Reefs; Pre-Restoration Assessment Michael Jury, DEQ



Historic Walleye Harvest from Saginaw Bay





12

Background: Inner Bay Reefs



From Organ et al. (1979) & Goodyear et al. (1982)

- Goals and anticipated outcomes
 - Determine habitat suitability of remnant outer bay and proposed inner bay reef sites by assessing substrate conditions, water quality and potential egg predators.
 - Evaluate reproductive usage by adult fish during both the spring and fall spawning periods.
 - Assess the genetic and phenotypic characteristics of the Saginaw Bay walleye and lake whitefish populations.
 - Develop and execute a plan to engage local stakeholders in Saginaw Bay reef restoration.

Timing and duration

 Fall 2014 – Spring 2016 pre-assessment



Location



- Partners
- Whom is the project benefiting (both human and ecological)
 - Biodiversity, habitat restoration
 - Fisheries



- Before/After photos coming soon.
- Lessons learned (success, challenges)
 - Model of sediment distribution and transport (LimnoTech)
 - Evidence of Lake Whitefish spawning on reefs in Bay



- How can others get involved?
- Contact information and/or project website
- http://www.miseagrant.umich.edu/sagin awbayreefstudy/
- Mike Jury (MDEQ) JURYM1@michigan.gov
- Bretton Joldersma (MDEQ) JOLDERSMAB@michigan.gov

Josh Leisen, Watershed Project Manager, Huron Pines





Huron Pines 😢











MISSION:

To conserve the forests, lakes and streams of Northeast Michigan.

ROLES:



- Coordinate large scale, high impact and long-term habitat restoration and enhancement projects
- Pull together private-public sector partnerships in order to take a collaborative approach to solving problems
- Promote our natural assets and link them to economic and community development opportunities in order to improve the quality of life in the region

Huron Pines is a 501(c)(3) nonprofit organization and an equal opportunity provider.



SERVICE AREA:

Northeast Michigan

MAJOR PROGRAMS:

- River Restoration
- Invasive Species Management
- Private Land Stewardship
- Kirtland's Warbler Initiative
- Huron Pines AmeriCorps
- Community Enrichment







NORTHERN SAGINAW BAY WATERSHED:

- Rifle, Au Gres, Tawas rivers and coastal Saginaw Bay
- Arenac, Iosco and Ogemaw counties (1,024 square miles)

THE INITIATIVE:

• Comprehensive effort to improve water quality, enhance wildlife habitat and strengthen local communities.

FUNDING SOURCES (\$100,000+):













RECONNECTING AQUATIC HABITAT:







REDUCING NONPOINT SOURCE POLLUTANT LOADS:







REDUCING NONPOINT SOURCE POLLUTANT LOADS:



NSBRI highlights since 2010:

- 4,750 feet of streambank stabilized
- 950+ tons/year sediment reduction
- 250+ volunteer hours served
- 600 acres improved through new BMPs









OUTREACH AND EDUCATION:



















CONTACT INFORMATION:

Josh Leisen Watershed Project Manager josh@huronpines.org 989.448.2293 ext. 16 **Huron Pines** Old US 27 South, Suite 2 Gaylord, MI 49735 www.huronpines.org



Saginaw Bay Coastal Initiative (SBCI) Accomplishments 2006-2015

Laura Ogar, Bay County Environmental Affairs & Community Development







Primary Pollutants resulted from Historical Land Use Changes:

• Sedimentation – Habitat Loss, Nutrients, Fish Spawning reefs, benthic disruption

• Excessive Nutrients – Cultural Eutrophication Urban and Rural sources

• High Bacteria Levels -Public Wastewater plants, Septics, Manure storage, Landspreading

•Contaminated Sediments -Industry

Sedimentation – Success:

SBCI Habitat Workgroup:

Worked to ensure restoration of the historic fish spawning reefs in the Saginaw Bay was included as part of the national push for Great Lakes Restoration activities. ...And was awarded a Great Lakes Fish and Wildlife Restoration grant for Phase 1 Pre-Restoration Assessment portion...looking towards construction funding.

Collaborators: Michigan DNR Fisheries - Alpena Office; MDEQ Office of the Great Lakes; Saginaw Bay District Office Remediation and Redevelopment Program; Purdue University; Michigan Sea Grant; Illinois-Indiana Sea Grant; Bay County Environmental Affairs and Community Development.

Excessive Nutrients - Success

SBCI Phosphorus Workgroup:

Drove local acceptance for a ban on (unnecessary use) of Phosphorus on Lawnsin Bay County, then around the bay, then a Statewide law passed;

Muck Removal on a portion of the North beach in place at Bay City State Park; Demonstration of Muck Removal in nearshore water zone , Saginaw Bay

Bay County Commissioners; Bay County Executive; City of Bay City; Department of Natural Resources – Parks Division
High Bacteria Levels - Success

SBCI CSO Work Group:

Reviewed actual discharge data from the City of Bay City and the City of Saginaw CSO discharge events, found:

- <u>Combined sewer systems are part of historical upgrades constructed to protect</u> <u>lakes and river systems</u>;
- In the Saginaw River...there are No untreated sewage discharges occur during a "CSO" event; All CSO Discharges receive Primary and Secondary (Bacteriological)Treatment; RETENTION TREATMENT BASINS (RTB's)
- <u>Convinced the Michigan Department of Environmental Quality (LANSING) to</u> <u>modify the statewide reporting form to recognize RTB events</u>

Over \$700 million improvements in wastewater treatment updates , including RTB and Phosphorus removal;

Collaborators: Michigan Department of Environmental Quality Saginaw Bay District Office, DEQ Wastewater Program Lansing Office; City of Bay City, City of Saginaw, City of Essexville, Bay County Health Department, Saginaw Bay WIN, Sportsfishers, Waterfront Property owners Saginaw Bay Coastal Initiative (SBCI) CSO Workgroup reviewed three years of <u>data</u> – 99% of samples met Recreational standards; only 2 separate sampling events were above recreational standards. Over 65% events have zero (0) bacteria.

SBCI Septic Work Group:

- Worked with coastal area Health Departments on **DRAFT Regional Septic Code –** Pending....

- Launched the <u>Bay County Septic Revolving Loan Fund</u>, to help fund upgrades to failing septic systems that were impacting or had the potential to impact surface water quality in the bay. Have replaced 7 systems and provided funding for 1 sewer connection.

Collaborators: Bay County Health Department, Central Michigan Health Department; Tuscola/Huron Health Department; Bay /Huron County Commissioners; Funders: Bay Area Community Foundation, Saginaw Bay WIN, LoneTree Council PIRGIM Fund

.Contaminated Sediments

<u>Historical industrial practices</u> – Tittabawassee River sediments, Saginaw River and Saginaw Bay

Active participants on the Citizens Advisory Group for the EPA Dow Dioxin Clean up, monitoring the clean up and removal activity along the Tittabawassee and Saginaw Rivers and ensuring the Saginaw Bay will be included within clean up and restoration activities.

U.S. EPA, MDEQ, Dow, Bay County, Saginaw Bay WIN

Tourism and Access – Success

SBCI Tourism Work Group: focused on Marketing and Quality of Life, and promotion of Access

MiGreatBay website - Saginaw RC&D

Saginaw Bay BlueWays Trail Map: kayaking and canoe launch sites - Arenac and Bay County Commissioners

Bay City State Rec Area Lakeshore and Beach Access Project – Beach grooming, Boardwalk, possible pier and restaurant, bait shop, ???

Collaborators: Saginaw RC&D, Bay Area Chamber of Commerce, Bay County Convention and Visitors Bureau, Arenac County Parks, Arenac EDC, Bay County Environmental Affairs and Community Development, Huron (Boys and Girl) Scouting, Lapham and Associates, East Coast Paddlers, Starkweather Bros, Funders: NOAA Michigan Coastal Zone Management, MDNR Parks and MDNR Wildlife Area Division, Iosco Tourism Council, Huron County EDC.

