# Proceedings Report on Great Lakes Coastal and Nearshore Habitat Assessment Project—Michigan

**November 19th, 2019**
**Constitution Hall**
**525 W. Allegan**
**Lansing, MI 48933**
**9:00 am – 4:00 pm**

**Prepared for:**
**Coastal States Organization**

**Final**

**4/13/2020**

LimnoTech
Water Environment | Scientists Engineers

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**Prepared for:**
**Coastal States Organization**

**4/13/2020**

**Prepared at:**
**LimnoTech**
**501 Avis Dr**
**Ann Arbor, MI 48108**

Funding for this project provided by Great Lakes Restoration Initiative

Workshop developed in partnership with:




MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY


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# Introduction

Many Great Lakes shoreline reaches have deteriorated in function and quality due in part to land use change, shoreline alterations, coastal infrastructure, and other influences. Effective restoration actions in these dynamic, complex systems require integrated approaches to enhance coastal biodiversity and promote ecological resilience. To help facilitate the development of these approaches, National Oceanic and Atmospheric Administration (NOAA), the Coastal States Organization (CSO), and Great Lakes Coastal Zone Management Programs conducted workshops in each of the eight Great Lakes states. These workshops were an opportunity for state-level partners to influence the direction of potential future restoration actions in the Great Lakes, and to advocate for funding to be spent at state-prioritized locations for coastal management, Great Lakes Restoration Initiative, and habitat objectives.

The overarching purpose of these workshops was to convene stakeholders and partners and to identify shared coastal management principles, goals, priorities, currently available data sources, and outstanding data needs. Emphasis was on identifying, to the extent possible, place-based actions; partners who could support the planning, execution, and maintenance of restoration actions; and identifying and describing data needs associated with these preferred actions. To meet these objectives, state partners developed invitee lists that drew from a wide range of partners, including representatives from local, state, federal, and tribal organizations. A full summary of the workshop invitees and attendees is provided in Section 5. The workshop results are based on the events of the day and participants in attendance. Organizers made an effort to invite a representative, broad based group of experts. Results are not intended to replace or supplant any current or future planned processes.

This report covers the proceedings of the one-day workshop held in Lansing, Michigan on Tuesday, November 19, 2019 as well as the background materials used during the workshop.

# 1 Morning Session (9:00 AM – 12:00 PM)

## 1.1 Opening Remarks

Mike Molnar from the Coastal States Organization (CSO) started the meeting with introductions and by providing the following background on the workshops:

This series of workshops is an outgrowth of three years of work between CSO, the US Army Corps of Engineers (USACE), NOAA, other Federal Agency partners, and each of the Great Lakes State Coastal Programs to address coastal resiliency issues in the Great Lakes Region. Group efforts originally focused on developing scope of work, and securing funding for the Great Lakes Coastal Resiliency Study (GLCRS). The purpose of the proposed GLCRS was to assess coastal conditions, and develop a risk based management approach for the next 50 years. While the GLCRS did not receive funding in the FY20 USACE budget, and future direction is uncertain at this time; this workshop is an outgrowth of the GLCRS discussions and an opportunity to align state habitat restoration needs with the EPA Great Lakes Restoration Initiative (GLRI) Action Plan. Funding for the workshops provided by agreement with NOAA Office for Coastal Management via US EPA GLRI Focus Area 4. State-level partners worked together to identify and numerically rank habitat restoration projects that align with the restoration goals identified by the GLRI Focus Area 4—Species and Habitat in the draft GLRI Action Plan III (USEPA, 2019). The study area for restoration projects extends in lakes Superior, Michigan, Huron, and Ontario extends from the 80-m bathymetry contour to the ordinary high water mark including terrestrial or inland aquatic habitats including "connecting habitats for coastal species or critical zones of influence for priority nearshore areas" (FA4 Coastal Systems Work Group). For Lake Erie, the study area extends from the 15-m bathymetry contour to the same inland boundary (Figure 1). For the data portion, the boundary goes inland to one county deep and out to the same waterside location as the study boundary.

The goals of this workshop are to:

1. Identify shared coastal management principles and goals for Michigan.
2. Develop a list of coastal and nearshore habitat restoration projects for funding in FY21 and beyond that target habitat benefits for lake trout, walleye, lake sturgeon, yellow perch, cisco, and migratory birds and waterfowl; and,
3. develop a list of available data, identify gaps, and prioritize data needs.

At the conclusion of all state workshops, NOAA will coordinate with other state and federal partners to identify funding mechanisms and determine potential projects to fund. NOAA OCM, NOAA Restoration Center, USFWS, USACE, USGS, EPA, and NFWF, amongst other funders, will look to this list for projects to fund.


**Figure 1. Map of the Michigan Study Area**

## 1.2 Overview Workshop and Agenda

The workshop agenda is summarized in Table 1.

**Table 1. Workshop Agenda**

| Workshop Segment | Purpose | Format |
|---|---|---|
| Introduction (9-9:20 AM) | Describe workshop purpose, preview agenda | Welcome and introductory statements |
| Icebreaker Activity (9:20-9:40) | Prepare group for interactive workshop | |
| Shared Principles and Goals: An overview of state and regional plans (9:40-10) | Prepare audience for discussions by providing overview of past communicated priorities, and identifying alignments with GLRI Action Plan III Focus Area 4 | Very brief presentation summarizing state-level reports and GLRI Action Plan III Focus Area 4 |
| Identification of Coastal Habitat Principles (10-10:25) | Start prioritization process by considering high-level principles guiding action | Small group brainstorming and reporting question prompting discussion |
| Mid-Morning Break | | |
| Identification of Coastal Habitat Goals (10:45-12:00) | Transition to identification of regional or species-specific goals, target 3-5 goals per region | Small group brainstorming organized by region with report out |
| Lunch Break | | |
| Identifying and Prioritizing Projects and Locations: An overview of state and regional plans (12:30-12:50) | Prepare audience for discussions of project prioritization and data needs by summarizing past projects | Very brief presentation summarizing past projects |
| Identification and Prioritization of Project Locations (12:50-2:20) | Roughly identify extent of potential projects and prioritize these. Complete worksheets summarizing potential project details. | Small group identification of potential projects on physical maps organized by region or target species |
| Mid-Afternoon Break | | |

| Workshop Segment | Purpose | Format |
|---|---|---|
| Overview of Data Availability (2:35-2:45) | Prepare audience for discussion of data gaps by summarizing presently available data | Very brief presentation of available data related to habitat |
| Collaborative Identification of Data Needs (2:45 – 3:45) | Identify data gaps and articulate why these data are needed. Complete worksheets summarizing data needs. | |
| Wrap-up and Evaluation (3:45 – 4) | Note forthcoming reports and request completion of evaluation forms | Paper evaluation form |

## 1.3 Shared Principles and goals: A Review of State And Regional Plans

Before working together to identify common habitat restoration goals and principles, LimnoTech staff gave a brief presentation highlighting regional principles and goals for habitat restoration in Lake Michigan. The purpose of this presentation was to help workshop attendees consider their own principles and goals related to habitat restoration in the lake that they typically work in. For brevity, only highlights from Lake Michigan were included.

LimnoTech first started by defining the terms "principles" and "goals", and then gave several examples from the GLRI Action Plan III and the Lake Michigan Biodiversity Conservation Strategy (Pearsall et al., 2012). Principles were defined as foundational science-based ideas that would influence action. Goals were defined as the desired result of an action. Principles and goals from the GLRI Action Plan III and The Lake Michigan Biodiversity Conservation Strategy are summarized in Figures 2 and 3. To link the regional plans to state-level planning efforts, LimnoTech also presented several principles and goals from several of the Great Lakes Fisheries Commission's Environmental Objectives reports (Davies et al., 2005; Rutherford et al., 2005; Liskauskas et al., 2007). These principles and goals are summarized in Figure 4.

LimnoTech discussed how alignment exists between principles and goals defined in past reports and the objectives, commitments, and measures expressed in GLRI Action Plan III Focus Area 4 (Habitat and Species). Attendees were encouraged to identify alignment between their current principles and goals expressed during the workshop, and the GLRI action plan.

