



# Michigan the Beautiful: Great Lakes

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## Michigan the Beautiful: Great Lakes

Developing Strategies to Conserve, Connect, and Restore 30% of Michigan's Great Lakes Coastal and Open Waters by 2030.

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The Nature Conservancy, Michigan Chapter

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## Land Acknowledgements

We recognize the continued presence, sovereignty, and leadership of Anishinaabe communities in stewarding the Great Lakes. We acknowledge that the coastal and open waters of Michigan's Great Lakes are part of the traditional, ancestral, and contemporary homelands of the Anishinaabe people, including the Ojibwe, Odawa, and Potawatomi Nations, who are collectively known as the Three Fires Confederacy. For millennia, these Nations have stewarded the lands and waters of what is now known as Michigan, maintaining deep cultural, spiritual, and ecological relationships with the Great Lakes. The treaties signed between the Anishinaabe Nations and the United States, including the Treaty of 1836 and the Treaty of 1842, continue to affirm their rights to fish, hunt, and gather throughout the region. Miigwetch to the Anishinaabe Nations who have cared for these lands and waters, and to the Tribal staff who have helped to guide and shape our research.





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“We work very hard to harness those compelling stories of human history to get people inspired...to care about the place as a whole because **none of these things – natural resources, cultural resources – none of them live in a vacuum.** We follow Jacque Cousteau’s advice and premise that **people will protect what they love**, and human stories really get people connected to these waters.”<sup>1</sup>

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<sup>1</sup> Note that this and all subsequent quotations in this report are selected from the interviews we conducted in 2024.





01

# Executive Summary

The Laurentian Great Lakes are a defining feature of Michigan’s identity, providing drinking water for millions, habitat for thousands of species, and unparalleled economic, cultural, and recreational value. However, Michigan’s coastal and open waters face escalating challenges, including legacy contamination, impacts from climate change, and the threat of biodiversity loss. Many of these same threats are felt across the globe – often referred to as the “Triple Planetary Crisis” of pollution, climate change, and biodiversity loss.

In an effort to combat these compounding crises, the 15th Conference of the Parties (COP 15) Convention on Biodiversity in 2022 established a global goal to conserve 30% of land and water by 2030, also known as 30x30. More than 100 countries, including the United States, have agreed to pursue the 30x30 goal. In response to the United States’ America the Beautiful 30x30 call to action, the Michigan Department of Natural Resources (DNR) is working to advance biodiversity protection by fostering community and state collaboration through the *Michigan the Beautiful* (MtB) initiative to conserve 30% of Michigan’s land and water by 2030. The Great Lakes – representing 20% of the world’s freshwater supply and 40% of Michigan’s area – are crucial to achieving this goal.<sup>2</sup>

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<sup>2</sup> “MSU Libraries Maps & Geospatial Services.” Michigan State University Libraries, Michigan State University, [lib.msu.edu/map/Miboundaries](http://lib.msu.edu/map/Miboundaries)



Recognizing the need for integrated and forward-thinking coastal management strategies, this report explores how Michigan can incorporate its Great Lakes coastal and open waters into *Michigan the Beautiful's* conservation strategy to achieve 30% protection of land and water by 2030 while addressing biodiversity loss, promoting environmental stewardship, and economic vitality. Our primary objectives were to:

- Develop actionable recommendations to guide Michigan's Department of Natural Resources and The Nature Conservancy in integrating Great Lakes conservation into statewide planning for *Michigan the Beautiful*;
- Evaluate how existing efforts throughout Michigan's coasts and Great Lakes align with *Michigan the Beautiful's* biodiversity stewardship goals;
- Identify opportunities to strengthen coastal resilience; and
- Enhance community stakeholder engagement and promote stewardship of open waters.

To inform this analysis, we conducted an extensive literature and document review, interviewed 48 individuals, and held three focus groups with agency staff, researchers, local leaders, Tribal staff, and other key stakeholders and rights holders. Additionally, we developed GIS maps to visualize key data and identify opportunities for enhanced conservation. We collected data from June to December 2024.

We grounded our findings in case studies of three distinct coastal communities – Sault Ste. Marie, Alpena, and Muskegon – that highlight the diversity and complexity of Michigan's Great Lakes regions. Sault Ste. Marie demonstrates the potential of strategic partnerships, such as Lake Superior State University's Center for Freshwater Research and Education, to address legacy contamination while

increasing community engagement and economic development. Alpena, home to the NOAA Thunder Bay National Marine Sanctuary, illustrates how marine protected areas can transform post-industrial towns into research and recreation hubs while earning community support through education and inclusive planning. Muskegon highlights the challenges of balancing waterfront redevelopment with equitable public access and ecological restoration as it moves toward delisting its Area of Concern.

Our research led to a set of ten recommendations designed to enhance Michigan's biodiversity conservation efforts. Our findings indicate that while the Department of Natural Resources should play a central role, successful implementation of our recommendations will require collaboration across federal, Tribal, state, and local governments, as well as non-governmental organizations. Our recommendations are grouped into three key areas: (1) Education & Engagement, (2) Coastal Zone Policy & Planning, and (3) Mechanisms to Increase Protections.

Our findings underscore the importance of weaving collaboration, equity, and community-driven solutions to ensure Michigan's coastal and open waters remain vital resources for future generations. Our spatial analysis found that 24.23% of Michigan's Great Lakes waters are currently under some level of protection, bringing Michigan close to its 30% conservation target. However, fully achieving the letter and spirit of the 30% goal requires strategic action as large disparities exist between protection designations. Many existing designations prioritize cultural or recreational values over ecological outcomes, revealing a gap between the quantity of protected areas and their actual ecological quality. This leaves a need to improve existing water-based protections, expand protections to include



more open water areas, and improve coastal and other land-based protections given their large impact on water quality. Our recommendations provide a pathway for integrating the Great Lakes into *Michigan the Beautiful* by expanding state conservation designations, strengthening coastal resilience planning, and enhancing biodiversity protections. We developed a prioritization matrix to aid in implementation of our policy recommendations, based on different scenarios. By implementing these strategies, Michigan can bridge the remaining protection gap, ensuring that the Great Lakes are at the forefront of the state’s conservation future. This is an opportunity for Michigan to lead in building resilient, inclusive, and sustainable coastal communities – setting a precedent for other Great Lakes states while safeguarding these waters for generations to come.

**Table 1. Recommendations**

Education & Engagement	Coastal Zone Policy & Planning	Mechanisms to Increase Protections
Utilize the Great Lakes as the Central Messaging Strategy for <i>Michigan the Beautiful</i>	Strengthen Regional Planning Organizations and Council of Governments for Coastal Resilience	Expand and Revitalize the State Natural Area Program to include Coastal Natural Areas
Empower Youth Stewardship Through Great Lakes Education Initiatives	Develop and Implement an Action Plan to Address Coastal Hazards	Expand the State Underwater Preserve System
Create a Great Lakes Bottomland State Park with associated Great Lakes Education Center	Develop and Implement a “Great Lakes Forever Pledge”	Prioritize Manoomin (Wild Rice) Stewardship in Future Conservation Planning Efforts
		Establish a State Great Lakes Trust Fund





# 02

## Introduction

### *Overview*

The Laurentian Great Lakes literally and figuratively define Michigan, holding deep cultural significance for Michiganders as symbols of the state's natural beauty and heritage. Across political, economic, and social lines, the Great Lakes serve as a unifier – bringing together Michiganders in their appreciation for and commitment to protecting this vast freshwater resource. As the world's largest freshwater ecosystem, the Great Lakes provide essential ecosystem services that support over 40 million people, shaping local traditions, recreation, and livelihoods.<sup>3</sup> Protecting these lakes from the growing threats of environmental stressors is becoming increasingly urgent, as the health of the Great Lakes directly impacts human well-being and quality of life. As climate change exacerbates these threats, environmental stressors are leading to a loss of biodiversity, habitat degradation, intensified storms and precipitation, and rising temperatures across the region. These challenges, compounded by human-driven land use changes such as intensifying agriculture, urban development, and urban sprawl, underscore the urgency of conservation efforts.

To address the growing threats to biodiversity and ecosystems, the COP 15 Convention on Biodiversity (2022) set a global target to conserve 30% of land and water by 2030. More than 100 countries, including

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<sup>3</sup> Sterner, Robert W., Bonnie Keeler, Stephen Polasky, Rajendra Poudel, Kirsten Rhude, and Maggie Rogers. "Ecosystem Services of Earth's Largest Freshwater Lakes." *Ecosystem Services* 41 (February 2020): 101046. <https://doi.org/10.1016/j.ecoser.2019.101046>.



the United States, have committed to this 30x30 goal. In response, the Biden-Harris Administration launched America the Beautiful – a national initiative to promote locally led conservation and achieve the goal of conserving 30% of U.S. lands and waters by 2030.<sup>4</sup> As part of this initiative, the White House introduced the Freshwater Challenge, aiming “to protect, restore, and reconnect 8 million acres of wetlands and 100,000 miles of our nation’s rivers and streams by 2030.”<sup>5</sup> Shortly after, Governor Gretchen Whitmer joined the challenge, committing to enhanced protections for Michigan’s lakes.<sup>6</sup>

In 2023, the Michigan Department of Natural Resources (DNR) launched *Michigan the Beautiful* (MtB), the state’s tailored version of the national call to action. While inspired by national efforts, MtB is specifically designed to address the unique needs of Michiganders by taking a community-led approach to conservation. This initiative aims to “conserve, connect, and restore at least 30 percent of Michigan’s lands and waters by 2030” and focuses on protecting biodiversity, maintaining clean air and water, creating equitable access to nature, and increasing habitat connectivity – all while strengthening both the economy and public health.<sup>7</sup>

While *Michigan the Beautiful* presents an ambitious vision, freshwater conservation – particularly on the scale of the Great Lakes – remains underexplored.

Without expanded policies and innovative approaches, Michigan will struggle to meet the 30%

conservation target for freshwater ecosystems. Healthy freshwater systems sustain biodiversity, provide clean drinking water, support resilient fisheries, drive local economies, and offer recreational opportunities. Protecting the Great Lakes is not just an ecological necessity; it is essential to Michigan’s identity, economy, and way of life. For MtB to succeed, conservation efforts must be inclusive and equitable, ensuring that all communities – particularly those historically burdened by environmental degradation – benefit from access to clean water and healthy environments. Achieving this goal requires collaboration across all levels of government, state agencies, and private partners.

Michigan already has a strong foundation to build on. Over the past several decades, the state has launched numerous successful restoration and conservation efforts. Much of this progress has been made possible through federal support – particularly the Great Lakes Restoration Initiative (GLRI), which has directed hundreds of millions of dollars to Michigan for habitat restoration, pollution clean-up, invasive species control, and stormwater management.<sup>8</sup>

Since its inception in 2010, GLRI funding has led to tangible progress across the state – restoring thousands of acres of wetlands and uplands, reopening fish passages, and delisting Areas of Concern.<sup>9</sup> Additionally, agencies such as the Michigan Coastal Management Program, housed within the Department of Environment, Great Lakes, and Energy (EGLE), have helped protect natural shorelines, enhance coastal resilience, and support sustainable land use planning in communities

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<sup>4</sup> “Biden-Harris Administration Outlines ‘America the Beautiful’ Initiative.” The White House, May 6, 2021. Accessed January 14, 2025. <https://www.whitehouse.gov/ceq/news-updates/2021/05/06/biden-harris-administration-outlines-america-the-beautiful-initiative/>.

<sup>5</sup> “The America the Beautiful Freshwater Challenge.” The White House, April 2024. Accessed January 14, 2025. <https://www.whitehouse.gov/ceq/the-america-the-beautiful-freshwater-challenge/>.

<sup>6</sup> “Gov. Whitmer Accepts Invitation to Join White House Initiative to Conserve and Restore Freshwater Resources: America the Beautiful Freshwater Challenge.” Executive Office of the Governor, June 27, 2024.

<sup>7</sup> “Michigan the Beautiful.” Department of Natural Resources. Accessed January 16, 2025. <https://www.michigan.gov/dnr/managing-resources/mtb>.

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<sup>8</sup> Jurjonas, Matthew, Christopher A. May, Bradley J. Cardinale, Stephanie Kyriakakis, Douglas R. Pearsall, and Patrick J. Doran. “A Synthesis of the Great Lakes Restoration Initiative According to the Open Standards for the Practice of Conservation.” *Journal of Great Lakes Research* 48, no. 6 (December 2022): 1417–31. <https://doi.org/10.1016/j.jglr.2022.01.008>.