Other SBCI Successful Accomplishments:

Secured funding and moved forward with the demolition of the abandoned Pinconning Water Treatment plant on the beachfront of the Pinconning Park;

Worked with Ducks Unlimited and MDEQ and local stakeholders to identify and map the High Value Coastal Wetlands along the Saginaw Bay;

Restoration work with US Fish and Wildlife on priority Saginaw Bay Phragmites Control through grant funding of treatments and landowner inkind match.

Raised the profile of the critical lack of Saginaw Bay Access with the Governor's Land Use Strategy, resulting in modified mapping along the Huron, Tuscola, Bay, Arenac County shoreline for greater accuracy.

Why not here?







Monitoring and Assessment of Preyfish in Lake Huron

Ed Roseman

U. S. Geological Survey Great Lakes Science Center Ann Arbor, MI





Goals and Anticipated Outcomes

- Estimate abundances of prey species
 - Fall Acoustics survey
 - 1994, 2004-2014 lake-wide survey
 - Fall bottom trawl survey
 - 1976-2014 main basin
- Provide estimates of abundance, size, distribution of important prey species
- Identify changes and trends



Goals and Anticipated Outcomes Bottom Trawl Survey



Monitoring and Assessment of Preyfish in Lake Huron

- Partners
 - MI DNR, MI Sea Grant, ON MNRF, CORA, GLFC
- Whom is the project benefiting (both human and ecological)?
 - Provide data and information to all stakeholders
- Before/After photos http://www.glsc.usgs.gov/

Monitoring and Assessment of Preyfish in Lake Huron

- Lessons learned (success, challenges)
 - Value of long-term monitoring to identify ecosystemscale changes
 - Value of partnerships, transparency, and collaboration
- How can others get involved? just ask!
 - Data sharing and analysis
 - Special sample collections
 - Outreach and communication

Monitoring and Assessment of Preyfish in Lake Huron

Contact information and project website eroseman@usgs.gov http://www.glsc.usgs.gov/

Michigan Sea Grant: Healthy Coastal Systems, Lake Huron

Brandon Schroeder, Extension Educator, Michigan Sea Grant, Michigan State University Extension



Healthy Coastal Ecosystems: A Lake Huron Perspective

- Water Stewardship
- Biodiversity Conservation
- Fisheries Habitat
- Citizen Science
- Youth as Habitat Conservation Partners

MICHIGAN SEA GRANT



Sea Grant

Sealizant **Educational resources** Posters, Books, Maps, etc.: Michigan Watersheds Posters Series Books Brochures Habitat materials: Websites: Avian Botulism, Coastal Habitats Harmful Algal Blooms: • Website, diagrams, photos Climate outreach & education: HARMFUL ALGAL BLOOM Websites: climate and weather AIS resources MICHIGAN SEA GRANT

Sea Grant Research investments



WHERE PEOPLE MEET THE MUCK

ach Muck and Public Perception at the Bay City State creation Area, Saginaw Bay, Lake Huron

INTEGRATED ASSESSMENT OVERVIEW

DJECT DESCRIPTION

WHAT IS INTEGRATED ASSESSMENT

- Integrated Assessments: ٠ Applied Research
- New Funded Project: Addressing Saginaw Bay 'Muck'



MICHIGAN SEA GRANT

Water Science Partnerships





Lake Huron Biodiversity Conservation



Lake Huron Biodiversity Conservation

- Assembles partners, projects, and information
- Defines vision, goals
- Establishes strategies for:
 - Protecting important areas
 - Prioritizing, abating threats
- Promotes international coordination
- Framework for measuring, monitoring, reporting
- IMPLEMENTING!

MICHIGAN SEA GRANT





MICHIGAN SEA GRANT

AIS: Buckthorn Removal, Bagley Creek Restoration





(All photos courtes) Brandon Schroe







MICHIGAN SEA GRANT UNIVERSITY OF MICHIGAN + MICHIGAN STATE UNIVERSITY

WWW.MISEAGRANT.UMICH.EDU





The filter feeding of invasive mussels reduces plankton in the water and allows light to penetrate more deeply.

THE CHANGING FISHERY OF LAKE HURON

Past, present and future

The fishery of Lake Huron has undergone several transformations over the last 100 years. This summary explains some of the changes affecting the lake's food web and the fishing industry.

DAYS OF PLENTY: Early 1900s

Historically, Lake Huron has supported an important commercial fishery for both the U.S. and Canada. In the early 1900s, approximately 5 million pounds of ciscoes (chubs and lake herring), 1 million pounds of lake sturgeon, 6 million pounds of lake trout and 6 million pounds of lake whitefish were An increase in salmon and trout in Lake Huron resulted in two changes: declines in the alewife population; and increases in native species like slimy sculpin, burbot, troutperch, stickleback and spottail shiner. By the 1980s, a commercial fishery for chubs had recovered to about 1 million pounds per year, and lake whitefish to about 6 million pounds.

2015 Lake Huron Regional		Community, Business
Fisher Sea Grant	Spring fishery workshops offer current research and information related to the status of the Lake Huron fishery	Connections
MICHIGAN STATE UNIVERSITY Extension	Michingan Sen Grant and Michingan State University Extension, in partnerstap with the Department of Natural Resources Fisherics Division, USGS Great Lakes Science Center, and local fishery organizations will be hosting three evening regional workshops across Lake Huron's coastline. Workshops are open to the public, and will provide valuable information for anglers, charter captains, resource professionals, and other community	• 31 Workshops (since 2005)
	members interested in attending. Workshops will include information and stams updates on topics such as fish populations and angler eatch data, forage or prey fish surveys, recovering native lake roott populations, stams of Saginaw Bay perch and walleye, habitat restoration efforts, updates on fisheries management activities, among many other Lake Huron related topics of local interest.	2187+ Participating
Local Workshop Spinsors and Contributors: - Lake Horon Citizens Fishery Advisory Committee • Michigan Charter Boat Association • Michigan Steelhead & Schmun Fisherman's	You are invited to participate! Three evening Lake Huron Regional Fishery Workshops (approx. 3 hours each) are open to the public at no cost. Workshop opportunities include: Oscoda Date: Thursday, April 23 Three: 600 - 9:00 pm. Location: Camp Im Lodge	 Engaging stakeholders
Association Blue Water Sportflikting Association Harmond Bay Area Anglers Association Haron Piner Lack Haron Sportflikting, Inc. La Charany Sportflikting, Inc.		with fisheries research &
Sogimow Bay Walleye Club Thunder Bay Walleye Club USFWS Friends of Lake Huron Watershed USDA Wildle's Services	Occide Toronality, MI, 48750 (locared 2 miles south of Oscoda)	management issues
Saginaw Bay Roef Project Partnership DEQ Office of the Great Lakes Pardue University	Date: Tuesday, April 28 Tuse: 6:00 - 9:00 p m. Les Cheneux: Sportsman's Club M-134, Cedarrille, MI, 49719	 Chinook Stocking
Workshop Registration:	(approx. 2-3 miles east of blinking light in Cedarville) Bay City	 Walleve Regulations
Workshops are no cost to participants, however pre-registration is requested, but wille-in participation is always welcome? Register Online	Dute: Thursday, April 30 Ture: 6:00 - 9:00 p.m. Location: Knights of Cohumbus (KC) Hall 360 S. River Road (M-13) Bay Circu M. 45:08	Cisco Restoration
http://www.anr.non.edu/2015Eakcfiouroffishcross- Program information or questions, contact: Brandon Schroeder, Michigan Sea Grant	usay Cuty, ML 487/08 (directly north of James Clements Airport on M-13 River Rd.) Workshop details available also online:	 Lake Huron Diet Study
(989-354-9885, schtoe45)(muu.edu) 65U u.m.affirmitte-artine, apud opportunity employer. Mo anomal organ, geoder, geoder identity, religion, age, height v	www.mineogrant.umich.edu/esplore/fisheries/fisheries/fishery-weekshops/ olgan Stere/University Extension programs and materials are open to all without regard to rate, color, origin doubly, political beliefs, neural orientation, marital atatus, family atatus, or veterus tatus.	 Habitat/Reef Restoration

Sea Grant

MICHIGAN SEA GRANT

Native Fisheries: Spawning Reef Assessment & Restoration



Lake Huron Predator Diet Study





"Five Thousand Fish: Citizen Science on Lake Huron"

Schaeffer, Roseman, and Schroeder, 2012



MICHIGAN SEA GRANT



lichigan







Report on the Lake Huron Restoration Regional Meetings | 174/423

Citizen Science Projects (for all ages)

- Water Quality
- Invasive Species
- Threatened/Endangered Species
- Fisheries

And more...