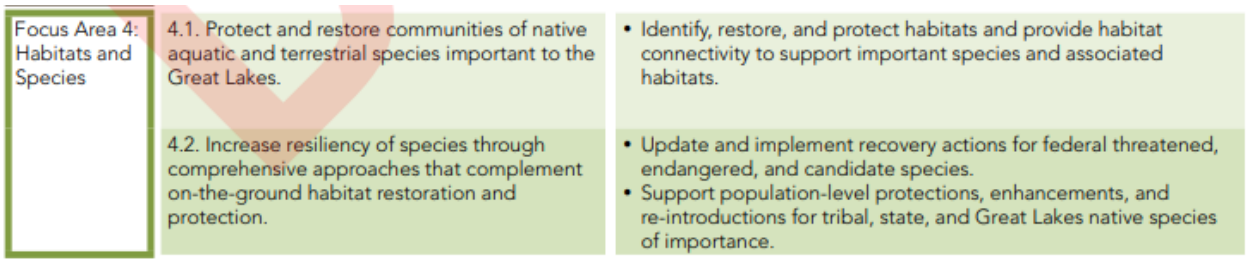


**Figure 2. Summary of Focus Area 4—Species and Habitat Principles and Goals Excerpted from GLRI Action Plan III (USEPA, 2019)**

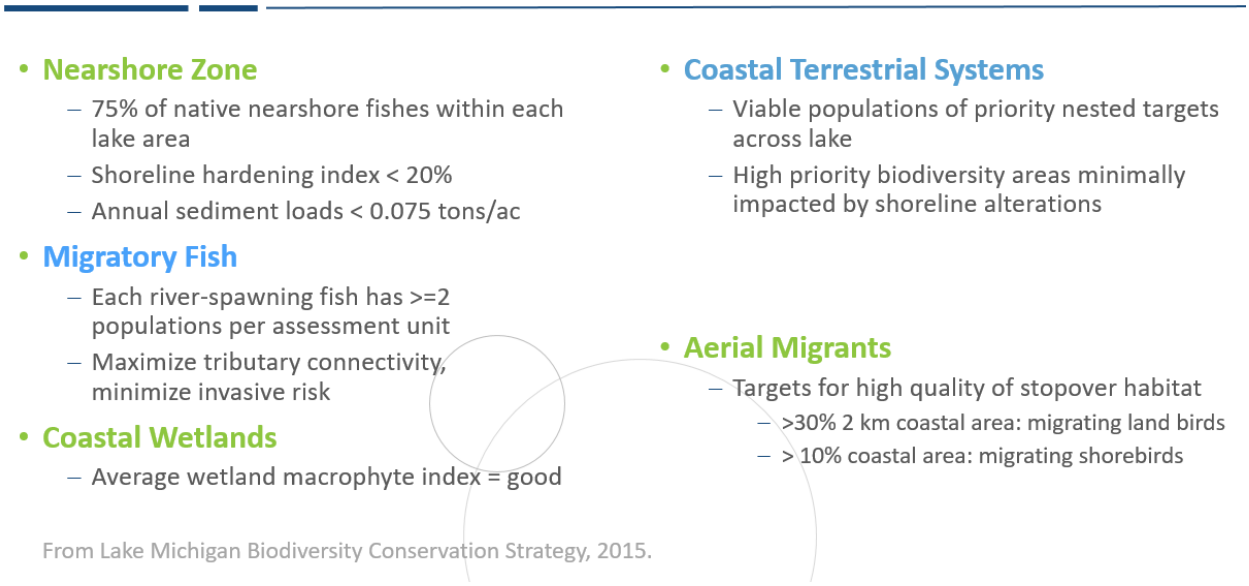


**Figure 3. Summary of Select Habitat Restoration Goals Presented in the Lake Michigan Biodiversity Conservation Strategy (Pearsall et al., 2012)**


**Figure 4. Summary of Select Principles and Goals from Great Lakes Fisheries Commission's Environmental Objectives Reports (Davies et al., 2005; Rutherford et al., 2005; Liskauskas et al., 2007)**

LimnoTech discussed how alignment exists between principles and goals defined in past reports and the objectives, commitments, and measures expressed in GLRI Action Plan III Focus Area 4 (Habitat and Species). Attendees were encouraged to identify alignment between their current principles and goals expressed during the workshop, and the GLRI action plan.

## 1.4 Identifying Principles

During an approximately 25-minute interactive session, workshop attendees organized themselves into groups of approximately six people and responded to the following prompt:

1. What do you think are the key principles for achieving success in nearshore habitat restoration in the great lakes and/or your state?

Each small group reported out on three words or phrases representing the key principles underlying successful habitat restoration projects (Figure 5 and 6). The words and phrases could generally be broken into four broad categories: partnerships and planning, support, science and data, and sustainability. The full results from the first prompt are summarized in Table 2.

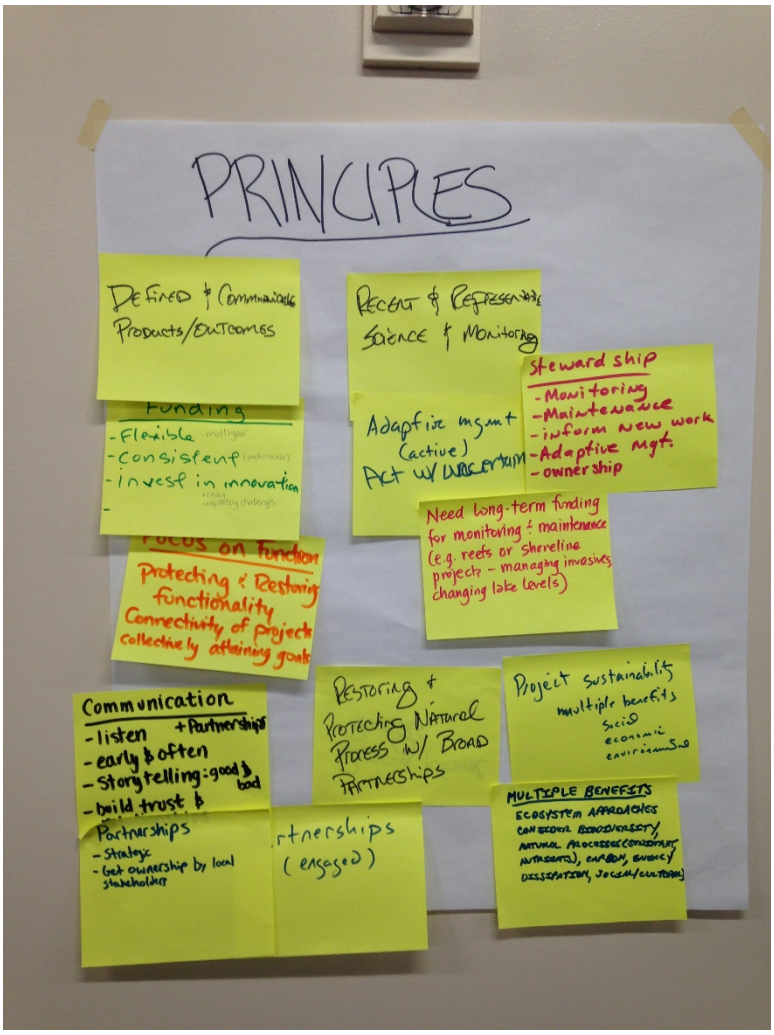


**Figure 5. Snapshot of the Results from the Principles Discussion**


**Figure 6. Participants Working Together to Develop Common Principles**

**Table 2. Summary of Key Principles Reported by Each Working Group**

| Category | Key Principle | Further Details |
|---|---|---|
| **Partnerships and Planning** | | |
| | Develop broad partnerships | • Should represent all parts of the landscape |
| | Develop engaged partnerships | • Participants should provide more than just a logo |
| | Clear communication with partners | • Don't just tell them, but listen to what they want/need (it's about more than just the<br>• Communicate early and often<br>• Storytelling: include both the good and bad<br>• Building trust in those partnerships<br>• Ownership |
| **Support** | Funding | |
| | Funding | • Should include funds for long-term monitoring and maintenance<br>• Flexible to account for changing needs |
| **Science and Data** | Recent and representative science and monitoring | • New projects may need to re-evaluate data |

| Category | Key Principle | Further Details |
|---|---|---|
| | | • Recognition of the diversity of conditions on a landscape<br>• Restoration and protection of natural processes<br>• Broad partnerships around those needs |
| | Recognition of natural processes | |
| | Adaptive management | • Is the project we did doing what we wanted it to do |
| **Sustainability** | Sustainable projects | • Target ecosystems with multiple benefits<br>• Incorporate social aspects for public support |
| | Stewardship | • Long-term monitoring and maintenance<br>• Ownership: who is managing this after completion? |