<sup>9</sup> “GLRI Results.” Great Lakes Restoration. Accessed April 4, 2025. <https://www.glri.us/results>.



statewide.<sup>10</sup> These efforts demonstrate Michigan’s capacity for coordination across agencies and sectors to achieve conservation goals.

Community-led conservation has also gained momentum in Michigan. Local and regional organizations – such as land conservancies, watershed councils, and regional planning bodies – are increasingly leading the way in implementing nature-based solutions and promoting environmental stewardship in local communities. Programs such as MI Clean Water, Michigan’s Clean Marina Program, and local planning tools developed by Michigan Sea Grant and MSU Extension have provided communities with resources to manage stormwater,

reduce nutrient runoff, and adopt best practices for coastal protection. These initiatives, paired with a growing awareness of climate impacts and a public deeply connected to the Great Lakes, position Michigan well to scale up freshwater conservation. *Michigan the Beautiful* can build on this momentum by aligning these existing efforts under a broader statewide strategy, maximizing their impact and ensuring long-term resilience.

This report provides recommendations for how Michigan can integrate its Great Lakes coastal and open waters into *Michigan the Beautiful* and work towards conserving 30% of freshwater by 2030.

**Table 2. Definitions and Acronyms for this Report**

Term	Definition
30x30	The UN-led global initiative for governments to designate 30% of Earth’s land and waters as protected areas by 2030.
Biodiversity	The variety of living species including plants, animals, and microorganisms found in a specified area.
Conserve	The strategic and sustainable management and use of ecosystems to protect ecological integrity and biodiversity, enhance resilience to climate change, and ensure long-term environmental, economic, and cultural benefits for present and future generations.
Michigan the Beautiful (MtB)	The State of Michigan’s initiative to conserve, connect, and restore at least 30% of Michigan’s lands and waters by 2030. Housed in the Department of Natural Resources.
Preserve	Protecting natural and cultural heritage resources from human impact.
Protected Area	Geographically defined space recognized or designated through legal means, to achieve long-term conservation of natural and/or cultural resources.
Stewardship	Activities and actions that encourage the responsible use and protection of the natural environment through conservation and sustainable practices to enhance ecosystem resilience and human well-being.

<sup>10</sup> “Overview of Michigan’s Coastal Resource Programs.” Michigan Coastal Management Program. Accessed April 4, 2025. <https://www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Programs/WRD/Coastal-Management/Overview-Coastal-Resource-Programs.pdf?rev=6d7664f7b548489f8ac37f53967305a1>.



While the DNR plays a critical role, achieving meaningful progress will depend on strong partnerships across all governmental levels, interagency coordination, and collaboration with local and private partners. By focusing on community-driven solutions and leveraging partnerships, Michigan can simultaneously protect its freshwater ecosystems and improve quality of life for its residents. The recommendations in this report aim to help Michigan unlock this potential, filling policy gaps and aligning efforts to ensure a healthy and resilient future for the Great Lakes. With 3,288 miles of coastline, Michigan has a unique opportunity to set a global precedent for freshwater conservation.

### ***Our Project***

Working alongside the Michigan DNR, The Nature Conservancy, University of Michigan Water Center, and Michigan Sea Grant, we explored how Michigan can incorporate management of its Great Lakes coastal and open waters into the *Michigan the Beautiful* conservation strategy. By addressing existing policy gaps and focusing on freshwater ecosystems, we have provided actionable recommendations to help Michigan meet its goal of protecting 30% of the state's lands and waters by 2030.

To develop these recommendations, our research team conducted an in-depth literature review on ecological threats facing the Great Lakes, equity issues in coastal communities, historical Great Lakes conservation efforts, existing coastal zone policies, the state of the Great Lakes fisheries, and how other states are working towards 30% conservation. We then utilized a semi-structured interview protocol to conduct interviews with 48 stakeholders from across Michigan, representing a diverse range of perspectives. A qualitative analysis of these interviews allowed us to identify key themes and develop evidence-based recommendations that bridge science, policy, and community needs. Additionally, we

conducted a GIS analysis to map existing protected areas across Michigan's Great Lakes. This spatial analysis helped us identify protection gaps and provide visual examples to support several of our recommendations.

In addition to taking a statewide perspective, we focused on three specific geographic areas, highlighting underserved coastal communities that have successfully implemented conservation measures and are looking to build on these efforts. By centering community voices and equity, our research is designed to ensure that conservation strategies are not only ecologically effective but also socially just and sustainable. These findings will help Michigan refine its approach to freshwater conservation under *Michigan the Beautiful*, offering a model for other regions seeking to balance environmental protection with local resilience and well-being.

### ***Recognizing Indigenous Sovereignty***

Successful and legitimate conservation initiatives in the Great Lakes region recognize and integrate Indigenous knowledge, perspectives, and rights. Indigenous communities have maintained deep connections to the water, land, and ecosystems of the Great Lakes for thousands of years, and their knowledge provides invaluable insights into sustainable conservation practices. Our team recognizes that partnership with Tribes must go beyond incorporating Traditional Ecological Knowledge into our work, and should prioritize engaging with Tribes as rights holders.

By engaging Anishinaabe Nations as partners and rights holders in the *Michigan the Beautiful* initiative, our work seeks to honor Indigenous sovereignty and cultural heritage, and is made stronger and more robust as a result. While we engaged with a handful of Michigan's twelve federally recognized Anishinaabe Nations through



interviews, a presentation to the Michigan Tribal Environmental Group, and a focus group for Tribal staff, further engagement would be necessary to fully represent the diverse perspectives of Michigan's Tribal Nations. The Indigenous people of Michigan have not only been stewarding the Great Lakes since time immemorial, but their ongoing commitment to, and connection with this resource has led to contemporary critical resources for future Great Lakes stewardship and management. Our work draws on these resources, which are further outlined in Appendix A (see subheading "Successful Great Lakes Protection and Restoration Measures"); we urge future collaborative Great Lakes stewardship initiatives to do the same.

Michigan's open and coastal waters are a vital part of the ancestral, traditional, and contemporary lands of the Anishinaabeg, the Three Fires Confederacy of Ojibwe, Odawa and Potawatomi peoples. These lands and waters were ceded to the United States through a series of treaties, including the 1795 Greenville Treaty, the 1807 Treaty of Detroit, the 1817 Foot of the Rapids Treaty, 1819 Treaty of Saginaw, 1820 Sault Ste. Marie Treaty, 1821 Treaty of Chicago, 1821 Carey Mission Treaty, 1833 Treaty of Chicago, 1836 Treaty of Washington, 1836 Cedar Point Treaty, and the 1842 Treaty of La Pointe.<sup>11</sup> Many of these treaties retained usufruct rights, allowing Indigenous peoples to hunt, fish, and gather on ceded lands and waters in perpetuity.<sup>12</sup>

In Michigan, these off-reservation treaty rights are implemented and managed primarily by the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) and the Chippewa Ottawa Resource

Authority (CORA). Through advocacy carried out in the 1970s and 80s, GLIFWC was established to serve the eleven Ojibwe Tribes in Michigan, Minnesota and Wisconsin who reserved hunting, fishing and gathering rights in the 1836, 1837, 1842 and 1854 Treaties with the United States government.<sup>13</sup> GLIFWC supports signatory Tribes in stewarding some 73 million acres of land and water in the region.<sup>14</sup> CORA represents the five Michigan Tribes who signed the 1836 Treaty with the United States government retaining usufruct hunting, fishing and gathering rights on ceded Treaty lands and waters.<sup>15</sup> CORA also serves as the entity through which the Tribes of Michigan advocate for their 1836 fishing rights in the Consent Decree process with the State of Michigan. These two bodies, their constituent nations, and the Treaties they uphold form the foundation of Tribal sovereignty in the Great Lakes region and they allow Tribes to steward some 73 million acres of land and water in the region. The recognition of these rights, and the self-determination they represent, has been upheld to varying degrees over time. Moving forward, honoring Tribal sovereignty and self-determination must go beyond symbolic gestures; it requires ensuring Tribal voices are actively included in resource management decisions.<sup>16</sup> Recognition of these rights is not only essential for advancing justice but also for the effective stewardship of Michigan's coastal and open Great Lakes waters – ensuring the long-term health and sustainability of this shared resource.

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<sup>13</sup> "Homepage | Great Lakes Indian Fish & Wildlife Commission," accessed February 19, 2025, <https://glifwc.org/>.

<sup>14</sup> "Tribe: Great Lakes Indian Fish and Wildlife Commission - Tribes & Climate Change," accessed February 19, 2025, [https://www.7.nau.edu/itep/main/tcc/Tribes/gl\\_ifwc?](https://www.7.nau.edu/itep/main/tcc/Tribes/gl_ifwc?).

<sup>15</sup> "What Is the Chippewa Ottawa Resource Authority Act (CORA)?," MSU Extension, November 9, 2012, [https://www.canr.msu.edu/news/what\\_is\\_the\\_chippewa\\_ottawa\\_resource\\_authority\\_act\\_cora](https://www.canr.msu.edu/news/what_is_the_chippewa_ottawa_resource_authority_act_cora).

<sup>16</sup> Shaw, Emily L., Valoree S. Gagnon, and Evelyn Ravindran. "Seasons of research with/by/as the Keweenaw Bay Indian Community." *Journal of Great Lakes Research* 49 (2023): S32-S45.

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<sup>11</sup> "Michigan-Related Treaties 1795 - 1864." Clarke Historical Library. Accessed January 18, 2025. <https://www.cmich.edu/research/clarke-historical-library/explore-collection/explore-online/native-american-material/native-american-treaty-rights/text-of-michigan-related-treaties>.

<sup>12</sup> Papke, David R. "Usufructuary Rights and the Chippewa." Marquette University Law School, March 13, 2013. <https://law.marquette.edu/facultyblog/2013/03/usufructuary-rights-and-the-chippewa/>.





# 03 Literature Review

## *Executive Summary*

Our literature review synthesizes current research and policy frameworks to support the integration of Michigan's Great Lakes coastal and open waters into the *Michigan the Beautiful* initiative and advance the goal of protecting 30% of the Great Lakes' open waters by 2030. The literature reviewed identifies both challenges and opportunities in freshwater conservation and offers insights to help guide Michigan's efforts toward inclusive, resilient, and effective 30x30 implementation. The full literature review can be found in Appendix A and citation list can be found in Appendix E.

Michigan has already made meaningful progress in freshwater conservation, laying a strong foundation for future success towards implementation of *Michigan the Beautiful*. Initiatives through the Michigan Coastal Management Program, the Great Lakes Restoration Initiative (GLRI), Michigan Sea Grant, local planning groups, MSU extension, and other robust partnerships have demonstrated the power of place-based collaboration and community engagement. These programs illustrate that when local knowledge and state-level coordination align, tangible gains can be made in protecting water quality, restoring habitats, and building climate resilience.



Our review confirms that while biodiversity loss, climate change, and legacy pollution pose serious threats to freshwater ecosystems and complicate efforts to maintain protected areas, Michigan is well positioned to lead. The state's wealth of scientific research, history of community-based stewardship, and growing momentum around nature-based solutions provide a strong platform for scaling up. We examine how social and economic factors, such as community vulnerabilities and resource limitations, shape how conservation policies are implemented. Moving forward, expanding access to conservation resources, addressing disparities in environmental benefits, and fostering greater regional coordination will be essential to achieving *Michigan the Beautiful's* goals.

Additionally, lessons from other leading states, such as California's marine protected area network and Illinois' Prairie State Conservation Plan, offer valuable models for creating durable governance structures, long-term funding strategies, and inclusive public engagement processes. By learning from these examples while building on its own strengths, Michigan can not only meet its 30x30 goals but also set a national standard for freshwater conservation.

#### Key takeaways:

- Michigan has a strong foundation to build on, with existing programs that emphasize collaboration, habitat restoration, and community stewardship.
- Continued success will require addressing legacy pollution, climate-related stressors, and social inequities in conservation access.
- Scaling up place-based, community-driven approaches is critical to protecting biodiversity and ensuring long-term resilience.
- Learning from other states' 30x30 strategies can help refine Michigan's policies and innovation in freshwater protection.





# 04 Methods

## ***Project Goals and Objectives***

To achieve our overarching goal of developing policy recommendations to assist the State of Michigan in integrating the coastal areas and open waters of the Great Lakes into the *Michigan the Beautiful* initiative, we adopted an expert and community-led approach to gather conservation priorities from stakeholders and rights holders across Michigan. We used three interrelated primary methods, as well as two supplementary methods (focus groups and case studies). The three primary methods include:

1. Literature Review: The literature review served as the foundation of our analysis, providing background on federal and state policies, ecological statuses, and existing conservation initiatives. This review identifies gaps and opportunities for integrating Great Lakes conservation into broader state efforts.
2. Semi-Structured Interviews: We conducted interviews with a diverse range of stakeholders including policymakers, scientists, tribal staff, and community leaders, to understand their priorities and perspectives. These interviews informed our recommendations and ensured they aligned with the needs and values of Michigan's communities.
3. Geospatial Mapping: We utilized geospatial analysis to identify existing protected areas, highlight areas for potential expansion, and visualize examples of some recommendations. These maps support strategic decision-making and help ground policy proposals in geographic context.