- Hines Emerald Dragonfly Habitat
- Plastic Pollution
- G.L. FieldScope
- Adopt-A-Beach

MICHIGAN SEA GRANT





Sea Grant

Alpena Adopt-A-Beach

Coastal Classroom 'Adopts' Area Beaches pt a Beach** is the Alliance for Lakes' premier volunteer using the Great Lakes - a g ecosystem in its own righ arting point for instruction sharizing hands-on, inquiry Josh Beatry, 6th grade - TBJE d by NOAA B-WET and learning. The go is, Adopt-a-

u debris items. They ny. This

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the City of Alp



Alliance for the Great Lakes ADOPT A BEACH

6th Grade Students Are Recognized By **City Council**

Created on Tuesday, 23 April 2013 02:30 Written by Jessica Adkins



Last fall a group of science students from Thunder Bay Junior High participated in a beach clean up effort that involved six local beaches.

The Mayor and City Council presented the students with a certificate of appreciation for all of their hard work last fall. Cheryl Mack the teacher, who led this project, says the class is planning to do a follow up event in May.

Sea Gran

Copyright: Thunder Bay Broadcasting 2013

MICHIGAN SEA GRANT

Mapping Federally Endangered Hine's Emerald Dragonfly Habitat

Volunteers Needed In August and September! At Negwegon State Park Help us Find and Protect Hine's Emerald Dragonfly Habitat

and Map Invasive Species Training Provided August 4th: 9-12 noon or September 22nd: 9-12 noon

Sign up to help survey during a morning or afternoon during the weeks of August 4-8 or Sept 22-26

Click this link to go to our invitation page on VolunteerSpot: Introvols pln DWnt
 Enter your email address: (You will NOT need to register an account on VolunteerSpot
 Sign up! Choose your spots - VolunteerSpot will send you an automated confirmation

r Contact : Eric Ostrander or Colleen Higgins, Harrisville State Park (969) 724-5126 or email: Ostrandere1@michigan.gov

Sponsored by: Michigan Natural Features Inventory Friends of Negwegon, MDNR State Parks Huron Piness

Michigan Sea Grant U.S. Fish and Wildlife Service Community Foundation of NE Michig



MICHIGAN SEA GRANT





AuGres River Watershed Project AuGres-Sims 4-5th Grade



Thank You. questions, comments or remarks?

Brandon Schroeder schroe45@msu.edu (989) 354-9885 www.miseagrant.umich.edu

MICHIGAN SEA GRANT

Sea Grant
Port Huron, Michigan – May 12, 2015

Michigan Sea Grant: Healthy Coastal Ecosystems, Lake Huron

Katy Hintzen, Extension Educator, Michigan Sea Grant College Program



Mission Statement

Michigan Sea Grant supports research, outreach and education to enhance sustainable use of Great Lakes resources, benefiting the environment, the quality of life, and the Michigan, Great Lakes and national economy.

MICHIGAN SEA GRANT



Education Resources	
 Michigan Sea Grant Book Store Posters Books Maps Brochures Harmful Algal Blooms Website 	<text><text><text><text><text><text><list-item><section-header><section-header><section-header><section-header><section-header><text><text><text><text><text><text></text></text></text></text></text></text></section-header></section-header></section-header></section-header></section-header></list-item></text></text></text></text></text></text>
DiagramsFact Sheets	Factors Influencing the Growth of HARMFUL ALGAL BLOOMS
 AIS resources Climate outreach & education 	A state of the sta

MICHIGAN SEA GRANT

Sea Grant

Sea Grant Research Investments



- Integrated Assessments: Applied Research
- New Project: Addressing Saginaw Bay 'Muck"

Sea Grant

MICHIGAN SEA GRANT

Native Fisheries: Spawning Reef Assessment & Restoration



Improving Awareness of Coastal Storm Hazards, Stormwater Runoff, and Risk Reduction Strategies

- 2 yr project funded through NOAA's Coastal Storms Program.
- Aims to enhance capacity to prepare for and respond to extreme storm events.
- 22 counties across the watershed.
- Still in the planning stage.



Sea Grant

MICHIGAN SEA GRANT

Report on the Lake Huron Restoration Regional Meetings | 186/423

Thank You. Questions, comments or remarks?

Katy Hintzen hintzen@msu.edu (989) 891-7198 www.miseagrant.umich.edu

MICHIGAN SEA GRANT



Blue Water River Walk

Randy Maiers, Community Foundation of St. Clair County

Blue Water River Walk



The history













The Basics

- Almost 1 mile of shoreline / 4,300 feet
- Located at the confluence of the Black River and St. Clair River
- South side of Port Huron
- 100+ years of industrial abuse and neglect
- Donated to the Community Foundation by local philanthropist James C. Acheson at Christmas, 2011

Project Scope & Components

- Gift of Land: \$1.5m
- Complete shoreline Restoration: \$2.25m
- Multi-purpose Pedestrian Trail: \$300k
- Railroad Ferry Dock: \$160k
- Fishing Pier sometime in 2015: \$160K
- Benches, public art, entry arches & other amenities: \$175k+
- Wetlands Park: \$1.5m+
- Staff & Support: \$250k

Guiding Principles

- Protect and preserve the shoreline
- Make it available to the public
- Never return to private or restricted access
- Restore natural habitat where possible
- Soften the shoreline as much as possible
- Make it people & visitor friendly
- Maintain heritage & legacy of the site
- Blend habitat restoration w/ public access, recreation & tourism

10,000 Tons of Debris



Today's shoreline...



What people don't see.....











River Walk Trail



- Multi-use trail that connects to Bridge to Bay
- Approx. \$300,000 budget shared by MDOT and private donors
- Completed in fall 2013
- Posts made from re-cycled lumber from old ferry dock

Visitor Friendly



North Entry Arch: Visual cues



Ferry Dock: Heritage





Ferry dock today....





Outdoor Classroom: before



Outdoor Classroom Today



Why Was it successful?