## 1.5 Identifying Goals

During an approximately 90-minute interactive session, workshop attendees worked together to identify a common set of goals that could be used to later prioritize habitat restoration projects. Participants self-organized into one of four groups by lake: Superior, Michigan, Huron and connecting channels, and Erie and connecting channels (Figure 7). The study area for restoration projects extended in lakes Superior, Michigan, Huron, and Ontario from the 80-m bathymetry contour to one coastal county inland. For Lake Erie, the study area extended from the 15-m bathymetry contour to one coastal county inland. Each group was asked to develop 3 to 5 goal statements related to either a target species of interest or a region or location of interest (Figures 8 through 12).

When setting goals, participants were asked to be specific. Each goal statement needed to contain the following four elements:

1. The *subject or resource of concern*
2. The *characteristic or attribute* for the subject or resource of concern
3. The *desired future condition or conceptual target* for that attribute within a 10-year implementation timeframe
4. A measure, if possible

Using these four elements, an example of a full goal statement could be something like "hydrologic connectivity will be restored (by 10%) for fish species that spawn in upstream tributaries".

Each small group reported its goal statements to the full group, and a nominal voting process was conducted to prioritize goals. The nominal voting process allowed all workshop participants to comment on goal statements that they were not able to direct participate in identifying. To vote, participants were given two dots for each region: one green and one red. For each region, participants had to select their highest priority using a green dot and their lowest priority using a red dot. For Lake Huron, participants were split across goal statements. Therefore, one more round of voting, using a purple dot, was required. Participants were each given one purple dot and told to select their top goal statement for Lake Huron. It should be noted that only nineteen workshop participants elected to participate in this final round of voting (as opposed to twenty-four who participated in the first round of voting). The goal statements and the results of the nominal voting process are summarized in Table 3.

At the conclusion of this session, attendees were asked if they had any issues with the goals. Several participants mentioned that it is important to recognize that we were setting goals while there is still a lot of missing information. Another participant mentioned that setting goals without complete information is what their group had in mind when they mentioned "investing in innovation" or funding innovative restoration projects. The Lake Superior group also mentioned that they felt hampered in goal setting because their group was lacking in regional expertise.

There was also some discussion about how to use these goals to rank projects. While no conclusive decisions were reached, the comments on this topic are summarized below:

- Comment: ¾ of the population is in southeast Michigan, from my perspective we should spend most of the money in the population centers
- Comment: but thinking about the function of the system, we might need a high value project in the upper peninsula
- Comment: it's easier to preserve something than to restore it, so that might result in high spending in low population areas
- Comment: sometimes it's project readiness, and it can be low hanging fruit

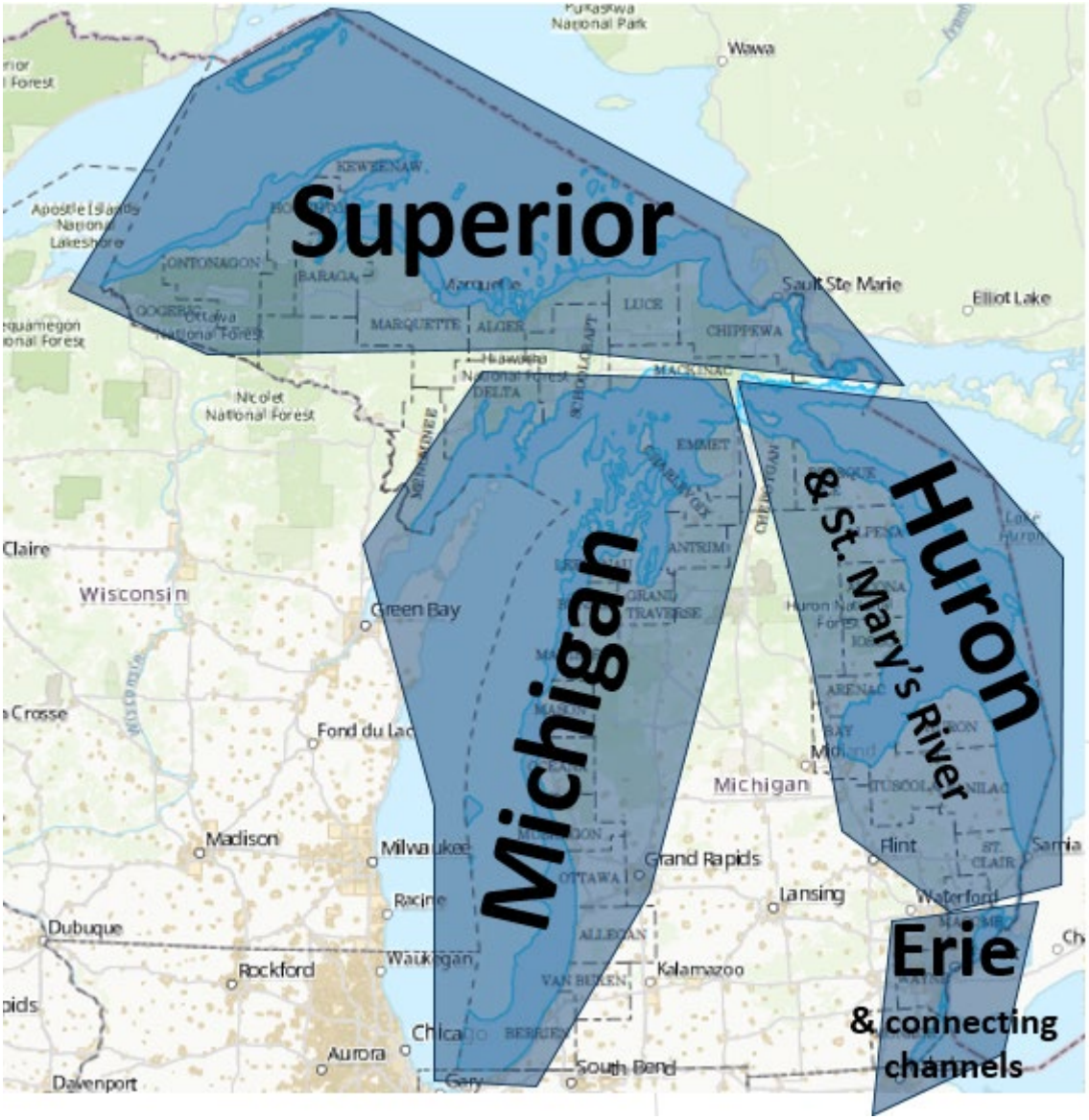


**Figure 7. Map of Michigan Coastlines and the Approximate Geographic Extent of the Four Groups: Superior, Michigan, Huron & Connecting Channels, and Erie & Connecting Channels**