## ***Literature Review***

We conducted an extensive review of policy, ecological, and spatial research to guide our primary analyses: interviews and mapping. This included case studies, related policies, and other state-led conservation and 30x30 plans. Specific topics addressed were conservation policies across different states, freshwater conservation mechanisms, coastal conservation efforts, biodiversity strategies, areas of high biodiversity within the Great Lakes ecosystem, ecological threats and challenges to freshwater ecosystems, coastal zoning regulations, the effectiveness of the Area of Concern program, community-led and community-based conservation efforts, Michigan’s portfolio of protected coastal lands, ecosystem restoration priorities, and the use of GIS in conservation. Both academic and gray literature were examined to ensure a comprehensive understanding of the current state and opportunities for Great Lakes conservation. We identified literature by conducting keyword searches in academic databases and reviewing state agency publications and reports. Search terms included “Great Lakes conservation,” “30x30,” “freshwater conservation,” “coastal biodiversity,” “community-based conservation,” “30x30 marine conservation,” and other similar terms. Sources were selected based on their focus on freshwater and coastal ecosystems, applicability to Michigan or the Great Lakes region, and their relevance to our research objectives.

## ***Semi-Structured Interviews***

We conducted semi-structured interviews with Great Lakes professionals across Michigan from May to October of 2024. Interviewees came from a wide range of backgrounds and technical expertise, with the goal of collecting a wide range of perspectives and information. Participants were selected through a combination of key informant interviews and snowball sampling. Interviewees represented various sectors and were categorized as ecological, political, or

social leaders. This group included coastal and community managers, environmental scientists, Indigenous community leaders, government officials, and representatives from environmental NGOs. Interviews were conducted primarily via Zoom, with some held in person. A consistent interview protocol was followed (see Appendix B), with minor adjustments based on the interviewee’s expertise.

Prior to each interview, participants were contacted using a standardized email template (see Appendix C) and provided consent for recording. At the conclusion of each interview, participants were asked for recommendations of others who would provide valuable insights, facilitating the snowball sampling process. By October 2024, we completed 48 interviews during the first round of data collection.

**Table 3. Breakdown of Interviewees by Sector**

Sector	# of Individuals
Research	9
Environmental NGO	6
Federal Government	6
State Government	5
Conservation	5
Planning	3
Regional Government	3
Commercial Navigation	2
Local Government	2
Community Engagement	2
Commercial Fishing	2
Tribal Staff	2
Philanthropy	1
<b>TOTAL</b>	<b>48</b>

Following the initial interviews, we maintained regular communication with participants, updating them on project progress and seeking their feedback on specific recommendations later in the process.

Interview recordings were uploaded to a qualitative data analysis software called Dovetail, where they were automatically transcribed for further analysis. We extracted major themes and identified observations that supplemented data collected from the literature review.

To process and analyze the qualitative data collected from interviews, we utilized Dovetail, a qualitative analysis software. Dovetail enabled us to systematically identify recurring themes, observations, and trends across interviews. Our analytical approach was grounded in thematic analysis, employing grouping and coding techniques to organize and interpret the interview transcripts.

For the initial round of analysis, the 48 interviews were evenly distributed among the six members, with each member responsible for coding eight transcripts. Using an iterative process, we tracked respondents' answers to specific questions and applied codes to each transcript. Over several weeks, we collaboratively developed a comprehensive codebook to standardize the coding process. This codebook included primary themes derived from our research objectives and interview questions, and featured nested subcodes to capture specificity when necessary. Codes were refined iteratively through team discussion and peer-review to ensure consistency and reliability. The main categories in the codebook include:

- Implementation Barriers
- Threats to Biodiversity
- GIS
- Coastline
- Ecosystem
- Economy
- Recommendations
- Existing Policies
- Local Units of Government
- Case Studies

The finalized codebook, including all subcodes, is provided in Appendix D.

Our analysis involved two rounds of coding to ensure thoroughness and validity. Each transcript was reviewed and coded independently by two team members, allowing us to cross-check and validate findings. Discrepancies in coding were flagged and resolved through group discussions to ensure a consistent interpretation of the data.

Once all transcripts were coded, the team collectively synthesized the data, identifying 32 preliminary recommendations. Through iterative discussion and prioritization, these recommendations were refined to a list of 25 key ideas, which were further distilled to a final list of 10 actionable policy recommendations. The refinement process was guided by our overarching project goals, relevance to the *Michigan the Beautiful* initiative, and feasibility of implementation. Input from our team advisors was also incorporated during this stage to ensure the recommendations were well-informed and practical. Throughout the refinement process, we received input and feedback from our points of contact at the DNR and The Nature Conservancy.

### ***Focus Groups and Follow-Up Discussions***

As part of our iterative research process, we conducted three virtual focus group sessions on Zoom to refine and validate our findings and recommendations. Two of the sessions were held in November of 2024, and the third was conducted in January 2025. A total of 28 individuals participated across the three one-hour sessions. Of these participants, 25 were individually previously interviewed during the primary data collection phase, and three were new participants.

One focus group was specifically dedicated to Tribal employees to ensure that their perspectives and



were adequately represented. In December 2024, we traveled to the Nottawaseppi Huron Band of the Potawatomi's Pine Creek Reservation for a meeting of the Michigan Tribal Environmental Group where we shared information about our project and upcoming Tribal focus group, which was held in January 2025. Two Tribal staff members participated in the focus group, bringing our total Tribal staff member engagement to four, representing three of Michigan's federally recognized Tribes.

The focus groups had two primary objectives:

1. To solicit feedback in a collaborative setting on three initial draft policy recommendations.
2. To gather input on the prioritization of specific GIS layers to be included in the geospatial model.

Each session was designed to foster interactive discussion, encourage participants to exchange ideas, and provide both verbal and written feedback. We utilized the software "Poll Everywhere" to facilitate real-time ranking and feedback. All sessions were recorded and uploaded to the Dovetail platform for transcription and analysis.

Participants were asked three targeted questions for each draft policy recommendation, with time allocated at the end of each session for open discussion. To rank GIS layers, participants were presented with eight proposed layers in Poll Everywhere, ranked them based on perceived importance, and then engaged in a discussion to elaborate on their rankings. Detailed focus group protocols, including guiding questions and structure, can be found in Appendix E.

For participants who were unable to attend a focus group session, but expressed interest in discussing feedback, we conducted nine follow-up "second-round" discussions to ensure their perspectives were

included. These discussions adhered to the same structure as the focus groups to maintain consistency in data collection. Unlike the focus group sessions, these interviews were not recorded; instead, the research team took detailed notes to document participant responses.

### ***Case Studies***

To further deepen our understanding of needs and concerns of coastal communities, we conducted three case studies in Alpena, Muskegon, and Sault Ste. Marie. Recognizing that any future conservation efforts led by the State of Michigan must be informed by the state's coastal residents, we made it a priority to involve these communities directly in our research process. Our goal was to ensure representation from three distinct regions of Michigan and three of the four Great Lakes, allowing us to tell a more comprehensive story of Great Lakes coastal communities.

Alpena, Muskegon, and Sault Ste. Marie were chosen because they each face unique yet interconnected challenges. While all are coastal communities, they differ significantly in social dynamics, economic drivers, and community priorities. A coastal community, for the purposes of this study, is defined as a township or city that includes Great Lakes shorelines.

The selection process for these locations was guided by a set of evaluation criteria, ensuring we addressed diverse perspectives and needs. These criteria included:

- Communities facing distinct challenges – whether ecological, social, or political.
- Locations with varying levels of existing conservation or protection measures.

- Areas representing different stages of the AOC process – delisting, intervention, or remain listed.
- Communities balancing environmental protection with economic vitality.

Each case study provided critical place-based data and insights into local conditions, community priorities, and implementation challenges, which were directly integrated into the development and refinement of our policy recommendations. Within each recommendation, we incorporated examples of how these policies or programs could be applied in these communities. This approach ensures that our recommendations are not only rooted in the unique realities of Michigan’s coastal regions but also adaptable to the varying conditions and challenges across the state. We assessed these case study locations by using the same qualitative, semi-structured interview protocol as outlined above, however these were conducted in-person. These interviews were altered to be more place-based and were conducted with local leaders and representatives

of anchor institutions. Our engagement with the interviewees were shaped by the historical and cultural context of each site – specifically how communities responded to environmental and economic disruptions, such as the loss of key industry(s) or designation as Areas of Concern (AOCs). We sought to better understand how these communities mobilized/organized, adapted, and continued their engagement over time. These case-based insights directly shaped the development of our recommendations, grounding them in real-world examples of community leadership and long-term stewardship.

**Table 4. Breakdown of Case Study Interviewees**

Location	# of Individuals
Alpena	7
Muskegon	6
Sault Ste. Marie	3

**Figure 1. Map of Case Study Locations**



Point data from AiLi Pigott and Longyu (Ciara) Xue, 2025. Map visualization by AiLi Pigott and Ciara (Longyu) Xue.



### ***Geospatial Mapping***

We used geospatial tools to identify current conservation coverage in Michigan's Great Lakes and to identify opportunities for expanding protections. We summed areas of existing protected regions in Michigan's Great Lakes including fish refuges, NOAA Marine Protected Areas, and the Michigan Underwater Preserve System and calculated the percentage of total area these protections currently cover.

To identify priority regions for conservation, we conducted a proximity analysis, focusing on areas with high ecological value and assessing where the portions of the State Underwater Preserve System could be physically connected to enhance ecological connectivity. We prioritized fish spawning habitats and reefs, where improved protection could benefit a wide variety of species, and thus strengthen ecological resilience. Our geospatial mapping allowed us to understand the extent of existing protections and assess which regions could benefit from increased protection or connectivity.

# Case Studies

## *Overview*

Any program focused on the future of the Great Lakes must be informed by the voices and experiences of Michigan's coastal residents and communities. While Michigan's coastal communities share common historical ties to Great Lakes industries such as shipping, fishing, and tourism, each community has its own unique social dynamics and conservation opportunities. To represent the diversity of these communities, we selected three case studies that together illustrate different parts of the spectrum of Michigan's coastal experiences. Each of these communities has a key anchor institution, such as Lake Superior State University's Center for Freshwater Research and Education in Sault Ste. Marie, Thunder Bay National Marine Sanctuary in Alpena, and Grand Valley State University's Annis Water Resource Institute in Muskegon. All of these anchor institutions have deeply impacted their communities and have played a significant role in the restoration and revitalization process.

Through this process, we became aware of important actions being taken by those from our chosen case study areas to address pressing challenges and support their communities effectively through innovative and strategic approaches. The combination of our case studies along with the interviews and focus groups further established our understanding of complex issues and highlighted various pathways forward. Together, these components provided a key part of the foundation necessary for the development of our



recommendations, ensuring they are grounded in real-world experiences and informed by the voices of those working tirelessly to serve their communities.

**“I really believe that communities are key to protecting, managing, [and] raising awareness of the Great Lakes.”**

### *Sault Ste Marie*

Sault Ste. Marie, also known as Bahweting or “The Gathering Place” in Anishinaabemowin, occupies one of the most critical commercial and ecological focal points in the Great Lakes system. Located on the St. Marys River, where Lake Superior flows into Lakes Huron and Michigan, the area has served as a center for trade and commerce since long before European settlement.<sup>17</sup> It is the oldest incorporated community in Michigan and has been home to thriving Indigenous communities since time immemorial. Today, it remains home to the Sault Ste. Marie Tribe of Chippewa Indians, the nearby Bay Mills Indian Community, and is an international border with Canada.