- Driven & Initiated by Private Sector: philanthropy & business
- Strong support from our AOC led to community ownership
- Stakeholder input from the beginning: visited Detroit's River Walk
- Created a Beautiful Vision & got people excited
- Units of Gov't and State or Federal Agencies: partners & collaborators...did not drive the project
- Heavy Donor engagement
- Stakeholders felt ownership
- Broke it down into manageable components

What's Next: 2015

- County Wetlands Park on south end
- Fishing Pier June/July
- More Public Art
- Drinking Fountain

Long Term Care & Maintenance

- Annual Costs: approx. \$25,000
- Currently covered by the Community Foundation via grants to the River Walk
- Growing a Permanent Endowment Fund currently has about \$90,000
- Needs to grow to \$500,000 to guarantee it forever
- People can leave the River Walk in their Wills, estate plans, trusts, etc.
Questions? www.stclairfoundation.org

Saginaw Bay Optimization Decision Tool: Linking Management Actions to Multiple Ecological Benefits via Integrated Modeling

Doug Pearsall, The Nature Conservancy



Project Overview: Saginaw Bay ODM project scope

• Ecological targets:

- Fish spawning sites
- Stream habitat
- Cladophora biomass
- Cyanobacteria biomass
- Total phosphorus
- Nearshore waterfowl habitat
- (Nearshore fish habitat)
- (Inland landbird habitat)

Socioeconomic values:

Public beaches Birding sites Recreational fishing Recreational boating Drinking water intakes

Geographic focus

- Saginaw Bay and Watershed
 - Kawkawlin, Pigeon, Pinnebog R. Watersheds



Key questions:

- Where should Ag BMPs be implemented to achieve ecological and socioeconomic goals?
- How does conservation benefit people?
- How should those benefits influence where we implement conservation?

Products

 An idealized ODM decision process and tool
A conceptual model linking conservation actions to riverine and bay ecological endpoints and associated ecosystem services and human values.
A gap analysis of data, knowledge, models and decision tools needed to support the idealized ODM.

4) A functional, realized ODM decision process and tool kit based on available data, knowledge, models and decision tools.

5) A map of NHD+ catchments for implementing BMPs to optimally achieve ecological and socioeconomic goals

Desired Outcomes

- Strengthened relationships and communication among Saginaw Bay stakeholders;
- Key stakeholders (e.g., MDARD, MDEQ, NRCS, Drain Commissioners, Soil Conservation Districts) will be informed on the ODM and its application
- Shared priorities for optimal BMP implementation;
- Increase the likelihood that producers will participate in MAEAP to meet shared ecological and socioeconomic goals.

Key Aspects of Current Work

- SWAT models for three focal watersheds (Kawkawlin, Pigeon, Pinnebog)
 Enhanced SAGEM2 (SAGEM3?)
 - Optimized suite of areas (NHD+ catchments) for implementing BMPs to achieve multiple goals
 - Builds on western Lake Erie Coastal Conservation Vision

SWAT Results (Limnotech)

Example Sediment Results (Kawkawlin)



On an area basis, these total yields correspond to UALs ranging from 0-1.17 MT/ha [0-0.52 tons/acre]



Optimization through Marxan (TNC)



Linking of models to optimization

SAGEM2 will enable linking of tributary outputs to specific nearshore grid cells
SWAT will establish proportional contribution of subwatersheds to rivermouth flow points

 Marxan can incorporate these relationships and optimize BMPs to benefit stream and nearshore endpoints

Key points of Sag Bay ODM

 Linking of watershed actions to responses in specific parts of the bay
Optimization to achieve goals for ecological

and socioeconomic values

Alpena, Michigan - May 14, 2015

Saginaw Bay Watershed Coordinated Monitoring and Research

Andrea Ania - Fish Biologist, National Fish Passage Program, U.S. Fish and Wildlife Service, Alpena Fish & Wildlife Conservation Office

Saginaw Bay Watershed Coordinated Monitoring and Research

Andrea Ania - Fish Biologist, **National Fish Passage Program** U.S. Fish and Wildlife Service Alpena Fish & Wildlife Conservation Office Alpena, MI

Location of Projects

Saginaw Bay Watershed

- Walleye population of Lake Huron
- Great Lakes Areas of Concern (AOC) designated geographic areas with severe environmental degradation.



http://upload.wikimedia.org/wikipedia/commons/8/81/Saginawrivermap.png

Project Descriptions

- Started out with one dam removal project and the opportunity to monitor...grew.
- Involve multiple partners collaboration and coordination
 - Chesaning Dam Removal/Rock Ramp Construction and Monitoring
 - Frankenmuth Rock Ramp/Fish Passage and Monitoring
 - Research Projects:
 - Restoring River Connectivity: Evaluating Fish as Vectors of Contaminants in the Saginaw River/Bay Area of Concern
 - Prioritizing Dam Removals within the Saginaw Bay Watershed Based on Spawning River Contributions to the Walleye Population of Saginaw Bay (Otolith Microchemistry)

Chesaning Dam/Rock Ramp

- Goals: Remove failing dam, retain impoundment for Chesaning Showboat/summer festival, install rock ramp for fish passage (walleye), 37 miles of upstream access
- Location: Shiawassee River, Chesaning, MI
- Completed 2009
- Link funding through USFWS Fish Passage Program to Village



Chesaning - Monitoring

- Opportunity to monitor (ARRA funded) newer design for MI
- Does the rock ramp function as intended allow passage of walleye and other lake fish during spring spawning runs?
- Pre-construction monitoring: Fish community assessment upstream and downstream of dam (USFWS)
 - Chesaning Dam on the Shiawassee River (2009) Study site
 - Frankenmuth Dam on the Cass River (2009-2012) Reference site & pre-construction monitoring for rock ramp



Chesaning - Monitoring

- Post-construction monitoring
 - Spring and summer fish community assessment upstream and downstream of the rock ramp (2010 – Present; MDNR)
 - Fish tagging and egg mats (CMU)
- Limited passage documented:

"In the spring of 2010 and 2011, Joe Leonardi (Fisheries Management Biologist, DNRE, Fisheries, Lapeer, MI) and students of Brent Murry (Research Assistant Professor, Department of Biology Central Michigan University, Mount Pleasant, MI) monitored fish occurrence below and above the dam and egg masses in the rapids. **Results from both years show the rapids are colonized with bass; however, few walleye were able to pass the rapids**."

(December 21, 2011 Ellen River Partners, Inc. White Paper)

Chesaning - Monitoring

- Post-construction monitoring results \rightarrow structure modification
- August 2011 Ellen River Partners modified the existing rapids
 - Moved stone in the existing weirs, ramp and channel sides to construct partial-length weirs (~40 feet long) on each side of the channel in between existing weirs.



Photos: Jacob Stoller



Chesaning Monitoring

- After the structure was modified, walleye passage has increased.
- MDNR plans to continue to monitor a few more years.
- Lessons learned are being used to improve the Frankenmuth rock ramp – same company doing design.



Project Descriptions

- Chesaning Dam Removal/Rock Ramp Construction and Monitoring
- Frankenmuth Rock Ramp/Fish Passage and Monitoring
- Research Projects:
 - Restoring River Connectivity: Evaluating Fish as Vectors of Contaminants in the Saginaw River/Bay Area of Concern
 - Prioritizing Dam Removals within the Saginaw Bay Watershed Based on Spawning River Contributions to the Walleye Population of Saginaw Bay (Otolith Microchemistry)

21.03 inHg

Frankenmuth Rock Ramp

- Goals: Provide fish passage (walleye) to 73 miles of upstream habitat and retain impoundment for Riverboat and recreation; nexus with Chesaning Rock Ramp monitoring
- Location: Cass River, Frankenmuth, MI
- U.S. Army Corp is lead Federal agency
- Link funding through USFWS NFPP to City and use as reference site for Chesaning monitoring.





Frankenmuth Monitoring

- In early 2010 started talking with CMU about ways to partner together and research needs within the watershed. MSU later.
- Pre-construction monitoring (2009 2012)
 - Fish Community Assessment upstream and downstream of dam
- Collectively began coordinating efforts between agencies and universities – sampling data used for multiple studies and jointly collected.