**Figure 8. Lake Superior Group Developing Goal Statements**

**Figure 9. Lake Huron Group Developing Goals Statements**

**Figure 10. Lake Michigan Group Developing Goals Statements**

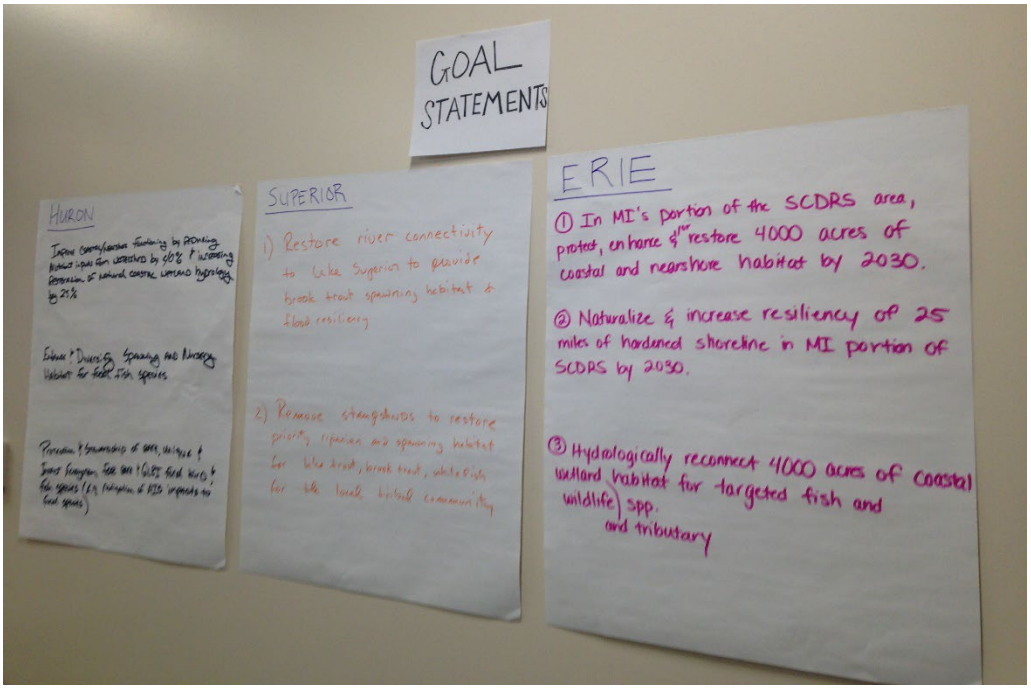


**Figure 11. Goal Statements for Huron, Superior, and Erie**

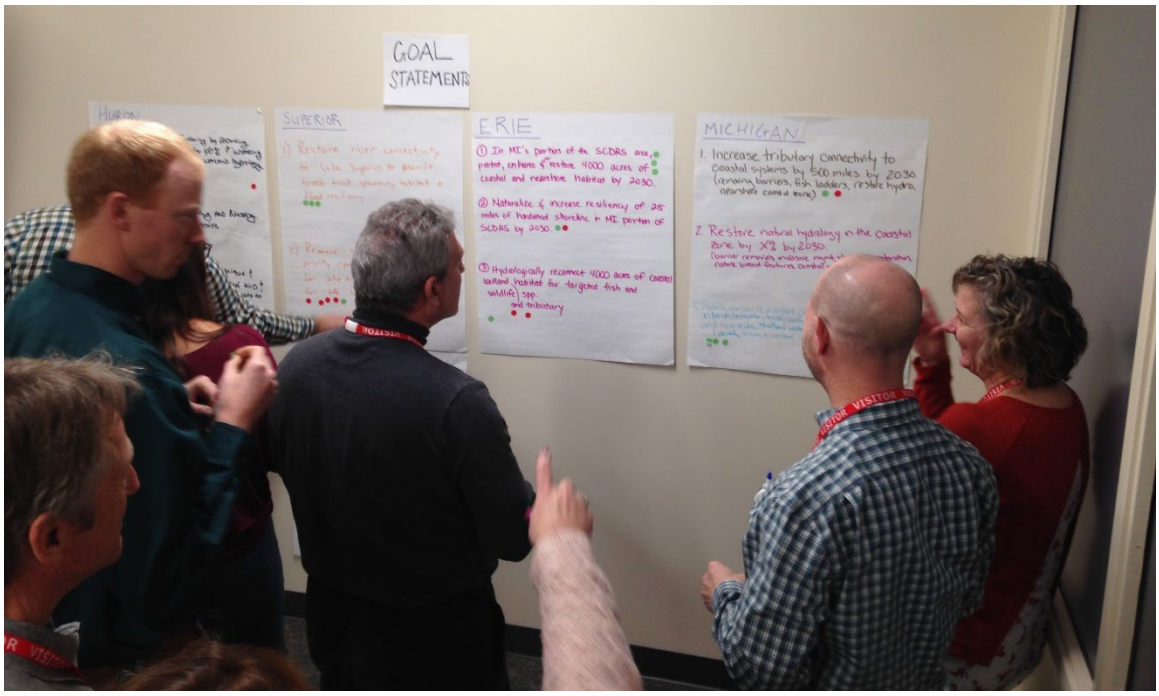


**Figure 12. Nominal Voting on Goal Statements by Group**

**Table 3. Summary of Goal Statements by Region and the Results of the Nominal Voting Process**

| Region | Goal | Green Dot | Red Dot | Purple Dot |
|---|---|---|---|---|
| **Superior** | | | | |
| | Maintain and protect priority coastal forest habitat for migratory bird stopover habitat | 6 | 7 | |
| | | 1 | 8 | |
| **Michigan** | | 14 | 1 | |
| | | 6 | 14 | |
| | | 4 | 8 | |
| **Huron** | Enhance and diversify spawning and nursery habitat for focal fish species | 9 | 9 | 10 |
| | | 8 | 9 | 6 |
| | | 7 | 6 | 3 |
| **Erie** | | 17 | 1 | |

| Region | Goal | Green Dot | Red Dot | Purple Dot |
|---|---|---|---|---|
| | | | | |
| | Naturalize and increase resiliency of 25 miles of hardened shoreline in MI portion of SCDRS by 2030 | 2 | 10 | |

# 2 Afternoon Session (12:30 PM – 4:00 PM)

## 2.1 Identifying and Prioritizing Projects and Locations: A Review of State and Regional Plans

Before working together to identify and prioritize habitat restoration projects, LimnoTech staff gave a brief presentation highlighting the different types of restoration projects targeted by the GLRI and examples of both GLRI-funded habitat restoration projects and other types of habitat restoration projects that have been funded in the state. Materials for this presentation were develop by LimnoTech with support from the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Coastal Management Program. The purpose of this presentation was to provide some background of recently completed and planned projects in the state to help spur conversations between participants.

According to GLRI Action Plan III, the GLRI funds habitat restoration projects that target the "…protection, enhancement, rehabilitation, and restoration" of ecosystems. LimnoTech provided definitions for the four types of projects and examples of projects recently completed in Figures 13 and 14 (USEPA, 2016).

After the presentation, staff from the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Coastal Management Program were given the opportunity to speak about planning habitat restoration projects within the state. Michigan is a very active state with respect to habitat restoration, and Michigan EGLE staff emphasized the importance of early coordination with permitting entities (typically the state or US Army Corps of Engineers). Another key step in project development is the identification of the potential benefits the project will provide as well as some assessment related to potential adverse impacts. When discussing habitat restoration projects in small groups, workshop participants were encouraged to consider permitting when selecting and scoping projects.


**Figure 13. Types of Habitat Restoration Projects as Defined by USEPA (USEPA, 2016)**

| Restoration Type | GLRI Funded Projects | Other Michigan Projects |
|---|---|---|
| Protection | Piping plover habitat preservation | Tittabawassee River Green Corridor<br>- Protects 2,000 ac of private land with conservation easements |
| Enhancement | Maintain and enhance lake trout production capabilities at Jordan River NFH | Grand Traverse Bay Spawning habitat enhancement<br>- Adding 450 tons of additional rock to existing reef |
| Re-establishment | Keweenaw Bay Indian Community Brownfield Restor.<br>- Brownfield remediation and re-establishment of native wildlife food plants | Restoration of Saginaw Bay rock reefs<br>- 1 ac of rock reef restored |
| Rehabilitation | Restoring Hydrological Function of Dowagiac R.<br>- Restore 5 miles of natural hydrology to Dowagiac River | 2017 Syndicate Park Dunes Restoration and Education Project<br>- 20 ac in Van Buren Twnshp |

**Figure 14. Examples of funded projects in the State of Michigan**

## 2.2 Identifying and Prioritizing Locations

During an approximately 90-minute interactive session, workshop attendees brainstormed potential project locations and marked up maps to document these projects (Figures 15 through 17). Each group then presented three of their proposed projects, and summarized how these locations align with principles and goals for regional habitat restoration that were developed in the morning session.