This geographic location also makes the St. Marys River a vital aquatic spawning habitat within the Great Lakes system. Today, Sault Ste. Marie is largely defined by the “Soo Locks”, which allow ships to bypass the steep rapids at Sault Ste. Marie, traveling from Lake Superior to the lower St. Marys River. All freight from Lake Superior to the lower Great Lakes – including nearly 100% of American iron ore – passes through the Locks.<sup>18</sup> As such, the Locks, and Sault Ste. Marie itself, are indispensable to the region’s \$36

billion Great Lakes shipping industry.<sup>19</sup>

The interconnectedness of economic vitality and environmental health has shaped Sault Ste. Marie’s history, present and future. One of the key reasons we selected Sault Ste Marie as a case study location is its designation as a Great Lakes Area of Concern (AOC). Community leaders are actively working to remediate legacy contamination while balancing the demands of heavy industry and commercial shipping, which continue to power the local economy. Thanks to the efforts of diverse partners, seven of the ten Beneficial Use Impairments for the St. Marys River AOC have been successfully addressed. Notable projects, such as the Little Rapids and Tannery Bay restorations, have significantly contributed to these improvements.<sup>20</sup>

However, despite these efforts, much of the St. Marys River remains unprotected under long-term conservation frameworks. The *Michigan the Beautiful* initiative and its 30x30 goals present an opportunity to secure lasting protections for this ecologically significant waterway. Incorporating the St. Marys River into the state’s broader conservation vision could provide essential safeguards for aquatic habitats while ensuring that restoration progress is maintained over time.

A central partner in these efforts is Lake Superior State University’s Center for Freshwater Research and Education (CFRE), which plays a leading role in research and planning related to the AOC. On our visit to Sault Ste. Marie, we met with representatives from CFRE and the Eastern Upper Peninsula Regional Planning & Development Commission (EUPRPDC) to gain a deeper understanding of the region.

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<sup>17</sup> Erich Dahlke, “Sault Ste Marie History,” Sault Ste Marie CVB (blog), accessed February 14, 2025, <https://saultstemarie.com/soo-area-and-great-waters-region/our-local-history/>.

<sup>18</sup> “Soo Locks Visitor Center,” Great Lakes and Ohio River Division, accessed February 14, 2025, <https://www.lrd.usace.army.mil/Submit-ArticleCS/Recreation/Article/3833525/soo-locks-visitor-center>

<sup>19</sup> LCA, “U.S. Great Lakes Shipping Is a Massive Economic Driver,” accessed February 14, 2025, <https://lcaships.com/u-s-great-lakes-shipping-is-a-massive-economic-driver/>.

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<sup>20</sup> REG 05 US EPA, “St. Marys River AOC,” Collections and Lists, August 20, 2019, Midwest, Great Lakes, <https://www.epa.gov/great-lakes-aocs/st-marys-river-aoc>.

At CFRE, we learned about the challenges of operating in what is effectively an “agency desert”, with no state or federal environmental agency offices within an hour’s drive. As one interviewee from Sault Ste. Marie mentioned:

“I’ve been here 20 years and I can tell you right now on the St. Marys River, this is the sole outflow of Lake Superior – the source of water to 30 million people – and **there is not a single agency that manages the Great Lakes that is in the St. Marys watershed.** The DNR is out of Gaylord... Fish and Wildlife Service is out of Alpena... EGLE is in Cadillac... and so the fact that it’s not in anybody’s backyard that’s managing it... has been a disadvantage. **The St. Marys has been last for research, last for sampling... out of sight, out of mind.**”

This lack of agency presence has positioned CFRE, an anchor institution, as a vital leader in Great Lakes research and restoration efforts for the area. Meanwhile, at EUPRPDC, we explored the critical role of shipping and tourism in the local economy. We also gained insights into the challenges local governments face in securing funding for coastal resiliency projects. The region’s fragmented coastal zoning policies further complicate efforts to implement cohesive regional planning.

Designating parts of the St. Marys River under *Michigan the Beautiful’s* 30x30 framework could help address this governance gap by providing a more coordinated and sustained approach to stewardship. Increased recognition under state conservation priorities could strengthen local restoration efforts, attract additional funding, and ensure that ecological health remains a priority alongside economic development.

## *Alpena*

As home to the Thunder Bay National Marine Sanctuary (TBNMS), Alpena represents one of the most comprehensive examples of a Michigan community with ongoing coastal and open water protections. We selected Alpena as a case study to examine how this transformation came about, how the community operates today as a hub for coastal tourism, conservation, and research, and to serve as a benchmark for comparison with other communities that lack similar protections – such as the other two coast study locations. Alpena also illustrates the evolution of a lakeshore town redefining its identity while maintaining economic vitality.

Alpena is located in the northeastern corner of the lower peninsula of Michigan, on the western shore of Lake Huron, where the Thunder Bay River flows into Thunder Bay. Its strategic location near northern Lake Huron, just south of the Straits of Mackinac, places Alpena adjacent to one of the busiest shipping corridors in the Great Lakes. Historically, this high level of shipping traffic, combined with unique lakebed topography, led to one of the highest concentrations of shipwrecks in the entire Great Lakes system. The cold, freshwater environment of Lake Huron preserves these wrecks quite well, resulting in some of the most intact and well-preserved shipwrecks in the world. This remarkable underwater heritage is what inspired NOAA to establish TBNMS in October 2000 as the first National Marine Sanctuary in the Great Lakes, with its headquarters in Alpena.<sup>21</sup>

However, the establishment of the sanctuary was not without resistance. When the plans were first unveiled, many Alpena residents were skeptical, fearing that the sanctuary would restrict certain activities such as fishing while prioritizing others, such as sport diving. This skepticism at times

<sup>21</sup> “Sanctuary History | Thunder Bay National Marine Sanctuary,” accessed February 14, 2025, <https://thunderbay.noaa.gov/about/history.html>.



escalated into vocal opposition and criticism. This is among the reasons we sought to include Alpena as a case study: how did a community that was against Great Lakes protections eventually come to embrace the sanctuary, and what lessons can be learned by other Michigan coastal communities undergoing similar processes?

Through community engagement and careful planning, the TBNMS evolved into a widely supported initiative, much like the US 23 Heritage Route, which also runs through Alpena. The sanctuary became a turning point for Alpena, facilitating its transformation from a post-industrial town into a thriving hub for coastal tourism – a true “blue community”. The TBNMS Visitors Center itself is housed in a repurposed former Thunder Bay River paper mill, symbolizing the town’s transition. Today, outdoor recreation and tourism, including visits to the sanctuary, drive Alpena’s local economy. This was evident during our visit, which coincided with the arrival of a Viking Cruise ship, bringing visitors to explore the sanctuary and learn about Alpena’s maritime and shipping history.

While the sanctuary is primarily focused on preserving and protecting Thunder Bay’s cultural resources, it also prioritizes recreational activities such as sport diving and spearfishing, as well as ecological restoration and biodiversity stewardship. Over the years, TBNMS has transformed Alpena into a research hub, attracting visitors and scholars from around the world to study shipwrecks, the lakebed, and freshwater ecosystems. A cornerstone of TBNMS’s impact is its emphasis on community education. During our visit, we learned how the sanctuary has reshaped Alpena’s relationship with its waterfront. One TBNMS employee shared with us that before the sanctuary, only about 40% of school-aged children in Alpena County had ever spent time on Lake Huron. By the 2020s, this number had

flipped to 80%, thanks to programs that bring local students onto the lake to connect with their community’s natural resources and learn about shipwreck research. One current program provides on-water experiences for every third grader in the county. Partnerships with organizations such as Huron Pines, a nonprofit conservation organization, have further strengthened this connection, emphasizing the role of environmental education in fostering local pride and stewardship. The staff at TBNMS are dedicated to improving the lives of their direct community members and as one interviewee described, work hard to,

“...harness those compelling stories of human history to get people inspired...to care about the place as a whole because **none of these things - natural resources, cultural resources - none of them live in a vacuum.** We follow Jacque Cousteau’s advice and premise that **people will protect what they love**, and human stories really get people connected to these waters.”

Alpena demonstrates the potential marine protected areas have in benefiting Michigan’s coastal communities. It highlights how the presence of state or federal visitor centers and research institutions can position small communities as global research and tourism destinations – something that *Michigan the Beautiful* can bring to coastal communities all over the state. Alpena’s success in embracing marine protections and leveraging federal involvement informed the development of our recommendations, serving as a model for other communities navigating similar challenges.

## *Muskegon*

The eastern shore of Lake Michigan is lined with a diverse array of coastal communities, ranging from traditional vacation destinations to post-industrial towns. Muskegon, a post-industrial community working to overcome legacy contamination and redefine itself as a hub for coastal recreation, represents many of the challenges and opportunities faced by many West Michigan shoreline communities.<sup>22</sup>

When the Great Lakes Water Quality Agreement initiated the Great Lakes Areas of Concern (AOC) program in the 1980s, Muskegon County stood out, hosting two of the 43 total AOCs.<sup>23</sup> The Muskegon Lake AOC, encompassing the entirety of Muskegon and Bear Lakes, is a striking example of both the environmental challenges and the resilience of Michigan's coastal communities. Muskegon Lake is a drowned river mouth lake – a feature common to West Michigan – that connects the Muskegon River to Lake Michigan. The City of Muskegon, situated on Muskegon Lake's southeastern shore, has historically served as an industrial center, beginning as a hub for the timber industry and later becoming a foundry town. Decades of industrial activity left Muskegon Lake heavily contaminated.<sup>24</sup>

When Muskegon leaders began addressing the lake's AOC status, they had no established roadmap to follow. The sustained efforts of community members, organizations such as the West Michigan Shoreline Regional Development Commission, the volunteers of the Muskegon Lake Watershed Partnership, and other local and regional partners provide an inspiring example of how communities across Michigan and

and the Great Lakes region can make significant progress toward AOC delisting. As Muskegon Lake nears official delisting, the City of Muskegon is rediscovering its waterfront – a space that was largely inaccessible to the public for over a century. As an active leader in Muskegon's restoration efforts described, **“It's really important to have places that everyone feels welcome and that also are restoring or protecting natural resources at the same time.”**

Renewed access to Muskegon Lake brings both opportunities and challenges. The availability of lakefront property raises important questions about balancing economic development with equitable public access. While residential development on the waterfront offers economic benefits, the City must also ensure that its residents – many of whom were deprived of lake access for generations – can enjoy and connect with this vital resource.

The restoration of Muskegon Lake also brings attention to broader issues that Michigan's coastal communities face, such as coastal resiliency, public access, and coastal zoning, which we address in our policy recommendations. The presence of Grand Valley State University's Annis Water Resources Institute and the proposed West Michigan Coastal Research Reserve (NERR), which would be based in Muskegon, presents an opportunity for the community to follow in Alpena's footsteps by becoming a hub for research and recreation. By leveraging its assets, Muskegon has the potential to serve as the model for other Michigan communities navigating the complexities of post-industrial recovery and waterfront revitalization.

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<sup>22</sup> “AOC History,” Muskegon Lake Watershed Partnership (blog), accessed February 14, 2025, <https://muskegonlake.org/aoc/history/>.

<sup>23</sup> REG 05 US EPA, “Great Lakes Areas of Concern,” Collections and Lists, June 17, 2013, Great Lakes, <https://www.epa.gov/great-lakes-aocs>.

<sup>24</sup> “AOC History,” Muskegon Lake Watershed Partnership (blog), accessed February 14, 2025, <https://muskegonlake.org/aoc/history/>.



## ***Conclusion***

The unique conservation approaches in Alpena, Sault Ste. Marie, and Muskegon highlight both the successes and gaps in Michigan's current coastal and Great Lakes protection efforts. Alpena's Thunder Bay National Marine Sanctuary demonstrates the value of federal protection for underwater cultural and ecological resources, while also giving opportunities for expanded nearshore conservation under the *Michigan the Beautiful* initiative. Similarly, Sault Ste. Marie's cross-border management of the St. Marys River underscores the importance of collaborative stewardship, particularly in aligning state, federal, and international efforts. Muskegon's efforts to restore and revitalize its waterfront, transforming industrial sites into community-centered natural areas and a knowledge-based economy, showcase the potential for MtB to support large-scale habitat restoration and public access initiatives. These case studies illustrate how MtB can build on existing frameworks to enhance coastal resiliency, expand protections, and increase community engagement. By learning from these models, MtB can develop strategies that address conservation gaps while strengthening regional and community-based partnerships.



# 06 Findings

## *Overview*

Our research assessed the current state of protections contributing to Michigan’s goal of conserving 30% of its lands and waters by 2030. While 19.2% of Michigan’s land is currently under protection, there is no definitive record of the percentage of Great Lakes waters with protection status. To address this, we conducted a spatial analysis of Michigan’s jurisdictional waters, finding that 24.23% are currently designated under some level of state or federal protection (see Figure 2). However, these designations vary widely in management capacity and conservation impact. Most provide designations without active management strategies, and provide protection for cultural resources rather than ecological resources. Strengthening these existing areas is just as critical as expanding new ones. The following recommendations build on these findings to enhance conservation efforts and ensure Michigan’s Great Lakes meet the 30x30 goal in both scope and effectiveness.