UNIVERSITY

Frankenmuth Monitoring

- Construction Scheduled for 2015
- Post-construction monitoring
 - Plan to sample in 2016, if construction is on schedule
 - Multiple years (2+ depending on quality of data and environmental conditions)
 - Data will be used to meet monitoring requirements established by the U.S. Army Corp (based on pre-construction study design)



Project Descriptions

- Chesaning Dam Removal/Rock Ramp Construction and Monitoring
- Frankenmuth Rock Ramp/Fish Passage and Monitoring
- Research Projects:
 - Restoring River Connectivity: Evaluating Fish as Vectors of Contaminants in the Saginaw River/Bay Area of Concern
 - Prioritizing Dam Removals within the Saginaw Bay Watershed Based on Spawning River Contributions to the Walleye Population of Saginaw Bay (Otolith Microchemistry)

Contaminants Study

- Goals: Evaluate if fish as upstream vectors of contaminants and as a potential link for contaminant transfer between aquatic and terrestrial community (barrier removal – risk of contaminants being moved upstream).
- Location: Cass, Flint and Shiawassee rivers
- Timing: 2012-2013
- Link Funding through GLRI/USFWS Contaminants Program to CMU (M.S. student – Clarence Fullard)





Contaminant Study

- Collaboration to collect samples
- Results
 - M.S. Thesis Clarence Fullard (Dr. Brent Murry)
 - Diet and Energy Pathway Perturbations of Rock Bass and Smallmouth Bass in Three Round Goby Invaded Great Lakes Tributaries (2013).
 - USFWS Contaminants Program:
 - Based on hazard assessment, ∑PCBs in smallmouth bass, walleye, white sucker, and golden redhorse downstream of the dam may present a risk to bald eagles.



Project Descriptions

- Chesaning Dam Removal/Rock Ramp Construction and Monitoring
- Frankenmuth Rock Ramp/Fish Passage and Monitoring
- Research Projects:
 - Restoring River Connectivity: Evaluating Fish as Vectors of Contaminants in the Saginaw River/Bay Area of Concern
 - Prioritizing Dam Removals within the Saginaw Bay Watershed Based on Spawning River Contributions to the Walleye Population of Saginaw Bay (Otolith Microchemistry)

Otolith Microchemistry

- Goal: Prioritize dam removals in the Saginaw Bay Watershed based relative contribution of walleye reproduction from individual rivers of Saginaw Bay (Otolith Microchemistry).
- Otolith inner ear of a fish; deposits of calcified materials reflect the water the fish inhabits (=where it has been).
- Layered deposition of calcified material
 - Location: Kawkawlin, Cass, Flint, Shiawassee and Tittabawasee rivers
 - Timing: 2011-2012
 - Link Funding through USFWS-FPP to CMU
 - Collaboration to collect samples (MDNR, CMU, MSU, USFWS)



Otolith Microchemistry

• Over 340 walleye were sampled for otolith microchemistry analysis.

Site Type	Year	Otoliths Prepared
Kawkawlin	2011	21
Flint	2011	18
Tittabawassee	2011	33
Saginaw Bay	2011	131
Tittabawassee	2012	32
Shiawassee	2012	17
Saginaw Bay	2012	95
Total		347



- More information is needed but learned some valuable lessons:
 - Sample preparation
 - Sampling limitations
 - Technology

Otolith Microchemistry

Unanticipated results:

Kawkawlin	Tittabawassee	Other*	Total
57.02%	29.82%	13.16%	100%
(65)	(34)	(15)	(114)

- Suspected dominate source of production (Tittabawassee, largest adult run) estimated to be source of only 30% of young walleye. Reproductive sink?
- Kawkawlin a small river with limited habitat supported an estimated 57% of young walleye production

Other Research Projects

- These projects linked through collaborative sampling (no funding)
- Michigan State University
 - M.S. Thesis Jacob Stoller (Dr. Dan Hayes)
 - Effects of a Rock Ramp Structure on Summer Fish Assemblages in the Shiawassee River (2013).
- Central Michigan University
 - M.S. Thesis Gabe Madel (Dr. Brent Murry)
 - Testing Trophic Guild Classifications in Temperate River Fish Communities Using Stable Isotopes (2013).
 - Study Area: Shiawassee, Cass and Flint rivers.





Future Outcomes/Work

- Publication (In-Progress)
 - Survey of fish communities upstream and downstream of a dam prior to rock-ramp installation
- Presentation at American Fisheries Society (2015)
 - Evaluation of a Naturalized Rock Ramp Fish Passage for Cool- and Warm-Water Fish in a Tributary of Saginaw Bay, Lake Huron
 - Evaluating Fish as Vectors of Contaminants: Implications for Dam Removal
- Working with CMU on continued monitoring in the watershed (Fish Passage Program)
 - M.S. Thesis Mike Rucinski (Dr. Tracy Galarowicz)
 - Started 2015 Continued monitoring of fish passage structures in the Saginaw Bay Watershed (adult, juvenile and egg sampling)

Lessons Learned

- Challenges with sampling:
 - Low spring flows can impact the ability to sample the river.
 - Access to the river high spring flows, undesignated launch (USACE incorporated launch into Frankenmuth design to aid postconstruction fish sampling)



Lessons Learned

- Challenges to passing fish:
 - Fish needs spaces between the rocks to move upstream.
 - Fish may not be able to pass during low water.
- Social Expectations:
 - The structure was designed for fish passage. Many boaters want these structures to also to provide whitewater kayaking opportunities.
 - Whitewater = Fish Barrier



Lessons Learned

- Challenges with building and maintaining a structure vs. dam removal:
 - Rocks may move during high flow events
 - Ice and debris can build up behind or get caught within the structure.
 - More costly than removal



Photos: MDNR
Lessons Learned

- Time scale associated with dam removal/modification projects can be an obstacle for student research projects:
 - Often unable to collect data in 2 years
 - Not enough time to collect pre/post construction data
 - Project delays funding, designing, permitting, etc.
 - Frankenmuth 2006...2015



Lessons Learned

- Collaboration is a key to success!
 - Prevent duplication of efforts.
 - Can use same sampling efforts to contribute toward more than one project (e.g. DNR and CMU; USFWS and CMU).
 - Can complete work that may not otherwise be able to due to time, equipment, or expertise.
 - Can gain a larger scale perspective of what is going on in the watershed.



Collaboration is a key to success

Partners/Acknowledgements

- Central Michigan University
 - Dr. Tracy Galarowicz and Dr. Brent Murry
 - Graduate Students Clarence Fullard, Gabe Madel and Mike Rucinski – and field assistants
- City of Frankenmuth
 - Sheila Stamiris
- Michigan Department of Natural Resources
 Joe Leonardi, Jim Baker and field crew
- Michigan State University
 - Dr. Dan Hayes and Jacob Stoller
- U.S. Army Corp of Engineers
- U.S. Fish and Wildlife Service
 - Contaminants Program: Jeremy Moore and Lisa Williams
 - · Fisheries Program: James, Boase, Justin Chiotti and Andrew Briggs
 - Habitat Program: Joseph Gerbyshak



Great Lakes Coastal Wetland Monitoring for Protection and Restoration

Matthew J. Cooper and Donald G. Uzarski, Institute for Great Lakes Research, Department of Biology, Central Michigan University

Great Lakes Coastal Wetland Monitoring for Protection and Restoration

Matthew J. Cooper Donald G. Uzarski

Institute for Great Lakes Research, Department of Biology

Central Michigan University, Mount Pleasant, MI





The Great Lakes Coastal Wetlands Consortium

Consortium formed in 2000, facilitated by Great Lakes Commission.

Develop and evaluate metrics and protocols for monitoring coastal wetland ecosystem health.

Based on SOLEC indicator approach.

Great Lakes Environmental Indicators (GLEI) project: separate program but some overlapping goals for coastal wetlands.





The Great Lakes Coastal Wetlands Consortium

2007: Consortium and GLEI combined efforts to ensure the best possible monitoring product.

Submitted final recommendations to EPA March 2008.

2009: GLRI-GLNPO RFP for \$10M to monitor coastal wetlands using GLCWC protocols.

Awarded in 2010, sampling 2011-2015.