After each region pitched their top three projects, all workshop attendees were given the opportunity to vote on them using blue, orange, and yellow sticky dots. Attendees were asked to rank the projects within each lake against each other in order to determine the top project in each lake. Each color of sticky dot

(blue, orange, and yellow) represented their first, second, and third choice, respectively. After workshop attendees voted, each project then received a score by totaling the number of first, second, and third place votes for each project, and then multiplying each of those counts by either one, two, or three points to calculate the final score for each project. The top project in each lake was the project with the greatest number of points. The sticky dot colors and the point system are summarized in Table 4.

The top projects from each lake then went on to a second round of voting. Participants were each given one purple dot and asked to select their top project out of all the lakes. This resulted in a ranking of all the top projects across all the lakes. After the final round of voting, there was a tie for first place between the Lake Michigan project and the Lake Huron Project, both with eight purple dots. To break this tie, participants were asked to pick between the two top projects. The Lake Michigan project came in first, with eleven votes, and the Lake Huron project came in second with nine votes. This information is also summarized in Table 5.

After the ranking process, many attendees noted that this step was difficult because there was value in all of the proposed projects. To ensure that no project information was lost, all projects that were discussed by individual groups are included in Attachment A.

There was also a detailed conversation about "next steps" and funding related to these opportunities. Since the Michigan workshop the workshop team has had several conversations about how best to answer these questions. The results of these conversations have been included in Section 3.2 Next Steps of this proceedings report.

**Figure 15. The Lake Superior Group Discussing Proposed Project Locations**

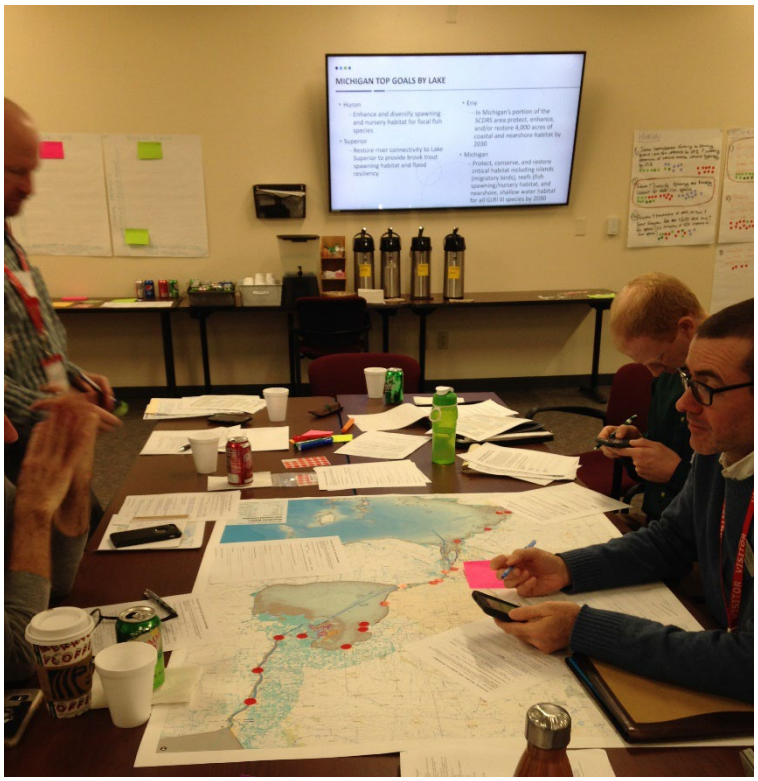


**Figure 16. The Lake Erie Group Discussing Proposed Project Locations**


**Figure 17. Participant Voting on Proposed Project Locations**

**Table 4. Summary of Voting System**

| Dot Color | Rank | Point Value |
|---|---|---|
| Blue | First | 3 |
| Orange | Second | 2 |
| Yellow | Third | 1 |

**Table 5. Summary of Proposed Projects by Lake**

| Region | Map # | Project | Further Details | Blue (1st) | Orange (2nd) | Yellow (3rd) | Lake Specific Score | Lake Specific Rank | Overall Lake Score | Overall Lake Rank |
|---|---|---|---|---|---|---|---|---|---|---|
| **Superior** | | | • This is a dam passage and road crossing removal project to restore brook trout and lake sturgeon habitat<br>• The Ontonagon River encompasses most of the western UP.<br>• Would be nice to have dam passage or removal here | | | | | | | 4th |
| | 4 | Swedetown Creek and Coles Creek | | 5 | 6 | 11 | 38 | | | |
| | 5 | Pictured Rocks National Lakeshore and vicinity | | 1 | 11 | 9 | 34 | | | |

| Region | Map # | Project | Further Details | Blue (1st) | Orange (2nd) | Yellow (3rd) | Lake Specific Score | Lake Specific Rank | Overall Lake Score | Overall Lake Rank |
|---|---|---|---|---|---|---|---|---|---|---|
| Michigan | 2 | Rehabilitate habitat in 6 Drowned River Mouth Wetland complexes in Southeast Lake Michigan. Restore wetlands, re-establish connection, address invasive species | • Drowned river mouths are unique systems that provide neat wetland habitat<br>• Lots of development through industry and residential<br>• lots of river bank and shoreline restoration potential<br>• Would restore habitat for water fowl, walleye, northern pike, yellow perch, sturgeon, ducks<br>• Grand Valley State Univ. and several other partners are already on board | 16 | 4 | 3 | 59 | 1st | 8 (11) | 1st |
| | 3 | Lake Michigan reefs--protect and rehab through physical actions and/or aquatic invasive species removal | | 8 | 10 | 3 | 47 | | | |

| Region | Map # | Project | Further Details | Blue (1st) | Orange (2nd) | Yellow (3rd) | Lake Specific Score | Lake Specific Rank | Overall Lake Score | Overall Lake Rank |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | • Benefits many of species: whitefish, walleye, cisco | | | | | | | |
| | 1 | Supporting/ advancing migratory waterfowl protection/ restoration on northern Lake Michigan islands (multiple actions & partners) | • Variety of potential activities here<br>• Many species in this area<br>• Potential for a variety of projects | 2 | 6 | 12 | 30 | | | |
| **Huron** | 2 | Saginaw Bay coastal wetland restoration | • Would benefit local fish species<br>• Actual geography may not be critical<br>• Opportunistic focus with a goal to restore | 13 | 6 | 4 | 55 | 1st | 8 (9) | 2nd |
| | 1 | Dam removal in Thunder Bay, Alpena, MI | • Taking dams out would restore fish passage and restore rapids<br>• Currently managed by Great Lakes renewable energy | 8 | 10 | 3 | 47 | | | |
| | 5 | Les Cheneaux islands coastal protection | • Important spawning habitat for cisco, yellow perch, and others | 1 | 6 | 14 | 29 | | | |

| Region | Map # | Project | Further Details | Blue (1st) | Orange (2nd) | Yellow (3rd) | Lake Specific Score | Lake Specific Rank | Overall Lake Score | Overall Lake Rank |
|---|---|---|---|---|---|---|---|---|---|---|
| **Erie** | 8 | Fords Cove | • This project is on the Ford Estate, which is in a county that has the 2nd highest number of boat registrations in the state<br>• It would address the lack of naturalized shoreline<br>• Create 8 acres of nearshore habitat, increasing fish nursery habitat<br>• 5.5 acres of coastal marsh enhancement in very visible site.<br>• This is definitely a priority project for the area | 14 | 2 | 6 | 52 | 1st | 4 | 3rd |
| | 1 | North Maumee Bay restoration | • This is a bottom land restoration project<br>• Would provide a beneficial use of dredged materials<br>• Reestablish emergent and submerged marsh using innovative techniques (floating islands, etc.)<br>• Ties into sediment and nutrient reduction | 7 | 11 | 4 | 47 | | | |
| | 4 | Pointe Mouillee State Game Area | • This project is a suite of projects on state property<br>• 66 acres of coastal wetland | 1 | 9 | 11 | 32 | | | |

| Region | Map # | Project | Further Details | Blue (1st) | Orange (2nd) | Yellow (3rd) | Lake Specific Score | Lake Specific Rank | Overall Lake Score | Overall Lake Rank |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |

## 2.3 Overview of Data Availability

Before working together to identify data needs, LimnoTech staff briefly presented their understanding of data gaps for the state of Michigan. This understanding was based on a region-wide search for data and with assistance from Michigan (EGLE) Coastal Management Program staff. Data gaps were described in terms of presence/absence, spatial resolution (low to high), and temporal resolution (low to high). As part of the data gap analysis, LimnoTech identified thirty-four types of data that could be useful for planning habitat restoration projects. This list of data types was generated after a review of papers produced as part of the Great Lakes Aquatic Habitat Framework (GLAHF) (Kovalenko et al., 2018; Wang et al., 2015) and an in-house review by a LimnoTech fish biologist.