Additionally, our analysis of the literature, 48 interviews, three focus groups, and GIS mapping data – including via case studies – led us to identify four key focal areas for increasing conservation in the Great Lakes: enhancing biodiversity, improving coastal management, strengthening education and engagement, and increasing funding. From these four focus areas, we determined four foundational principles that guided our policy recommendations. Together, these principles served as a critical framework for developing our policy recommendations.



## Current State of Protection

There is no definitive estimate of the percentage of Michigan's Great Lakes waters currently under protection or conservation status. Determining which areas truly meet biodiversity conservation standards is challenging due to inconsistencies in management approaches and protection levels across different designations. To address this gap, our team conducted a spatial analysis to determine the extent of protected waters in Michigan's Great Lakes.

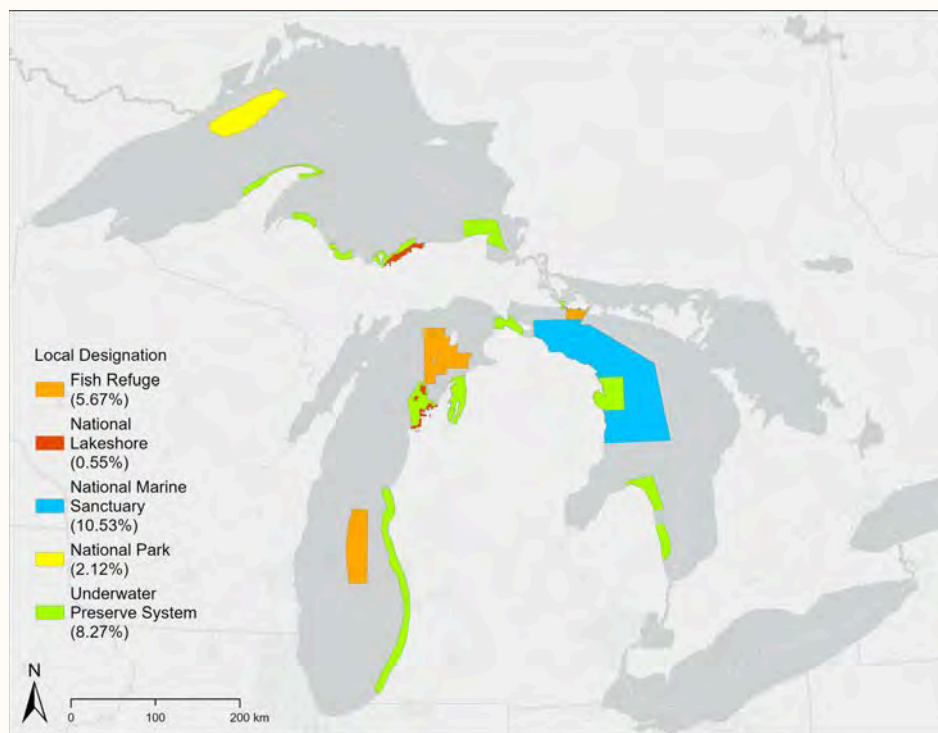
Using our definition of a Protected Area (see Table 2), we included five categories of designation: State Underwater Preserves, National Lakeshores, National Marine Sanctuaries, National Parks, and Fish Refuges. To calculate this percentage, we overlaid these designated areas, identified and removed overlapping regions to avoid double counting, then summed the total protected area. This value was then divided by the total area within Michigan's Coastal Administrative Boundaries.

that 24.23% of Michigan's jurisdictional Great Lakes waters are under some level of protection, suggesting the state is closer to the 30% target than previously estimated.

The analysis determined that 24.23% of Michigan's jurisdictional Great Lakes waters are under some level of protection, suggesting the state is closer to the 30% target than previously estimated.

The National Marine Sanctuary covers 10.53% of Michigan's Coastal Administrative Boundaries, the Underwater Preserve System covers 8.27%, fish refuges cover 5.67%, National Parks cover 2.12%, and National Lakeshores cover 0.55%. It should be noted that these percentages are calculated based on the surface area of each designation type and their sum is >24.23%. Overlapping designated areas were only counted once, explaining why the individual percentages in the key do not add up to 24.23%.

**Figure 2. Protected Waters Within Michigan's Great Lakes Jurisdiction**



Fish Refuge polygon data from Shannon Brines, 2025; National Lakeshore, National Marine Sanctuary, National Park, and Underwater Preserve System polygon data from NOAA, 2023. Map visualization by AiLi Pigott and Longyu (Ciara) Xue, 2025.

These designations form the foundation of Michigan's current Great Lakes protection portfolio and reflect decades of leadership in both state and federal conservation efforts. While each category offers important protection designation, they vary in scope, strength, and alignment with biodiversity conservation goals, raising important questions about whether this percentage truly meets the objectives of *Michigan the Beautiful*.

### ***Not All Protected Waters Are Protected Equally***

While 24.23% of waters fall within protected designations, these areas vary significantly in their level of protection, management capacity, and enforcement. For example, National Marine Sanctuaries – such as Thunder Bay National Marine Sanctuary – offer a high standard of cultural protections with federal oversight, dedicated staffing through NOAA, some research capacity, and community engagement programs that contribute meaningfully to ecosystem stewardship and cultural preservation. State Underwater Preserves, while an important part of Michigan's maritime heritage, were created primarily to protect historic shipwrecks. These preserves currently lack dedicated management, enforcement capacity, or conservation programming, and while they may provide incidental ecological benefits, they do not include formal conservation measures such as habitat restoration, fisheries protection, or restrictions on damaging activities. However, they represent a major opportunity for enhanced ecological value if resourced and supported with biodiversity objectives in mind. Similarly, while National Lakeshores and National Parks offer strong protections against extractive activities, they often prioritize recreation and tourism, which can lead to habitat degradation if not properly managed. High visitor traffic, shoreline development, and infrastructure expansion can impact fragile coastal ecosystems, leading to habitat fragmentation, erosion, and disruption of wildlife.

Fish refuges, managed by Michigan DNR, play a key role in protecting aquatic biodiversity and fish habitat. While relatively small in surface area, they are tailored to specific ecological functions and offer models for targeted species or habitat protections that could be replicated elsewhere. All these designation types play a crucial role in protecting Michigan's natural landscapes, but their biodiversity conservation value depends on maintaining integrity.

Given these variations, the 24.23% figure cannot be assumed to fully meet the conservation standards of *Michigan the Beautiful*, but offers a very strong platform to build from. To align with the program's goals to connect, conserve, and restore, protected areas must not only be expanded, but programs must also be strengthened to ensure that they contribute meaningfully to biodiversity conservation, ecosystem resilience, and sustainable management of Michigan's Great Lakes. Designation alone does not ensure ecological outcomes.

To reach biodiversity goals, Michigan's strategy should strengthen active management within existing protected areas, integrate biodiversity objectives into currently recreation or heritage focused designations, increase partnerships with NGOs to support conservation on and beyond public lands, prioritize partnerships with Tribal nations to ensure the state's goals align with Tribal capacities, and secure long-term funding and stewardship programs for Great Lakes protection. By improving the effectiveness of existing protections and expanding designations where gaps remain, Michigan has the opportunity to lead the nation in freshwater conservation.

### ***Foundational Principles***

Throughout our interviews, several critical ideas, needs, and themes emerged that transcend any single recommendation.



These overarching foundational principles are essential to the success of *Michigan the Beautiful* and the effective implementation of our recommendations.

## 1. Prioritize Relationship-Building Over Timelines

A recurring theme was the tension between meeting project or political deadlines and fostering meaningful relationships. While urgency may occasionally be necessary, most effective conservation efforts benefit from prioritizing collaborative, consensus-driven processes over rigid timelines. Strong relationships foster innovation, early exploration of ideas, adaptability through inclusive input, and provide ongoing project stewardship. This tension is particularly evident and felt by Tribal nations, where state-led initiatives often fall short of meaningful collaboration. One Tribal staff reflected on their experience working with the state:

“I [don’t hear] a lot of discussion and **we don’t usually have someone come and talk to us - it’s just a piece of paper asking for our endorsement or comments** - so there [isn’t] that back and forth as much, that might be helpful to hash out issues.”

For stewardship efforts to succeed, Michigan must reframe its engagement with Tribal communities, prioritizing proactive collaboration. This means seeking input and taking time to build relationships with Tribal nations from the outset of any project, rather than engaging them reactively or at later stages. A restructured approach rooted in trust and mutual respect will be key to long-term success. Furthermore, it is critical to include all Tribes, regardless of treaty status, including those not represented by GLIFWC or CORA. Two additional Tribal staff emphasized the challenges posed by grant requirements and agency timelines, highlighting the disconnect between state processes and Tribal priorities:

“In addition to having capacity, **having systems that work for tribal priorities** - and I don’t just mean our tribal priorities and access - I also mean our timelines... the way that [Tribal] community members interact with the landscape is both a technical-science-type consultation, but it’s also a cultural consultation, and **that perspective is lost when agencies aren’t willing to modify their timelines.**”

“There’s a need for federal and state programs to - if they really want to serve tribal communities - **to look at it in the perspective of what tribes need, not how tribes can fit into their needs.**”

## 2. Address Capacity Gaps

For a program as ambitious as MtB to succeed, Michigan must address its current capacity limitations in biodiversity conservation and stewardship. Adequate funding and institutional support for initiatives and associated projects are essential to ensure long-term success at the state and local level. Existing programs provide a foundation for conservation efforts, but many lack the staffing, funding, or coordination necessary to maximize their impact. For example, the Michigan Natural Features Inventory (MNFI) plays a critical role in providing ecological data and expertise, but capacity constraints limit its ability to fully support conservation planning. Interviewees repeatedly emphasized the need for stronger ecological data, strategic planning, and sustained investment to support informed decision-making. One individual, with over 20 years of experience in the field, articulated the issue succinctly:

“**Without a program dedicated to biodiversity stewardship, [stewardship] just doesn’t happen. Without a program that can advocate for biodiversity stewardship, it doesn’t happen.** Even

on state game and state forest lands – areas designated as ecological reference areas or conservation opportunity areas – **if you don't have staff who understand how to engage in stewardship, it's not going to happen.** It's business as usual or benign neglect.”

When discussing coastal dune ecosystems and the designation of critical dunes, the same individual emphasized why simple designations are insufficient and why increased capacity is essential for ecosystem health:

**“Designation is not enough.** These are all systems that merit not just protection, but active stewardship... They are systems that come to mind immediately in terms of their contribution to native biodiversity, but also to ecosystem services - coastal resiliency, migration corridors, habitat for pollinators and birds, recreation, spawning habitat.... If you can get capacity for stewardship of those systems, that would go a really long way for increasing coastal resiliency and for maintaining native biodiversity.”

### 3. Broaden Access to the Great Lakes

For many Michiganders, their connection to the Great Lakes begins and ends at the shoreline. Most residents do not own a boat or have opportunities to explore the open waters; their experiences are limited to beaches, docks, and shorelines. Expanding equitable access to the Great Lakes is critical to fostering a sense of ownership and stewarding across all communities.

This requires both protecting and increasing public access to shorelines and creating new opportunities for people to engage with open waters. Guaranteeing access to beaches, docks, and fishing areas is essential, but so is expanding public boating access and fostering deeper connections to offshore ecosystems.

Strengthening across these levels is critical to fostering a sense of ownership and stewardship across all communities. This includes protecting and increasing fisheries at all levels – recreational, commercial, and Tribal. One commercial fisherman, reflecting on the changes they have witnessed along Michigan's coasts, expressed a longing for the days when dockside fishing was an accessible and integral part of life:

“I'd love kids to be able to go on the docks and catch a few perch... To me that's what Michigan was about – the ability to go out and get your dinner with so little investment...Now [it's not] feasible for these families to go out fishing for less than \$100.”

Ensuring that dockside anglers, as well as shoreline visitors, can connect with and benefit from conservation efforts will strengthen public advocacy and support for MtB initiatives. While many coastal communities still have piers that provide access for both fishing and boating, the decline of nearshore fisheries has made it increasingly difficult to catch fish from docks and shorelines. As fish populations shift and decline, more anglers require boats to access productive fishing areas, creating financial and logistical barriers for many residents. Conservation and stewardship must resonate with the everyday experiences of Michiganders to create lasting impact. Another interviewee highlighted the potential for exclusion when biodiversity and conservation efforts fail to consider diverse perspectives:

**“Biodiversity can be exclusionary, right? How do we ensure that everyone has access to the benefits of the services that these lakes and all of the ecosystems in the Great Lakes provide, and how do we ensure that all communities, all different stakeholders can bring their very different perspectives to how these systems are managed, so that they don't become exclusionary?”**



This challenge is compounded by the disconnect many people feel from Great Lakes' ecosystems, especially those who live and recreate beyond the shoreline. Many underserved communities, particularly communities of color, have been historically excluded from accessing the coast and water-based recreation due to racism - whether through segregation, displacement, or lack of investment in public waterfront space. One interviewee underscored the need to help people engage with and understand less visible aspects of the Great Lakes, such as underwater habitats:

“[In] the Great Lakes, people see the beaches and the shoreline. Most people would have no idea what [a fish spawning reef] would look like, or they would think of a marine coral reef with tropical fish. Getting people to somehow see and interact with the Great Lakes more might be a way of broadening that stakeholder engagement.”