Currently working on 5 year coastal wetland monitoring project



Great Lakes Coastal Wetland Monitoring Program

~1000 coastal wetlands over 5 years Wetlands >4 ha. in area Surface water connection to Great Lakes



Statistical Design

- Stratify by ecoregion, lake, and wetland type.
- Randomly draw wetlands from each strata for each sampling year.
- Re-sample subsets 2 consecutive years.
- · Good estimates of spatial and temporal variation.
- Additional targeted sampling at restoration sites (pre- and postrestoration).



Lake Huron



Great Lakes Coastal Wetland Monitoring Program

~1000 coastal wetlands over 5 years

- Chemical/Physical Uzarski et al. 2008
- Invertebrates Uzarski et al. 2004
- Fish Uzarski et al. 2005
- Plants Albert 2008
- Birds Grabas et al. 2008
- Amphibians Timmermans et al. 2008





Quantify ecosystem disturbance Indices of Biotic Integrity

- Reference Conditions: (>85 to 100% of possible score)
- Mildly Impacted: (>70% to 85% of possible score)
- Moderately Impacted: (>50 to 70% of possible score)
- Moderately Degraded: (>30 to 50% of possible score)
- Degraded: (>15 to 30% of possible score)
- Extremely Degraded: (0 to 15% of possible score)



Summarized Results, 2011-2014

Vegetation IBI



Summarized Results, 2011-2013

Fish IBI



Summarized Results, 2011-2014

Bird IBI



IBIs Using Different Taxa

- Different organisms indicate disturbance at different scales
 - Plants = coarse scale
 - Invertebrates = local scale
 - Fish = intermediate scale
- Individual wetland does not experience disturbance uniformly
 - Based on hydrology
 - Gradient from terrestrial to true aquatic









Metric development and improvement

- Enormous amount of data
 - Continue to develop new metrics
 - Continue testing existing metrics
 - Maintain consistent sampling protocols
 - Build flexibility for updates into decision support tools





www.greatlakeswetlands.org











Examples of restoration and conservation efforts supported by our data

- State of Michigan, Department of Natural Resources
 - St. Marys River & Little Rapids area monitoring fish and benthos conditions to aid in delisting Beneficial Use Impairments in AOCs
 - William C. Sterling State Park, Lake Erie evaluation of wetland restoration efforts especially in regards to vegetation, fish, and shorebirds
- Ducks Unlimited
 - Röchester Embayment Area of Concern, Braddock Bay pre-restoration monitoring for restoring native sedge meadow habitat
- Minnesota Pollution Control Agency
 - Lower St. Louis River Area of Concern large-scale habitat restoration for removing beneficial use impairments
- New York State Department of Environmental Conservation
 - Lakeview Wildlife Management Area habitat monitoring and marsh bird data collection for the statewide Marsh Bird Monitoring Program
- Fond du Lac Environmental Program
 - Spirit Lake and Kilchliss Meadows, St. Louis River Estuary pre-restoration monitoring for aquatic vegetation restoration and habitat improvement
- State of Wisconsin Department of Natural Resources
 - Clough Island, St. Louis River estuary pre-restoration habitat assessment to establish baseline conditions
 - Wisconsin coast of Lake Superior habitat monitoring especially with regards to rare species
 observation, invasive species detection, and climate change effects.



GLRI Action Plan II: Habitat and Species

Measures of Progress with Annual Targets	Baseline/Universe	2015	2016	2017	2018	2019				
Number of miles of Great Lakes tributaries represented by GLRL funded projects	Baseline: 1,900	Target 2,200	Target 2,500	Target 2,800	Target 3,100	Target 3,400				
Number of miles of Great Lakes shoreline and riparian corridors protected, restored and enhanced by GLRI-funded projects*	Baseline: 0 Universe: N/A	75	100	175	225	300	NATIONAL FIEN AN	ID WILDLIFE FOUNDATION	Apply for a Grant Become a Particle Cons	ervelien Programs Media Center
Number of acres of Great Lakes coastal wetlands protected, restored and enhanced by GLRI-funded projects*	Baseline: 0 Universe: 260,000	7,000	15,000	30,000	52,000	60,000		NFWF	Who We Are What We Do	Partnerships Resu
Number of acres of other habitats in the Great Lakes basin protected, restored and enhanced by GLRI-funded projects	Baseline: 117,000 Universe: 1,290,000	127,000	147,000	167.000	187,000	207.000	OUDILADIO	Sustain Our	Great Lakes 2015	ABLATED DOCUMENTS + FOR Venue
This Measure of Progress is a modification of an Action P nded by GLRI. The baseline is zero because the new Actio rogress.	lan I Measure of Progress on Plan II Measure of Pro	s that has be gress is not t	en modiñe the same m	REST(ORATIO	tion initiative n II		Interpretation of the second s	ETOPOSIIS dendary, February IR, SHG by 1159 PM Eastern Tunday, April 28, 2015 by 1159 PM Eastern exham. The program will award grants for on- for, with a feetoom improving the quality and consent of countil workeds. Approximation 55-75 for grant search in 2015. The program is and Widdle Fondarism. (NY NY) with finaling Mintal, U.S. Environmental Princetion Agency, U.S.	 Instance-University Program initiality



Funding for this work was provided by the Great Lakes National Program Office under the United States Environmental Protection Agency, grant number GL-00E00612-0. Although the research described in this work has been partly funded by the US EPA, it has not been subjected to the agency's required peer and policy review and therefore does not necessarily reflect the views of the agency and no official endorsement should be inferred.



Saginaw Bay Spawning Reefs; Pre-Restoration Assessment

Dave Fielder, Saginaw Bay Reef Restoration, Michigan Department of Natural Resources



Historic Walleye Harvest from Saginaw Bay

a'l



Reef restoration for Saginaw Bay first conceived as...

- A recovery strategy in the Saginaw Bay walleye recovery plan
- Conceived as a demonstration project



Premise:

- Historically the bay's walleye population was supported by both reef and river spawning fish
- Populations hailing from multiple spawning sources are more resilient to perturbation
- Recovery of walleye should seek to achieve sources and population structure, not just numbers.
- Potential benefit for other species too (lake whitefish, lake trout, cisco)



Background:



From Organ et al. (1979) & Goodyear et al. (1982)



Study sites:


Information needed before restoration can begin:

- Before we can invest in reef habitat restoration we need to know:
 - The full status of remaining historic reef habitat in the inner bay. There is still some remnant habitat.
 - What's spawning there?
 - What is the condition of the proposed restoration sites?

Basically we need a "before" look at things.

Specific study objectives:

• **Obj. 1:** Determine habitat suitability of remnant outer bay and proposed inner bay reef sites by assessing substrate conditions, water quality and potential egg predators.

• **Obj. 2:** Evaluate reproductive usage by adult fish during both the spring and fall spawning periods.

• **Obj. 3:** Assess the genetic and phenotypic characteristics of the Saginaw Bay walleye and lake whitefish populations.

• **Obj. 4:** Develop and execute a plan to engage local stakeholders in Saginaw Bay reef restoration.



Sedimentation Model-Predicted Deposition (2009)

Follow up work will be to propose two reefs for restoration:

- Conceptually:
- Each 0.4 ha in area and 1 m in relief
- Each reef will amount to 4,000 m³ of material
- 25% cobble, 75% gravel, native material, glacial till
- Placement by barge and crane
- New effective depth of 1.4 2.2 m post construction





Some of the field work involved in this study:

- Sedimentation and hydrodynmics model predictions to refine reef placement
- Spring and fall evaluations
- Gillnet collections (spawners) and egg collections (spring pumping and fall traps)
- · Genetic analysis
- Microzone water quality monitoring
- Visual inspection and side scan habitat mapping

Example of side scan sonar mapping



Egg sampling on reefs





Netting to sample for evidence of spawners



Genetics analysis of spawners



Timeline:

Activity	2015 Project Quarters 2016							
	Q1 (Oct)	Q2 (Jan)	Q3 (Apr)	Q4 (Jul)	Q5 (Oct)	Q6 (Jan)	Q7 (Apr)	Q8 (Jul)
Substrate survey			X	X	X			2
Water quality sampling	X		X		X		X	
Biotic Assessments	2						6 	2
Spawning fish collection	X		Х		X		X	
Egg deposition monitoring	X		X		X	2	X	8
Egg predator collections	X		X		X		X	
Genetic and phenotypic sampling	8		х		х			5
Coordinative & Engagement	1							5
Stakeholder Mtgs		X		X		X		X
Progress Reports		X		X		X		2
Final report								X

Funding provided by The Great Lakes Fish & Wildlife Restoration Act and project partners.