In summarizing datasets LimnoTech divided data sets into three groups: physical, biological, and environmental (Figures 18 through 21). A glossary of terms used in Figures 18 through 21 can be found in Section 6.

- **X**
  - We have found a dataset that matches the metric
- **OK**
  - sufficient level of information for project-scale work
- **LOW**
  - The resolution of the data is technically insufficient to complete project-scale work
- **MODERATE**
  - The resolution of the data is more coarse than desired to complete project-scale work, but useable
- **HIGH**
  - There is sufficient high-resolution to use this dataset for project scale work

| Spatial Resolution | Temporal Resolution |
|---|---|
| Ok | Ok |
| Low | Low |
| Moderate | Moderate |
| High | High |

**Figure 18. Summary of Short-Hand Used in Data Gap Analysis Presentation**

| Data Type | Present? | Spatial Resolution | Temporal Resolution | Notes |
|---|---|---|---|---|
| Discharge infrastructure: volumes and types | | | | GAP |
| Ecoregions (ecoprovinces) | X | Ok | Ok | |
| Dams (river access) | X | Ok | Ok | |
| Road crossings | X | Ok | Ok | |
| Shoreline classification | X | Ok | Ok | |
| Stream mouths (watershed pour points) | X | Ok | Ok | |
| Watersheds | X | Ok | Ok | |
| Bottom ruggedness (rugosity) | | | | GAP |
| Bottom slope | X | Low | Low | Derived depth & relief |
| Connectivity to adjacent habitats | | | | GAP |
| Hydrogeoforms | X | Low | Low | Derived depth & relief |
| Relative exposure index (REI) | | | | GAP |
| River substrate | | | | GAP |
| Spawning reefs | X | Ok | An update? | Many old srcs, 2011 |
| Substrate composition, variability, and distribution | X | Low | Low | 2015, GLAHF 30-m |
| Water depth | X | High | Moderate | LMCP |
| Wave energy | X | Moderate | Moderate | USACE modeled results |
| Wave height | X | Low | High | GLOS buoy (no win. data) |

**Figure 19. Data Gap Summary for Physical Data**

| Data Type | Present? | Spatial Resolution | Temporal Resolution | Notes |
|---|---|---|---|---|
| Benthos (trophic str/func) | X | Moderate | High | GLNPO points, most recent 2011 |
| Coastal wetlands | X | Moderate | Ok | MTRI 12.5-m |
| Fish (trophic str/func) | | | | GAP (CSMI focus area) |
| Plankton (trophic str/func) | X | | High | GLNPO data |
| Prevalence of invasive species | X | Moderate | Moderate | GLANSIS, most recent 2014 Phragmites stands |
| Submerged aquatic vegetation (presence/absence) | X | Low | Low | Mich. Tech Research Inst, 2012, 30-m |
| Vegetation density | | | | GAP |
| Vegetation heterogeneity | | | | GAP |
| Vegetation morphotype | | | | GAP |
| Vegetation species composition | | | | GAP |

**Figure 20. Data Gap Summary for Biological Data**

| Data Type | Present? | Spatial Resolution | Temporal Resolution | Notes |
|---|---|---|---|---|
| Chlorophyll-a | | | | GAP |
| Turbidity | | | | GAP |
| Suspended minerals | | | | GAP |
| Water temperature (incl. timing/variability) | X | Low | Moderate | Derived from NOAA coastwatch satellite |
| Dissolved oxygen | | | | GAP |

**Figure 21. Data Gap Summary for Environmental Data**

## 2.4 Collaborative Identification of Data Needs

Data was discussed two ways during the workshop. The two-step approach was used to try to encourage and capture conversations related to data throughout the course of the workshop. The first method was to use a data wall (Figures 22 and 23). On the data wall, workshop participants had the opportunity to identify two types of datasets: those that they needed and those that they had. Participants were also able to qualitatively identify the spatial resolution of the data (ranging from basin scale to local scale) and the temporal resolution of the data (ranging from sampled once to sampled annually). Table 6 summarizes the data needs identified using the data wall. Additional workshop discussion items related to data needs follow this table. Data summary worksheets filled out by workshop participants can be found in Attachment B.

The second way that data was discussed was by having participants return to their lake groups. Participants were asked to consider three questions:

1. Do you have data to fill the identified data gaps?
2. What data do you need to complete your proposed project?
3. What data do you need to identify and prioritize future projects?

The answers to these questions are summarized in Tables 7 and 8.