By increasing both physical access to shorelines and opportunities to experience the Great Lakes beyond the shore, Michigan can ensure that conservation efforts are inclusive and resonate with all communities.

#### **4. Michigan Needs to Lead Amongst other Great Lake States**

Despite managing more Great Lakes coastline than any other state, Michigan lags behind its regional counterparts in structured conservation policies, dedicated funding, and coastal stewardship programs.

Other Great Lakes states have developed policies and programs that strengthen conservation and water stewardship, often establishing more structured approaches to coastal management, funding mechanisms, and state natural areas. Meanwhile, Michigan – despite its deep connection to the lakes –

has yet to adopt comparable measures at the same scale. Part of this gap may stem from the challenge of managing such vast and varied coastlines – Michigan manages 3,288 miles of coastline, while Wisconsin only manages 820 miles, the second longest Great Lakes shoreline.<sup>25</sup> Despite this difference, Michigan still has a lack of statewide coordination and investment. Addressing these disparities will allow Michigan to integrate the Great Lakes into MtB and reclaim leadership in regional conservation efforts.

One key distinction lies in coastal zoning policies. Michigan's current approach relies on the elevation ordinary high-water mark (EOHWM) to determine coastal development limits, while states such as Wisconsin and Minnesota use the natural ordinary high-water mark (NOHWM). The NOHWM, which incorporates physical evidence of past water levels, often results in more protective setbacks that reduce erosion and flooding risks while safeguarding critical shoreline habitat.<sup>26</sup> These differences in regulatory frameworks shape how states manage coastal resilience in ecosystem health, particularly during periods of high water.

Approaches to conservation funding also vary significantly across the region. Some Great Lakes states have established long-term, dedicated funding mechanisms to support coastal and water conservation.

- Minnesota's Clean Water, Land, and Legacy Amendment dedicates one-third of its 0.375% sales tax increase to water protection efforts.

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<sup>25</sup> Shoreline Mileage Of the United States .” NOAA Office for Coastal Management. Accessed April 18, 2025. <https://coast.noaa.gov/data/docs/states/shorelines.pdf>.

<sup>26</sup> Norton, Richard K., Guy A. Meadows, and Lorelle A. Meadows. “The Deceptively Complicated ‘Elevation Ordinary High Water Mark’ and the Problem with Using It on a Laurentian Great Lakes Shore.” *Journal of Great Lakes Research* 39, no. 4 (December 2013): 527–35. <https://doi.org/10.1016/j.jglr.2013.09.008>

The Clean Water Fund has invested in reducing agricultural runoff, protecting drinking water sources, and restoring critical aquatic ecosystems with projects ranging from implementing buffer strips along waterways to groundwater protection. These initiatives safeguard communities and ecosystems reliant on Lake Superior and other major watersheds.<sup>27</sup>

- Minnesota’s Environment and Natural Resources Trust Fund received 40% of state and lottery proceeds to support long-term conservation efforts. This funding has been used to protect wildlife habitat, improve water quality, and support research on environmental challenges. In 2024, voters overwhelmingly approved extending this funding mechanism for another 25 years, reinforcing the state’s commitment to conservation.<sup>28</sup>
- New York’s Environmental Protection Fund provides consistent funding for open space conservation, waterfront revitalization, and climate resilience. Notable projects include protecting fish spawning habitats in the Great Lakes Basin and addressing coastal flooding and erosion along Lake Ontario and the St. Lawrence River.<sup>29</sup>
- Wisconsin’s Knowles-Nelson Stewardship Program focuses on land acquisition and habitat protection, helping expand public access to Lake Michigan’s shoreline and restore critical coastal wetlands.<sup>30</sup>

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<sup>27</sup>“About the Funds.” Minnesota’s Legacy. Accessed February 13, 2025. <https://www.legacy.mn.gov/about-funds>.

<sup>28</sup> Kraker, Dan. “Voters Overwhelmingly Back Minnesota Lottery Spending on Environmental Projects for Another 25 Years.” MPR News, November 6, 2024.

<sup>29</sup> “Environmental Protection Fund (EPF).” New York State Department of Environmental Conservation. Accessed February 13, 2025. <https://dec.ny.gov/environmental-protection/fund>.

<sup>30</sup> “The Knowles-Nelson Stewardship Program.” Knowles Nelson Stewardship, January 29, 2025. <https://knowlesnelson.org/>.

In contrast, Michigan lacks a dedicated funding source for coastal conservation, which shapes the scale and consistency of its stewardship efforts. Without long-term funding commitments, conservation initiatives often rely on fragmented or temporary resources, limiting their effectiveness.

Natural area conservation efforts likewise differ across Great Lakes states, and Michigan is not at the forefront. Many have established formal programs to identify, protect, and actively steward ecologically significant sites. Wisconsin, for example, has over 700 designated State Natural Areas, safeguarding diverse ecosystems such as coastal dunes, wetlands, and old-growth forests.<sup>31</sup> These areas not only serve as critical habitat but also provide opportunities for public education and research. In Michigan, by contrast, natural areas are primarily recognized through passive designation rather than active management, raising questions about sustaining long-term ecosystem integrity. Multiple interviewees noted that without dedicated stewardship, designated natural areas can degrade over time, leading to habitat loss and declining biodiversity.

While each state faces unique conservation challenges, Great Lakes stewardship has become a regional priority. Many states have structured policies and programs that actively support conservation, while Michigan continues to navigate how best to integrate the Great Lakes into statewide initiatives. Understanding these regional approaches provides valuable insight into effective conservation strategies and highlights opportunities for Michigan to strengthen its stewardship efforts within the framework of *Michigan the Beautiful*.

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<sup>31</sup> “State Natural Areas.” Wisconsin DNR. Accessed February 13, 2025. <https://dnr.wisconsin.gov/topic/StateNaturalAreas>.



# Recommendations

Ensuring that 30% of Michigan's lands and waters are conserved by 2030 requires a comprehensive conservation approach that includes increased protections and enhanced cooperative management, education, and funding in service of Great Lakes open and coastal water conservation. The recommendations that follow are organized into three key action areas:

- 1. Education & Engagement:** Strategies to increase public awareness and participation in conservation efforts.
- 2. Coastal Zone Policy & Planning:** Policy and planning recommendations for municipalities, supported by state-level action and capacities, to improve coastal protections and address inconsistencies in existing frameworks.
- 3. Mechanisms to Increase Protections:** Strategies to expand formal conservation designations for Great Lakes waters under state jurisdiction and strengthen existing protections.

Each recommendation provides a detailed explanation of its potential benefits, challenges, key decision-makers, and relevance to our case study locations. Collectively, these actions aim to increase Michigan's protected waters beyond 30%, strengthen community resilience, and safeguard coastal biodiversity to ensure long-term stewardship of the state's Great Lakes resources.

## Education & Engagement

### *1. Utilize the Great Lakes as the Central Messaging Strategy for Michigan the Beautiful*

Interviews with both governmental and non-governmental stakeholders consistently highlighted a critical need for cohesive and uniform messaging on environmental issues and strategies across all state agencies. Stakeholders identified communication disconnects within and between agencies, which could hinder the effectiveness of *Michigan the Beautiful* implementation and create public confusion. This is not just an internal government issue – when state agencies are not aligned, external organizations, conservation groups, and the public receive conflicting or inconsistent messaging about Michigan’s environmental priorities.

Additionally, public support for Great Lakes protection provides a powerful opportunity to unify conservation messaging. According to the International Joint Commission’s 2024 Great Lakes Regional Poll, there is nearly unanimous support (96% of respondents) for the importance of government investment in Great Lakes protections, and 94% of respondents believe it’s important to protect the Great Lakes – increasing from 85% in 2015.<sup>32</sup>

The same report found that water quality concerns remain top-of-mind for residents, with the majority supporting stronger investments in conservation, pollution prevention, and habitat protection. This data underscores the public’s deep emotional and practical investment in the Great Lakes, and reveals a major opportunity: in placing the Great Lakes at the heart of MtB’s communication strategy, the

the state can tap into existing public support and build momentum for broader land and water conservation goals.

To fully realize the potential of MtB, the Great Lakes should be positioned as a foundational element of its public messaging and implementation strategy. The Great Lakes are the defining characteristic of Michigan and can serve as a powerful entry point to engage the public. While many organizations already promote Great Lakes conservation, the state lacks a centralized, cohesive framework to ensure MtB’s messaging is integrated across all agencies and reflects a unified vision for land and water conservation. Currently, MtB’s focus is primarily on terrestrial conservation, as reflected in the omission of the Great Lakes from Senator Sue Shink’s Michigan the Beautiful Bill, SB 1124. While the bill has not advanced, its exclusion of Great Lakes protections raises concerns about whether current state-level conservation efforts are fully incorporating the Lakes. This omission mirrors feedback from stakeholders, who noted that coastal and aquatic systems often receive less explicit attention in statewide conservation planning.

By using the Great Lakes as the unifying theme of MtB, state agencies can create a more consistent and effective framework that strengthens both internal coordination and external engagement. To achieve this, we recommend the following steps:

- 1. Develop a Great Lakes-centered messaging framework.** Create a dedicated public engagement strategy for the Great Lakes within *Michigan the Beautiful*. Leverage the Great Lakes as a unifying symbol of Michigan’s environmental identity and driver of public pride and participation. Consider integrating this messaging with the *Pure Michigan* campaign or launching a new initiative that ties Great Lakes conservation

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<sup>32</sup> “2024 Great Lakes Regional Poll.” International Joint Commission, October 2024. <https://ijc.org/en/wqb/great-lakes-poll>.



directly to the broader goals of MtB. This would build a sense of ownership and draw on cultural affinity for the Great Lakes, focusing on Michigan's shared history and their importance as a lasting natural and economic asset for all.

- 2. Foster cross-division and interagency collaboration.** Form a Great Lakes-focused task force within MtB, led by the Office of the Great Lakes with representatives from relevant DNR divisions. This group should meet regularly to align priorities, coordinate efforts, and ensure consistent messaging across all aspects of MtB that involve the Great Lakes.
- 3. Enhance public engagement with Great Lakes-driven content.** Develop educational and promotional materials that center on the Great Lakes as the heart of MtB's story. These materials should highlight how Great Lakes conservation contributes to the larger MtB goals, linking forests, inland waters, and coastal areas – perhaps through tributary watersheds – into a cohesive, inspiring narrative for the public.

*Potential Benefits:* A Great Lakes-centered messaging strategy will provide a clear and unified framework that enhances coordination across agencies while reinforcing Michigan's leadership in freshwater conservation. This approach will help drive public engagement, strengthen conservation partnerships, and align state-led messaging with broader environmental efforts across the region.

*Potential Barriers:* Coordinating messaging across multiple divisions and agencies will require a significant investment of time and resources. When the Pure Michigan campaign launched in 2013, it received \$13 million in state funding.<sup>33</sup> A similar level of investment could be considered for a *Michigan the*

*Beautiful* campaign to ensure comparable reach and impact.

*Decision Makers:* Michigan DNR Office of Public Lands and relevant agency divisions responsible for conservation messaging and public engagement.

*Application:* Each case study location demonstrates why a Great Lakes-focused messaging strategy would be successful. In Alpena, the experience of Thunder Bay National Marine Sanctuary underscores the importance of messaging to ensure effective implementation. Initially met with resistance, TBNMS was ultimately embraced by the community once it became clear that its purpose was to protect and promote the shared resource, rather than limit fishing rights or other recreational activities. In Sault Ste. Marie, the example highlights the need to emphasize the vital role of Indigenous knowledge in Great Lakes conservation. Muskegon presents a challenge in framing the Great Lakes for redevelopment, where messaging must carefully avoid overselling or misrepresenting the impacts of such redevelopment on environmental sustainability and community well-being.