Our National Marine Sanctuaries

Russ Green, NOAA Thunder Bay National Marine Sanctuary






































































Geobiolog



Cyanobacterial life at low O₂: community genomics and function reveal metabolic versatility and extremely low diversity in a Great Lakes sinkhole mat A VOMIME' A IDDNNA'S TENDALL'S IAN¹⁴ D N MARCUS'S C NOLD.⁴ N. D. SHELDON'AND G. J. DICK¹⁵⁰

- - La distribution of the Service model and Service, University of Middgen, Ann Arlon, MJ, USA more Water Romeron Facilitat, Grona V Kally Suis J Distority, Modgen, MJ, USA more Water Romeron Science, Grona V Kally Suis J Distority, Modgen, MJ, USA statistic of Comparison Machine and Bendrimmatics, Elisioni of Hiddgen, Ann Arber, MJ, USA statistics of Comparison and Elisionian Science, Statistica Science, Statistica Andrey, MJ, USA

ABSTRACT

Cyanobade

or: G. J. Dick. Tel : 734 763 3228; fax: 734 763 4690

IUTRODUCTION

thunderbay.noaa.gov

2012 CSMI Nearshore Fisheries Thunder Bay: Effects of Nutrient Rerouting on Fish Communities

Jim Johnson, Todd Wills, Bill Wellenkamp, Dave Fielder, and Mike Thomas





Project partners:

- CMU: Beach zone, food habits of predators;
- EPA: Nutrients nearshore and offshore;
- USGS Great Lakes Science Center & NOAA: Plankton, nearshore and offshore;
- USGS and DEQ: Nutrients in Thunder Bay River and its dams.





Part I Lower food web

Food available to fish has declined since zebra and quagga mussels;

Especially so in shallower water where mussels have greatest effect.











Nutrients and lower food web 2012 findings by:

- NOAA
- EPA
- Michigan DEQ
- USGS







Is the Thunder Bay River a nutrient source for Thunder Bay? NO!

- Point source removals (wastewater cleanups especially in Alpena—Good Job!);
- Heavily forested watershed;
- Reservoirs as nutrient "sinks";



Zebra and quagga mussels taking up nutrients
 in reservoirs & river-mouth area.

USGS/NOAA/EPA



USGS/NOAA/EPA





Summary of nutrient setting

- Decline in pelagic nutrients and plankton;
- Loss of nearshore spring plankton bloom;
- Nearshore plankton bottleneck for larval fish;
- Nutrient signal from Thunder Bay River is rather weak.





Part II

Fisheries response to food web change 2012 findings by:

- Michigan DNR, Alpena and Mt. Clemens
- US Fish & Wildlife Service
- Central Michigan University





Methods

Gear	Metric	Thunder Bay	Lexington	Saginaw Bay
Trap and fyke				
nets	Soak nights	113	34	0
38-114 mm exp.	76 m Soak			
gillnets	nights	44	14	16 [*]
Micromesh				
(12.7, 16.0, 19.1	30 m Soak			
mm) gillnets	nights	41	14	0
10-m bottom				
trawling	Tows (10 min)	43 ten-min tows	6 five-min tows	24 ten-min tows
5-m bottom				
trawling	Tows	12 ten-min tows	0	0

* Saginaw Bay gillnets were 336 m long



Trap net catches









Gillnetting – large, graded mesh







Spring gillnet catch, other species, Thunder Bay



Reckport Week North Pt, Station 1 Black River, Station 2 N = 1,082 10-min tows 1986-2013

30-m bottom trawl trends, Thunder Bay



Beach seine age-0 whitefish catches have declined

- 1993 catch per tow (DNR/FWS):
 - Alpena: 32
 - Ossineke/Devil River: 52
 - Black River/Alcona: 10
- 2012 Catch/tow (CMU):
 - Alpena: 0
 - Ossineke/Devil River: 0
 - Black River/Alcona: 0












Why?



Why?

Changed pathways: benthic colonial algae are leading source of primary production in nearshore, replacing pelagic algae:

- Release of nutrients from decaying Cladophora is during late-season, when least needed by first-feeding fry.
- Benthic colonial algae less efficient vector of nutrients to fish community.



Research finds little in way of new info March 17, 2015

Steve Schulwitz - News Staff Writer , Alpena News

ALPENA - Alpena Municipal Council has been looking for answers to what the debris that washes up on local beaches in Alpena is, where it comes from and how it can control it for years to come. Last summer it hired Environmental Consulting and Technology Inc. for \$13,500 to research the debris and during Monday's council meeting it delivered the results. Little new information was gained from the study. The dark, sludgy material is a combination of wood residue and decaying algae and isn't a health threat to swimmers. The origin and age of the wood is still uncertain but researcher Marty Boote said studies conducted



Miche-ke-wis and Starlite Beach looking north, September 2007

Miche-ke-wis and Starlight Beach looking north, September 2007







Signs of Change for the Better

- Mussel biomass may be declining;
- Are beaches cleaner?
- Will some fish populations recover somewhat?





Miche-ke-wis and Starlight Beach looking north, September 2014



Blair St. Pier ungroomed beach, September 2014





Infestation of Thunder Bay reefs by algae and mussels







East Reef – natural reef overgrown with Cladophora



Reef 'aging':

- dissolved oxygen is high (well data)
- colonization by gobies and periphyton (expected)
- little colonization by quagga and zebra mussels (unexpected)



Mussel colonization rates used to be much faster!



Reef Study conclusions so far:

Natural, degraded reefs do not attract lake trout

Lake trout adults are attracted to the new reefs - but it took time

Lake trout spawned on new reefs, but erratically

Whitefish spawn everywhere (reef habitat not limiting them) – but were lured off degraded reefs?





2012 CSMI Study conclusions so far:

Reproduction of most nearshore fish species declined after mussel invasion (gobies a notable exception);

Lake whitefish are especially affected, declining commercial fishery;

Cause appears to be low prey availability for fry after hatch

Foodweb continues to change – decline in mussels, rise in gobies, reduction in beach wrack.

Nutrient loading is low, probably not a future problem for Thunder Bay.





Recommendations for future work:

- 1. Investigate destination of nutrients released from mussel dieback and beach wrack recirculation (another round of mussel and Cladophora growth, or recovery of food web?);
- 2. Continue to monitor whitefish reproduction will it recover?;
- 3. Nutrients end up on the beaches manage loading carefully;
- 4. Long-term monitoring of reef use and fry production from the new reefs (lake trout, whitefish, walleye)
- 5. Long-term monitoring of aging of the new reefs
 - Sedimentation
 - · Colonization by dreissenids
 - Structural stability



Northeast Michigan Restoration Projects

Jennifer Muladore, Ecologist, Huron Pines





Huron Pines 😢











MISSION:

To conserve the forests, lakes and streams of Northeast Michigan.

ROLES:



- Coordinate large scale, high impact and long-term habitat restoration and enhancement projects
- Pull together private-public sector partnerships in order to take a collaborative approach to solving problems
- Promote our natural assets and link them to economic and community development opportunities in order to improve the quality of life in the region

Huron Pines is a 501(c)(3) nonprofit organization and an equal opportunity provider.