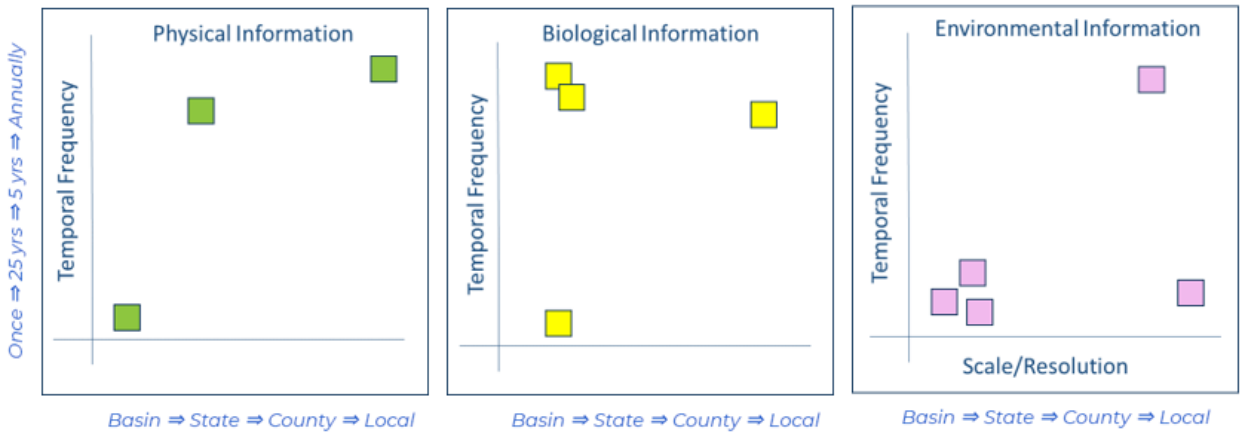


**Figure 22. Conceptual Schematic of the Data Wall**

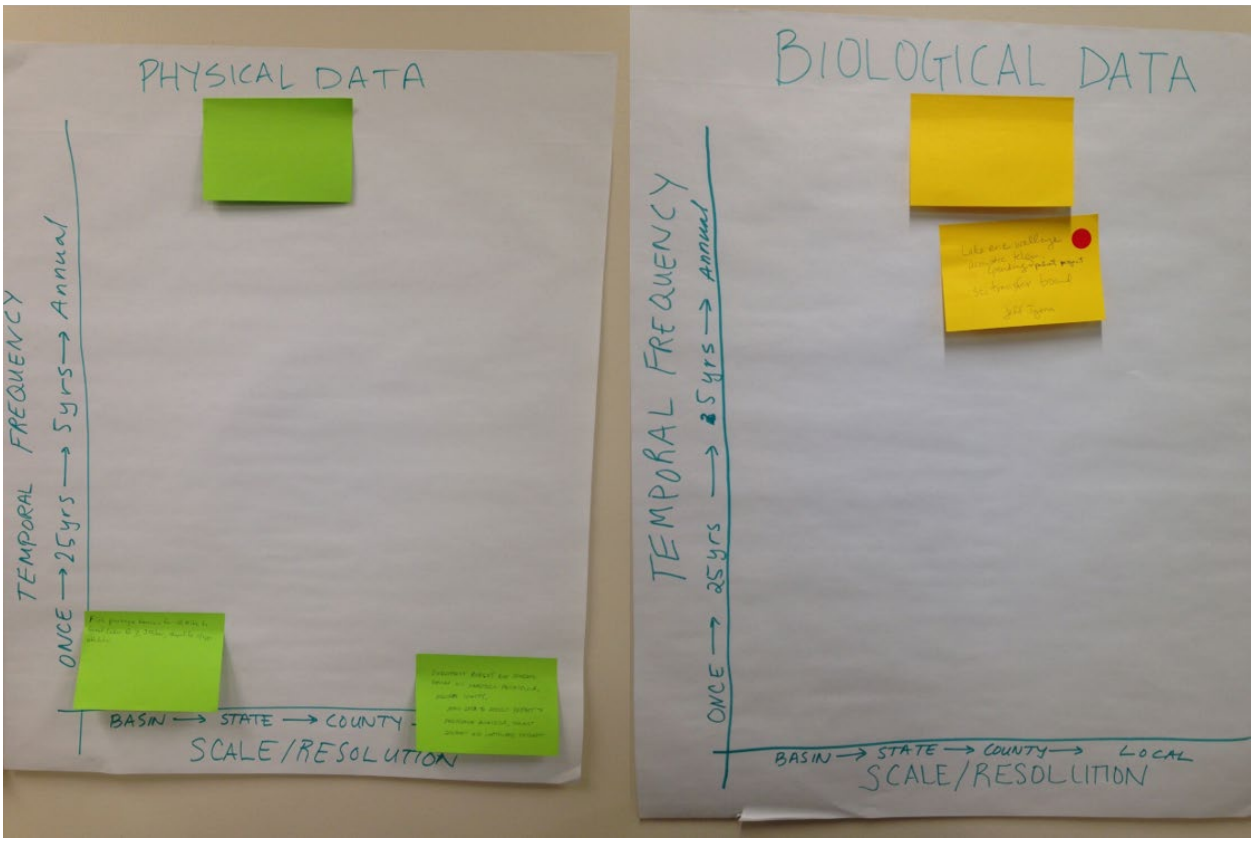


**Figure 23. Data Wall for Physical and Biological Data Sets**

**Table 6. Summary of Datasets Included on the Data Wall**

| Data Type | Have or Need | Description | Temporal Scale | Spatial Scale | Contact or Notes |
|---|---|---|---|---|---|
| **Physical** | | | | | Data curated by Huron Pines |
| | Need | | Low | Low | |
| | Need | | Low | High | |
| **Biological** | Have | Lake Erie walleye acoustic telemetry data from a pilot project | Moderate (county) | High (annual) | Curated by Great Lakes Fisheries Commission (Jeff Tyson) |
| **Environmental** | No data sets or data needs identified | | | | |

**Table 7. Summary of Data Sets Available to Fill Data Gaps**

| Lake | Data Set | Contact |
|---|---|---|
| **Michigan** | EGLE has NPDES discharge permit data | |
| | USACE has navigation channel data for rugosity | |
| | USGS has a software package called "circuitscape" for evaluating connectivity | |
| | USACE and NOAA have sites for wind and wave energy | |
| | Michigan DNR has fish data | |
| | Food web model | Ed Rosemund |
| **Erie** | St Clair/Detroit River project is working with Great Lakes Aquatic Habitat Framework to develop site-specific data for SCDRS projects. Mapping for all past and pending projects in the system | GLAHF |
| **Huron** | Michigan Natural Features Inventory data is available upon request | Mike Monfils |
| **Michigan** | EGLE has NPDES discharge permit data | |

**Table 8. Summary of Data Needs by Lake**

| Lake | Information Type | Project data needs? | Prioritization data needs? |
|---|---|---|---|
| **Superior** | What | finer resolution of infiltration rates (darcy layer) per sq. mile draining rates for watershed or drainages | No information provided |
| | Where | Basinwide | No information provided |
| | Why | Important for quantification of the amount of water that will impact structures such as road stream crossings | No information provided |

| Lake | Information Type | Project data needs? | Prioritization data needs? |
|---|---|---|---|
| | Resolution | Once/Basinwide | No information provided |
| **Michigan** | What | To prioritize within the Drown River Mouth projects:<br>• Vegetation mapping/inventory<br>• Shoreline development map<br>• Compilation of existing efforts (planned and implemented)<br>• Peer review of priorities<br>• Update Bathymetry<br>• Yellow perch habitat suitability map<br>• Land use mapping/real estate map (historic and current)<br>• Community assessment | No information provided |
| | Where | no information provided | No information provided |
| | Why | no information provided | No information provided |
| | Resolution | annual/basin wide | No information provided |
| **Huron** | What | larval fish survey focused on focal species. Need distribution and wetland usage | Nutrient loading data for Saginaw Bay and watershed |
| | Where | Saginaw Bay | Saginaw Bay |
| | Why | To help focus priority wetland restoration | We lack spatial and temporal nutrient loading data for Saginaw Bay. This data would help with target |

| Lake | Information Type | Project data needs? | Prioritization data needs? |
|---|---|---|---|
| | | | setting, tracking, prioritization, implementation, etc. |
| | Resolution | Annual/County | Annual/County |
| **Erie** | What | • Catch per unit of focal fish species<br>• Element occurrence for target species and habitat<br>• Site specific environmental and physical attributes (e.g., wave energy) that is higher resolution<br>• Annual peak densities of focal fish species | Local sediment, nutrient, water quality, wave energy data |
| | Where | St Clair/Detroit River | Maumee Bay<br>Ford Cove<br>other St Clair/Detroit River sites |
| | Why | Helpful for permit approval | Regulators require it prior to permit review |
| | Resolution | Once/Local | Once/Local |

# 3 Workshop Summary

## 3.1 Workshop Findings

### 3.1.1 Common Principles

Workshop participants identified four common principles that underlie many successful habitat restoration projects:

1. They involve collaborative planning and stakeholder engagement that occurs early and often to make sure all voices are heard.
2. They require funding that is reliable so that planning for the future can occur. These funds should also be flexible enough to adapt to emerging project needs.
3. They use sound science and a data driven decision making process so that the effects of the restoration process can be quantified. And,
4. They are sustainable into the future and take into account a wide variety of environmental conditions.

### 3.1.2 Common Goals

The top common goal identified by workshop participants are summarized in Table 9. It should be noted that while workshop attendees were able to come to consensus around common goals, they also recognized that, in many cases, the current data is insufficient to quantitatively assess these goals. The types of baseline data that workshop attendees would like to collect are outlined in Section 2.5.

**Table 9. Summary of Top Goals for Each Lake Identified by Workshop Participants**

| Lake | Goal |
|---|---|
| **Superior** | Restore river connectivity to lake Superior to provide brook trout spawning habitat and flood resiliency (culvert crossing ~3 fps) |
| **Michigan** | Protect, conserve, and restore critical habitat including islands (migratory birds), reefs (fish spawning/nursery habitat), and nearshore, shallow water habitat for all GLRI III species by 2030 (identify, protect, restore, understand) |
| **Huron** | Enhance and diversify spawning and nursery habitat for focal fish species |

| | |
|---|---|
| **Erie** | In Michigan's portion of the St. Clair/Detroit River area protect, enhance, and/or restore 4000 acres of coastal and nearshore habitat by 2030 |

### 3.1.3 Identification of Workshop Priorities

The results from the habitat restoration project prioritization process are summarized in Table 10. For further details about the projects in the table, see Section 2.2. For further information about projects that were not ranked, please see Attachment A.