**“Thinking about how to frame these issues in a way that has a broad appeal and avoid the perception of ‘this is just a liberal democratic tree hugger’ type of thing is really important.”**

## ***2. Create a Great Lakes Bottomland State Park with associated Great Lakes Education Center***

In order to broaden public awareness of Michigan's Great Lakes and bottomland resources and establish a foundation for further bottomland research and education, we propose that the State of Michigan creates a Great Lakes Bottomland State Park and an associated Great Lakes Education Center. This two

<sup>33</sup> “Pure Michigan Campaign Drives \$1.2 Billion in Visitor Spending.” Networks Northwest. Accessed April 18, 2025. <https://www.networksnorthwest.org/news-events/news/pure-michigan-campaign-drives-12-billion-in-visitor-spending.html>.

part recommendation could be adopted together, or separately. By bottomlands, we are referring to our Great Lakes lake bottoms – extending to the state and international borders – and all associated cultural and ecological resources like shipwrecks and spawning reefs.

Throughout our interview process, we heard a desire for the 30x30 planning process to foster both greater recognition of Michigan's Great Lakes bottomland resources, and for greater capacity for the state to do Great Lakes outreach and education. We felt that these two goals worked well as a single recommendation for the creation of a Bottomland State Park, and the creation of an associated Great Lakes Education Center. The idea for a Great Lakes Bottomland State Park came directly from our interview process, and builds upon previous legislative efforts to establish such a park; Senate Bill 429 of 2007. Creating such a State Park would be largely symbolic to place the 38,000 square miles of Michigan's Great Lakes bottomlands into America's largest state park. Such a park would not have restricted access or require a Recreation Passport like other State Parks, and it would not change how the bottomlands are managed or supersede the management of existing marine protected areas (see Recommendation #8) It would, however, highlight for Michiganders the importance of our bottomland resources and the lakes themselves and expand the State's capacity for Great Lakes research, education and outreach (Foundational Principle #2). As one interviewee noted,

“we don't think of [the lakebed] on a huge area of 38,000 square miles as being a kind of vast opportunity and a vast responsibility. It just sort of **sits there like a parking lot**”.

One way that this expanded capacity for Great Lakes education and outreach could be achieved is through

the creation of an associated Great Lakes Education Center. This Education Center would operate similarly to existing DNR interpretive centers, offering educational and interpretive signage relating to the Great Lakes. Such an Education Center could either serve as the Visitors Center for the Great Lakes Bottomland State Park, or it could stand on its own, as the State of Michigan does not yet have an interpretive center dedicated solely to the Great Lakes. This is important to emphasize, the Education Center could be adopted without the creation of a Bottomland State Park. This Education Center could be housed at one of Michigan's existing coastal State Parks that does not yet have a visitors center.

In choosing where to locate a Great Lakes Education Center, the DNR should conduct a thorough analysis that considers the following criteria:

- Where are the DNR's current Visitors/ Interpretive Centers located?
- What aspects of Great Lakes education are already incorporated in the existing Centers?
- Should the placement of the Education Center prioritize parts of the state that are not currently represented by a DNR coastal interpretive center, even if that means it would be farther from the state's population base?
- Should the Great Lakes Education Center be seen as a tourism draw for areas of the state that rely on Great Lakes tourism even if that makes the Education Center far away from the state's population base?

Considering each of these criteria, our team conducted a preliminary analysis, and chose three potential locations for a Great Lakes Education Center. It is important to note that different interpretations of the above criteria could yield different preferences for location of the Education Center. Our analysis is an example of how this



this location could be selected, but the DNR would need to conduct its own thorough analysis.

Our potential locations have been chosen based on the following reasoning. In order to take advantage of the DNR's existing infrastructure and land base, the new Great Lakes Education Center should be built at an existing coastal State Park. In order to fill a gap in the DNR's educational/interpretive programming, the new Great Lakes Education Center should be geographically and programmatically distinct from existing "relevant" DNR coastal Visitors/Interpretive Centers. We identified those "relevant" DNR coastal Visitors/Interpretive Centers as the Gillette Sand Dunes Visitors Center at PJ Hoffmaster State Park, the Ludington State Park Education Center, the Oden State Fish Hatchery in Emmet County, and the Saginaw Bay Visitors Center at Bay City State Park. This means that all four of the DNR's "coastal" Visitors/Interpretive Centers focus are located in the Lower Peninsula - three on (or near) Lake Michigan and one on Lake Huron. These Centers focus primarily on sand dunes, fisheries, and Great Lakes inland watersheds, respectively. The exception is Oden State Fish Hatchery which raises fish to be stocked in both inland and Great Lakes waters while its Visitors Center highlights both the inland and Great Lakes fisheries.

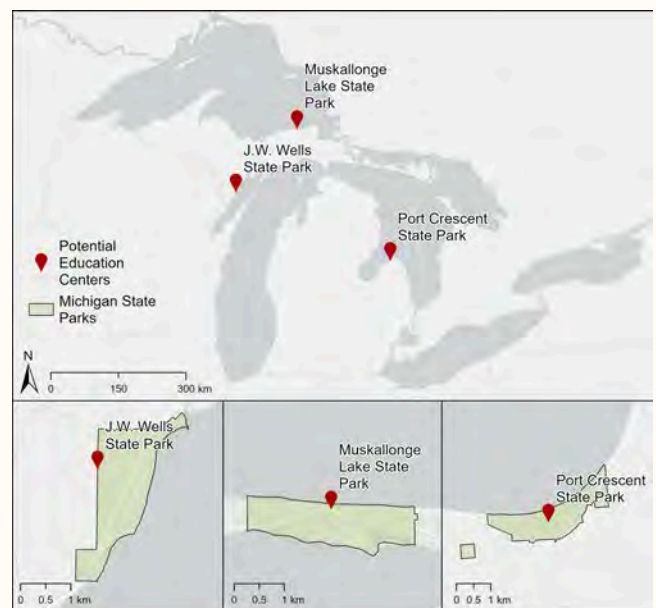
As such, our team proposes three potential locations for a Great Lakes Education Center, with an emphasis on Great Lakes coastal and open water biodiversity, and Great Lakes fisheries. Two in the Upper Peninsula, and one in the Lower Peninsula:

- 1. Muskallonge Lake State Park** (Upper Peninsula, Lake Superior)
- 2. JW Wells State Park** (Upper Peninsula, Lake Michigan, near Wisconsin population centers, potential to capitalize on Non-Resident Recreation Passport fees)

- 3. Port Crescent State Park** (Lower Peninsula, Lake Huron, near southeast Michigan population centers)

Visitorship at these parks may be lower than other Michigan State Parks. This could be seen as an opportunity rather than a drawback. The establishment of a Great Lakes Education Center at one of these parks would likely increase visitorship significantly.

**Figure 3. Map of Potential Great Lakes Education Center Sites**



Michigan State Park polygon data from Michigan DNR, 2020; Potential Great Lakes educational center sites point data from AiLi Pigott and Longyu (Ciara) Xue, 2024. Map visualization by AiLi Pigott and Longyu (Ciara) Xue, 2025.

Creating a new Great Lakes Education Center would require significant capital and staffing resources. Before pursuing full implementation, in order to assess interest and develop partnerships, the DNR could begin by funding several Great Lakes outreach specialists, and creating new Great Lakes educational material and signage to be disseminated regionally at existing interpretive centers, State Parks, and classrooms. These steps could precipitate the eventual creation of a permanent home for the Great Lakes educational programming.

In addition to the physical building, the Great Lakes Education Center could take on a virtual form. QR codes at boat launches and beaches could inform boaters and beach goers about the Bottomland State Park and its resources. In addition to making the resources of the Great Lakes Education Center more accessible to all Michiganders, the virtual Education Center could be used as a preliminary step that establishes the educational and interpretive materials before full implementation. This step would require far less initial funding, and could be aligned with other preliminary steps like building out the state's Great Lakes educational capacity (see Recommendation #3).

*Potential Benefits:* Expanding Michigan's Great Lakes outreach, education and research capacity by creating a Great Lakes Bottomland State Park & Education Center would highlight our bottomlands resources and provide further opportunities for education and engagement within the state for generations to come. Eventually, they could serve as the central node around which Great Lakes bottomland research and stewardship could take place; a foundation for collaboration, co-management, conferences and more. The Great Lakes bottomlands are an important resource that would benefit from further recognition. Not only are the bottomlands home to important cultural resources such as shipwrecks and Indigenous archaeological sites, but they play a tremendous ecological role in the Great Lake system from fish spawning reefs and refuge to vital aquatic habitat for other species.<sup>34</sup> Our team heard in our interview process that you "can't protect what you don't know," and that enhanced stewardship often follows increased education and outreach. This is perhaps most evident in Michigan at Thunder Bay National Marine Sanctuary (see Alpena Case Study).

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<sup>34</sup>Kovalenko, Katya E., Lucinda B. Johnson, Catherine M. Riseng, Matthew J. Cooper, Kristofer Johnson, Lacey A. Mason, James E. McKenna Jr, Beth L. Sparks-Jackson, and Donald G. Uzarski. "Great Lakes coastal fish habitat classification and assessment." *Journal of Great Lakes Research* 44, no. 5 (2018): 1100-1109.

The Great Lakes Bottomland State Park and Education Center could play a similar role. The proposed Great Lakes Education Center would act as a hub for Great Lakes education and interpretive material. It could also serve as a research hub, supporting studies in bottomlands ecology and underwater archaeology. Eventually, the State Park and Visitors Center could foster planning for greater cooperative management and stewardship of the bottomlands. Modeled after the Gillette Sand Dunes Visitors Center, the facility would provide a public-facing resource dedicated to Great Lakes bottomlands. It would also offer the DNR an opportunity to collaborate with other agencies and Tribal partners to develop a comprehensive Great Lakes bottomlands management plan. In conjunction with initiatives such as creating a Bottomlands State Park, expanding the Underwater Preserve System, expanding the Great Lakes Observing System, or growing the state's shipwreck and bottomland archaeology program, the Education Center could serve as a central hub to support these efforts.

*Potential Barriers:* In our preliminary analysis of potential Great Lakes Education Center locations, we chose to prioritize existing coastal State Parks, and areas of the state that are not already represented by a DNR Visitors Center. This means that the three State Park locations we chose as a potential home are relatively far from the state's population centers. While this is one way to choose a location that encourages spreading the DNR's resources across the state to areas of that could benefit from the associated increase in tourism, these locations could be hard to access for some Michiganders. It would be reasonable for the DNR to instead choose to prioritize a location that is close to population centers and freeways. Other forms of analysis could prioritize access to the Great Lakes Education Center for Michigan's socially vulnerable communities



(see Appendix A - subheading “Social Vulnerability”). The DNR’s Outdoor Adventure Center is a strong example of this type of prioritization. In this light, Belle Isle, though close to the OAC, could be a strong candidate for the Great Lakes Education Center.

There would likely be minimal funding necessary to create a Bottomlands State Park because it is a largely symbolic move. However, building a new Great Lake Education Center would require significant resources. While it can be hard to estimate exactly how much it would cost to establish and construct a new visitors center, the \$1.5 million price tag of the new renovations at the Bay City State Park Saginaw Bay Visitors Center give some indication that this undertaking would cost several million dollars.<sup>35</sup>

Additionally, establishment of a Bottomlands State Park could require legislative action, as was attempted in 2007. That effort stalled, and renewed political feasibility would need to be assessed for such a Bill to be proposed again. According to Part 741 of Michigan’s Natural Resources and Environmental Protection Act, while the DNR has authority to propose new State Parks, the establishment of a new State Park requires legislative action.<sup>36</sup> A large project such as a new Great Lakes Education Center would likely also require legislative budget appropriation, or a Michigan Natural Resources Trust Fund grant, or the adoption of a state Great Lakes Trust Fund (see Recommendation #10); all of which come with their own questions of feasibility. However, were the Bottomland State Park to be created, all associated funding needs would be eligible for support through the State Parks Endowment Fund.

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<sup>35</sup> Sarah Spohn | Thursday, September 5, and 2024, “Bay City State Park Renovations Bring Visitors and Positive Responses,” Route Bay City, accessed March 18, 2025, <https://www.secondwavemedia.com/baycity/features/bay-city-state-park-renovations-bring-visitors.aspx>.

<sup>36</sup> Natural Resources and Environmental Policy Act, Part 741, Act 451 of 1994, <https://www.legislature.mi.gov/documents/mcl/pdf/mcl-451-1994-III-4-2-PARKS.pdf>

*Decision Makers:* While the Michigan DNR Parks and Recreation Division would direct and manage any effort to develop a Bottomland State Park or a Great Lakes Education Center, it is likely that such large projects would require legislative or other action. For example, as was attempted in 2007, a Great Lakes Bottomland State Park Bill would likely need to be passed by the legislature to give the DNR the authority to establish such a park. Similarly, the establishment of a Great Lakes Education Center would likely require State budgetary appropriation, or grant assistance from a fund such as the Natural Resources Trust Fund. In this case, decision making authority would fall to the Michigan Natural Resources Trust Fund Board, legislators, and the Governor.