Watershed Restoration

CURRENT PROJECTS:

- Cheboygan River Watershed (2015-2017)
- Au Sable River Watershed (2014-2015)
- Thunder Bay River Watershed (2012-2015)
- Black River (Alcona County) (2012-2015)
- Northern Saginaw Bay (2010-2015)

HOW WE WORK:

 Holistic restoration of watersheds and subwatersheds through removing aquatic passage barriers, stopping and preventing erosion, invasive species control, stormwater management and community engagement



Watershed Restoration

2014-2015 HIGHLIGHTS:



Pine River Erosion



Thunder Bay Erosion/Access



Song of the Morning Dam Removal



Alcona Black River aquatic passage



Land Stewardship

CURRENT PROJECTS:

- Private Lands Stewardship Program
- Pigeon River Country Wildlife Habitat Program
- Kirtland's Warbler Initiative
- Jack Pine Habitat Restoration and Education

HOW WE WORK:

 Coordinate projects on lands of all sizes and ownerships to meet overarching goals for ecosystem resiliency and variety of human uses. Project types include: erosion control, aquatic buffers, stormwater management, wildlife habitat, pollinator gardens, forest management, invasive species removal, management plans, landowner education



Land Stewardship

2014-2015 HIGHLIGHTS:



Kirtland's Warbler Tours and Festival



Photo by Phil Huber



200 site visits across projects in 2015



Pigeon River Country Wildlife Habitat and Oil and Gas Restoration



Invasive Species

CURRENT PROJECTS:

- Northeast Michigan Cooperative Weed Management Area (CWMA)
- Landowner cost-share
- Priority species inventories
- Outreach and Education

HOW WE WORK:

 Through our CWMA partnership, we work with all landowners on coastal and inland sites to fight priority invasive species like phragmites, Japanese knotweed, garlic mustard, Japanese barberry, European frog-bit



Invasive Species

2014-2015 HIGHLIGHTS:



Aerial Phragmites Survey



Mobile Boat Wash



"Invasive Species Blitz" and volunteer events



Galerucella Beetle Releases



Community Engagement

CURRENT PROJECTS:

- Huron Pines AmeriCorps
- Ambassadors for Conservation
- Rose City Stormwater

HOW WE WORK:

 By working closely with community leaders, students, and volunteers we are able to increase the capacity for on-theground projects initiated and sustained locally throughout Northeast Michigan.


2014-2015 HIGHLIGHTS:



Student Monitoring



Professional Development



Community Ser vice



Local Relationships



Project Funding

FEDERAL GRANTS AND CONTRACTS:

- National Fish & Wildlife Foundation
- U.S. Fish & Wildlife Service
- U.S. Forest Service
- U.S. Environmental Protection Agency
- Natural Resources Conservation Service

STATE GRANTS AND CONTRACTS:

- Michigan Department of Natural Resources
- Michigan Department of Environmental Quality
- Department of Military and Veterans Affairs



Project Funding

FOUNDATION GRANTS

- The Carls Foundation
- Elizabeth, Allan, & Warren Shelden Foundation
- Great Lakes Commission
- Great Lakes Fishery Trust
- Au Sable North Branch Area Foundation
- The Conservation Fund
- DTE Energy Foundation
- ITC Holdings Corp.

OTHER SUPPORT

- Conservation partners
- Individual donors
- Local businesses



Huron Pines



CONTACT INFORMATION:

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Sault Ste. Marie, Michigan – May 27, 2015

Planning for Watershed Restoration in the "Twin Soo's"

Mike Ripley, Chippewa Ottawa Resource Authority







RAP Needs Public and Agency Support to "Fix" the Urban Tributaries to the St. Marys River



Pressure from BPAC Helped Lead to Upgrades in Sewage Treatment Plant



Bacteria closes north shore of Sugar Island to swimmers By SCOTT BRAND

The Evening News

SUGAR ISLAND - Residents and visitors to

SUGAR ISLAND — Residents and visitors to the north shore of Sugar Island should refrain from swimming in those waters due to the presence of high bacteria levels, according to an advisory is-sued by the Chippewa County Health Department. "It appears there have been at least two episodes of elevated coliforms this spring," said Dr. James Terrian of the Chippewa County Health Depart-ment.

ment. The latest readings have caused the health de-partment to issue a "no-body contact" advisory for the areas of Sugar Island off of Westshore Drive, Williams Drive and Village Road. Terrian explained E. coli bacteria is an indicator bacteria and tests can be done simply and increme-

bacteria and tests can be done simply and inexpen-sively to determine its presence. While it is not al-ways barmful, the presence of E. coli clearly indi-cates that conditions are right for other, more harm-ful becarie to theira ful, bacteria to thrive.

Most mammals and many birds carry the E. coli bacteria in their intestinal tracts, but Terrian expressed the belief that the levels appearing on Sug-ar Island's north shore are coming from the concentrated dumping of raw sewage and not as a re-sult of animal scat.

"Based on the pictures I've seen, that looks be-yond what a family of beavers could cause in one evening," said Terrian dismissing the animal theory.

ry. Terrian speculated that raw sewage is being pumped into the river from the Sault Ste. Marie, Ont. discharge, adding it is not far from the north shore of Sugar Island. If that is not the case, Terri-no affered un another errulanation.

shore of Sugar Island. If that is not the case, Terri-an offered up another explanation. "It would suggest the smuggling of sewage — or the illegal importation — and maybe we should get the Border Patrol involved," he said quickly adding he was only being fictuitous. Terrian also addressed the possible explanation that the periodic pollution of the north shore is not the result of freent seware discharges that come

that the periodic pollution of the north shore is not the result of recent sewage discharges, but comes from the river flushing out materials that were dumped decades ago. He expressed the belief that it might theoretically be possible for bacteria to live in the St. Marys River, before adding there is other evidence — particularly the presence of con-doms and tampons — which suggests the discharge is more recent. is more recent.

Bacteria can cause a wide range of ailments in-cluding cholera, diphtheria and dysentery. The health department will notify the public once the E. coli readings have fallen to acceptable levels and the "no-body contact" advisory is removed.

Urban Streams Flowing Into St. Marys River Contribute to Impairments



Sault Area Watershed Plan Describes Problems and Suggests Solutions

• Written by Chippewa/East Mackinac Conservation District and Approved by the State of Michigan.

• Michigan has template that includes:

- 1. Definition of Critical Area
- 2. Prioritizing Pollutants, Sources and Causes
- 3. Determining Objectives and BMPs
- 4. Identify existing projects, programs and ordinances
- 5. Involving the Public



Ashmun Creek and Mission Creek in Sault, MI Are Highly Degraded



Ashmun Creek Impairments Include:

• Erosion from Surging Water

• Degraded Water Quality

• Development in Headwaters









Detroit District of Army Corps is Currently Conducting a Feasibility Study to Replace Culverts at Mouth of Ashmun Creek





City of Sault Ste. Marie has also applied for a grant to replace culverts in Mission Creek identified in Watershed Plan





Next Steps

• Need answers to basic questions like how much water and how fast? Which areas contribute most water? What is the most effective way to stabilize?

• Need to do groundwork like permissions, permits, update estimates.

• Need to protect bioreserve from development and provide access to non-motorized recreation.



Sault, Canada Urban Tributaries



Waterfalls on Bennet and East Davignon Creeks



These Are the Same Streams as They Flow Through the City of Sault Ste. Marie





Much of West Side of Sault, Canada was built in the Flood Plain









Solution was to Create Concrete Channels However This Destroyed Fish Habitat and Degrades Water Quality







Draft Watershed Plan for Davignon and Bennett Creeks was Developed by DFO but Never Adopted





Opportunity to Protect Intact Coastal Wetlands