**Table 10. Summary of Ranked Michigan Habitat Restoration Priorities Developed by Workshop Participants**

| Region | Map # | Project | Further Details | Overall Lake Rank |
|---|---|---|---|---|
| **Michigan** | 2 | Rehabilitate habitat in 6 Drowned River Mouth Wetland complexes in Southeast Lake Michigan. Restore wetlands, re-establish connection, address invasive species | • Drowned river mouths are unique systems that provide neat wetland habitat<br>• Lots of development through industry and residential<br>• lots of river bank and shoreline restoration potential<br>• Would restore habitat for water fowl, walleye, northern pike, yellow perch, sturgeon, ducks<br>• Grand Valley State Univ. and several other partners are already on board | 1st |
| **Huron** | 2 | Saginaw Bay coastal wetland restoration | • Would benefit local fish species<br>• Actual geography may not be critical<br>• Opportunistic focus with a goal to restore | 2nd |
| **Erie** | 8 | Fords Cove | • This project is on the Ford Estate, which is in a county that has the 2nd highest number of boat registrations in the state<br>• It would address the lack of naturalized shoreline | 3rd |

| | | | | |
|---|---|---|---|---|
| | | | | |
| **Superior** | 2 | Ontonagon River watershed | | 4th |

### 3.1.4 Data Needs

See Section 2.5 for a tabular summary of data needs.

## 3.2 Next Steps

At the end of the workshop, Mike Molnar, from CSO, briefly discussed the next steps involved in this process:

- Information organization: we will sort through all the great information and develop a report that is to be shared with the coastal program
- Data gap filling: select data gaps identified during this workshop and others will be addressed for a limited portion of the shoreline from April 2020 through March 2021
- NOAA will be able to fund some engineering and design work for a subset of projects.
- Federal partners, with funding available, will convene during the spring to discuss the project priorities identified in the state-specific workshop and their potential fit with various funding streams.
- Continue the conversation – today has been a great conversation starter. We encourage you to continue the discussion among yourselves and partners.

# 4 References

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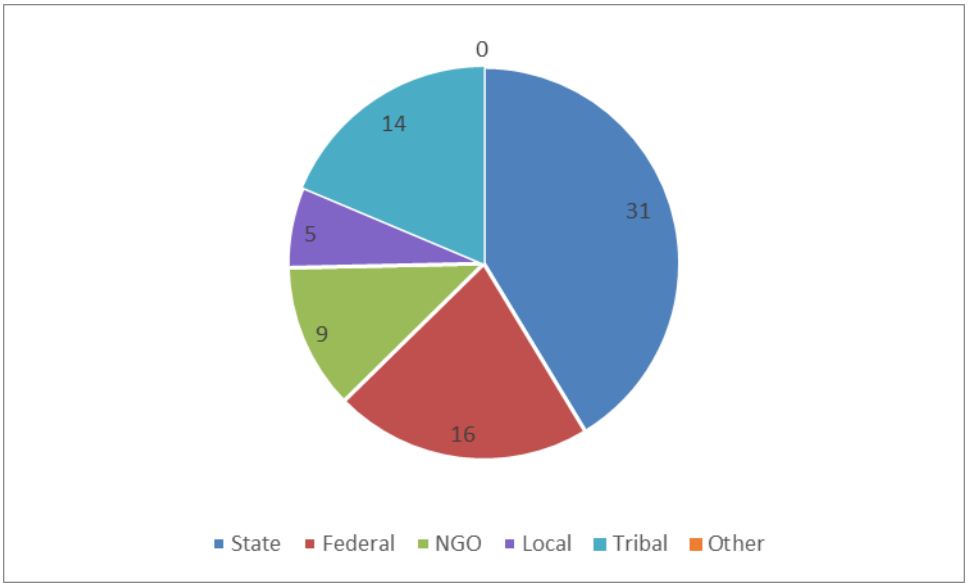
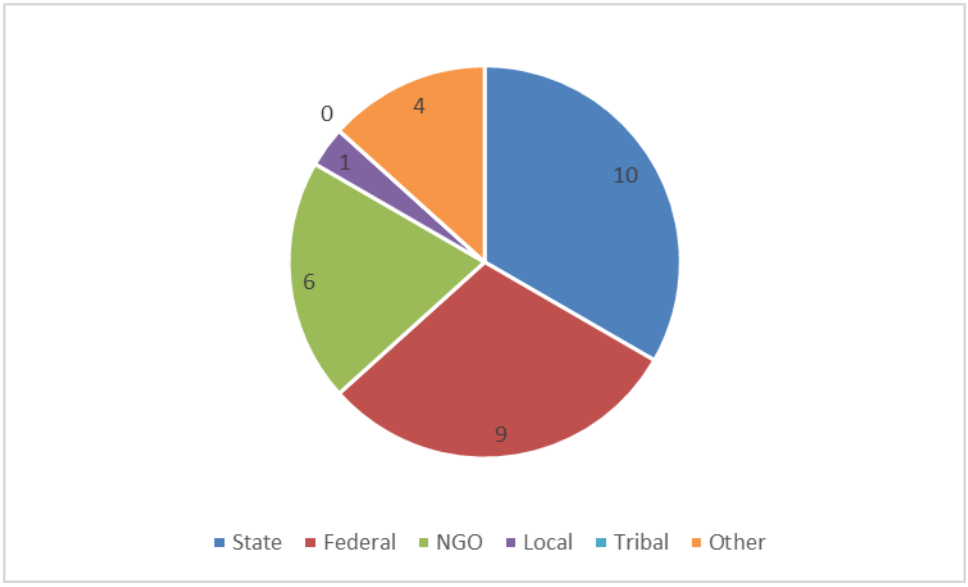
# 5 Workshop Attendee Summary

Breakdown of workshop invitees:




Breakdown of workshop participants:



The table below summarizes workshop participants and their contact information:

| Last | First | Affiliation |
|---|---|---|
| Selzer | Michelle | Michigan EGLE |
| Clapp | David | Michigan DNR |
| Joldersma | Bretton | Michigan EGLE |
| Tyson | Jeff | Great Lakes Fisheries Commission |
| Briggs | Andrew | Michigan DNR |
| Kowalski | Kurt | US Geological Survey |
| Leisen | Josh | Huron Pines |
| Monfils | Michael | Michigan State University |
| May | Chris | The Nature Conservancy |
| Franks Taylor | Rachael | NOAA |
| Ellis | Eric | Great Lakes Commission |
| Uzarski | Don | Central Michigan University |
| Preisser | Matt | Michigan EGLE |
| Bohling | Mary | Michigan State University |
| Sims | Julie | NOAA |
| Hemken | Meghan | NOAA |

| Last | First | Affiliation |
|---|---|---|
| Kotke | Chad | Trout Unlimited |
| Wesley | Jay | Michigan DNR |
| Bradley | Doug | LimnoTech |
| Boase | Karen | Michigan EGLE |
| Deloria | Christie | Fish and Wildlife Service |
| Padilla | Julie | LimnoTech |
| Blackburn | Julie | RESPEC |
| Grush | Jeremy | LimnoTech |
| Meyer | Amanda | US Army Corps of Engineers |
| Heatlie | Terry | NOAA |
| Harrington | Hal | US Army Corps of Engineers |
| Wong | Jenny | US Fish and Wildlife Service |

# 6 Glossary

**Benthos:** biotic organisms that are found at the bottom of water bodies.

**Ecoregion:** A major ecosystem that has a unique geography and receives consistent sunlight and moisture.

**Hydrogeoforms:** Underwater geologic structures. Hydrogeoforms include features such as underwater reefs, plains, and ridges.

**Relative exposure index (REI):** The relative exposure index is the effective fetch of a waterbody scaled by mean wind speed. The effective fetch is the length of a waterbody where the wind blows in a consistent direction. Together, fetch and wind speed determine wave size and energy. Ultimately, areas with lower relative exposure index provide better fish habitat.

**Trophic structure/function (trophic str/func):** Describes the relationship between different organisms within the food web of an ecosystem.

# Attachment A

# Project Summary Worksheets

# Attachment B

# Data Summary Worksheets