*Application:* In Alpena and Muskegon, and Sault Ste. Marie, we learned how Thunder Bay National Marine Sanctuary, the Annis Water Institute and the Center for Freshwater Research, respectively, serve as cultural and research hubs that draw people to these communities and serve as catalysts for education and outreach, as well as education and stewardship. A Great Lakes Education Center could serve as a similar “anchor institution” for its host community that fosters long term community vitality as well as a catalyst for Great Lakes education and stewardship. Creating a Bottomland State Park and/or creating a Great Lakes Education Center would improve Great Lakes education opportunities statewide and would provide increased tourism and associated community benefits for the coastal community adjacent to the Education Center.

### ***3. Empower Youth Stewardship Through Great Lakes Education Initiatives***

*Michigan the Beautiful* is an initiative seeking to initiate a “collective journey to conserve, connect and restore at least 30 percent of Michigan’s lands and

waters by 2030”.<sup>37</sup> To achieve this and adequately participate in this initiative, Michiganders of all ages would benefit from improved access to environmental programs; to empower tomorrow’s environmental stewards, Michigan must increase support for and expand programs such as the Great Lakes Stewardship Initiative and Nature Awaits, and increase exposure to jobs & post secondary educational opportunities to 8-12 students. MtB not only intends to protect biodiversity throughout the state but also nurture a new generation of environmental stewards, making investing in this initiative vital for Michigan’s future.

These programs presently provide introductory and immersive opportunities for Michigan’s youth. Nature Awaits supports a 4th grade field trip to a state park, while the Great Lakes Stewardship Initiative (GLSI) engages students in a longer-term immersive experience which includes a stewardship project. These programs not only introduce young people to Michigan’s natural resources and spaces but also help foster a lasting appreciation for the outdoors. Participation in these types of programs has been shown to cultivate strong personal connections to the environment, which not only fosters stewardship but also increases the chances of individuals protecting nature in adulthood.<sup>38</sup> Without such programs, limited access to nature and environmental education puts our youth and the preservation of Michigan’s natural resources at risk.

Michigan has an opportunity to lead by example by building on these already existing programs, further supporting equitable access to the outdoors and inspiring future generations to protect the Great Lakes and surrounding ecosystems.<sup>39</sup>

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<sup>37</sup>“Michigan the Beautiful.” Department of Natural Resources. Accessed January 16, 2025. <https://www.michigan.gov/dnr/managing-resources/mtb>.

<sup>38</sup>Strife, Susan, and Liam Downey. “Childhood Development and Access to Nature.” *Organization and Environment* 22, no. 1 (March 2009): 99–122. <https://doi.org/10.1177/1086026609333340>.

<sup>39</sup>Honold, Alex. “Environmental Education Makes a Difference, Then and Now.” *Ecology Center*, 2021. <https://www.ecocenter.org/ecology-center-50/environmental-education-makes-difference-then-and-now>.

Creating lifelong stewards requires addressing barriers to outdoor education, expanding current programs, and securing funding to support these initiatives sustainably. Michigan’s future depends on the dedication of its stewards. If there are no champions for the Great Lakes, dunes, and forests, the environmental, cultural, and economic loss would be devastating.

## **1. Expand Place-based Learning**

### *Action Step to Achieve Increased Place-based Education Throughout Michigan*

Presently, the Great Lakes Stewardship Initiative’s “Place-based Stewardship Education” program is accessible to K–16 teachers and community partners, with six regional hubs spanning the entirety of Michigan.<sup>40</sup> Place-based learning is critical in building connection to one’s environment and subsequently ensuring the future success of MtB, through the cultivation of generational stewardship. This program strives to introduce youth to their local environment, emphasizing the interconnectedness of nature and communities by providing professional development to educators and community partners. To expand place-based learning within Michigan, it would be advantageous to increase funding and resources for the GLSI to enhance its reach throughout Michigan by ensuring that all schools, especially those in underserved areas, have equal access to participate in this program, facilitating a greater understanding, connection, and appreciation for their environment.

### *Increase Resources for the GLSI*

Increase funding to the GLSI with a continued pledge from state-trusts. Previous funding sources include but are not limited to, The Great Lakes Fisheries Trust, (GLFT), Wege Foundation,

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<sup>40</sup>“Where We Work.” Great Lakes Stewardship Initiative: Where We Work, Great Lakes Stewardship Initiative, 2025, [greatlakesstewardship.org/how-we-work/](https://greatlakesstewardship.org/how-we-work/).



Community Foundation for Muskegon County, and the U.S. Environmental Protection Agency.<sup>41</sup> The GLSI received a time constrained monetary investment from the Great Lakes Fisheries Trust in 2007 for ten years with a pledge of \$10 million.

Expanding the GLSI, requires a consistent source of funding. A rough estimate of how much the program would need to successfully be implemented, without accounting for timescale, would be double the initial 2007 pledge of \$10 million while also adjusting for inflation, ensuring the GLSI receives what \$10 million would be in the year the financing is acquired. A potential funding source could be the Great Lakes Trust Fund which is further outlined in Recommendation #10.

Additional resources for the GLSI would grant the program the opportunity to further invest in a dedicated mentoring, job-shadowing, and skills development program for students in the 8th-12th grade. Creating an environmental career hub where employees of state agencies, universities, and environmental organizations can showcase educational videos, share career journeys, offer mentorship, and provide networking advice would help further cultivate stewardship within this age group.

With \$10 million from the GLFT, the Great Lakes Stewardship Initiative was able to effectively host six networking hubs. For place-based learning to effectively expand throughout the state and reach all Michigan students, we are recommending that this initiative once again receives a substantial financial commitment, similar to the investment outlined above, to ensure that there is a hub in all ten Michigan regions.<sup>42</sup>

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<sup>41</sup> "Our History." Great Lakes Stewardship Initiative: OUR HISTORY, Great Lakes Stewardship Initiative, 2025, [greatlakesstewardship.org/our-history/](https://greatlakesstewardship.org/our-history/).

<sup>42</sup> "Michigan's Regions | Michigan Business." Michigan's Regions, Michigan Economic Development Corporation, 2025, [www.michiganbusiness.org/regions/](https://www.michiganbusiness.org/regions/).

Increasing funding to this initiative further supports accessibility of environmental education for Michigan students, teachers and environmental education leaders.

### *Community Partner Influence on GLSI*

To ensure a well rounded place-based education, it is imperative to partner with local organizations and businesses, Indigenous communities and tribal colleges, and environmental educators to ensure diverse perspectives and inclusive programming. An example of a successful place-based environmental education initiative which included participation from a myriad of partners, is Project Clarity, a collaborative effort to improve the health of Lake Macatawa and its watershed.<sup>43</sup> Efforts like this demonstrate the power of multi-stakeholder partnerships to advance both ecological restoration and community learning. It is important for the GLSI to be aware of and build upon existing place-based projects already active in communities. Rather than starting from scratch, the GLSI can play a valuable role by supporting the integration of these locally-grounded initiatives into school curriculum, ensuring that students engage with the environmental challenges and solutions most relevant to their own communities.

## **2. Fourth Graders - Visit a State Park**

### *Action Steps to Achieve Nature Awaits Expansion*

Build on the Nature Awaits program – which currently offers 90-minute experiential education opportunities at state parks for classes of 15 or more students – by expanding the length of available field trips. This could be achieved by offering a range of flexible time slots, extending from the current 90 minutes up to 5 hours, allowing for a broader variety

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<sup>43</sup> "Project Clarity - Outdoor Discovery Center." Outdoor Discovery Center - Advancing Outdoor Education and Conservation in West Michigan, Project Clarity, 13 Nov. 2023, [outdoordiscovery.org/project-clarity/](https://outdoordiscovery.org/project-clarity/).

of hands-on learning experiences throughout the visit.

Additionally, we recommend lowering the minimum class size requirement for participation in the Nature Awaits program from 15 to 10 students to better accommodate smaller schools and class sizes, particularly in rural and underserved communities. To further support access for classrooms with fewer than 10 students – or in the event that reducing the threshold to 10 is not feasible – we also suggest implementing a coordination mechanism that allows multiple small classrooms to be matched together for a shared field trip experience, this would ensure broader access to the program. To ensure there is no additional strain on scheduling or staffing resources and to achieve this expansion, it is imperative to continue to provide financial assistance to this program by increasing funding and diversifying its funders, specifically to ensure that the state parks, schools, and Nature Awaits program are able to cover transportation, program fees, and other logistical costs.

### **Michigan Students - Visit a Great Lake**

#### *Action Steps to Achieve Nature Awaits Expansion, Continued.*

In addition to the recommended expansion above, the Nature Awaits program should broaden its field trip offerings by providing an opportunity for Michigan students to visit a Great Lake or an Education Center along the Great Lakes. These trips would provide students the opportunity to learn more about Michigan's open waters and Great Lakes ecosystems. To ensure that this opportunity is successful, it is imperative to use existing resources such as Grand Valley State University's Robert B. Annis Water Resources Institute (AWRI) - Education & Outreach Vessel Curriculum Guide, and Inland Seas Education Association

Seas Education Association (ISEA).<sup>44, 45</sup> Utilizing established, place-based materials like these strengthens the program's academic foundation and reinforces real-world connections for students. To fund this specific expansion for youth education, the program should look to receive funding from Michigan's Trust Funds, such as the Great Lakes Trust Fund further outlined within this report in Recommendation #10, which seeks to support community resilience projects and aligns with the goal of cultivating the next generation of stewards. Like the previous section of this recommendation, this program should be supported by a budget comparable to the Nature Awaits: Visit a State Park initiative. To strengthen its impact it is imperative to prioritize the diversification of program's funding sources. An additional state agency partner could include Michigan Department of Environment, Great Lakes, and Energy (EGLE).

To further connect the recommendations, the expansion of the Nature Awaits: Visit a Great Lake initiative can be paired with Recommendation #2, which seeks to establish a Great Lakes Education Center. Visiting these centers will allow for students to interact with ongoing research; provide an opportunity for the students to learn more about Michigan's cultural and natural history. Additionally, students would have the chance to interact with the professionals actively working in this field, further encouraging connection and stewardship of the next generation by showcasing potential careers.

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<sup>44</sup> "Vessel Program Curriculum Guide." Vessel Program Curriculum Guide - Robert B. Annis Water Resources Institute (AWRI) - Education & Outreach, Grand Valley State University, 25 Mar. 2025, [www.gvsu.edu/wri/education/vessel-program-curriculum-guide-60.htm#About\\_the\\_Program](http://www.gvsu.edu/wri/education/vessel-program-curriculum-guide-60.htm#About_the_Program).

<sup>45</sup> "About Isea." Inland Seas Education Association, Inland Seas Education Association, 10 Jan. 2025, [schoolship.org/about-isea/](http://schoolship.org/about-isea/).



#### 4. Increase Regional-Specific Education

##### *Action Steps to Increase Regional-Specific Education*

Update Michigan’s curriculum by adding Great Lakes region-specific education into Michigan’s academic standards for each academic year, ensuring that all students receive foundational and tailored knowledge on the Great Lakes, its natural resources, the impacts of climate change, and resilience initiatives.

To successfully form a regional-specific curriculum it is important to work with existing programs such as the Center for Great Lakes Literacy, Michigan-based universities, Michigan Sea Grant, environmental education experts and organizations such as *Great Lakes Stewardship Initiative* and *Alliance for the Great Lakes* – Great Lakes in My World to develop an impactful Great Lakes curriculum.<sup>46, 47</sup>

By implementing these initiatives, Michigan can confidently work to build a new generation of environmental stewards who are not only knowledgeable about their own natural environment but are also empowered to take action. This investment in environmental education is critical to achieving the state’s 30x30 goals and ensuring the long-term protection of the Great Lakes and surrounding ecosystems. Without it, there risks being no continued buy-in generationally.

*Potential Benefits:* The success of Michigan’s environmental future depends on our ability to inspire and prepare the next generation of stewards. By expanding outdoor education programs and addressing barriers to access, Michigan can ensure

that every child has the opportunity to experience the Great Lakes, parks, and forests firsthand. These experiences are vital to cultivating a lifelong connection to the environment, preserving Michigan’s natural resources, and strengthening its identity as the Great Lakes State.

*Potential Barriers:* Implementing the proposed initiatives outlined within this recommendation may present several challenges that must be thoughtfully considered. A key drawback to this recommendation, which advocates for the expansion of existing programs, are the financial costs associated with program development, implementation, and long-term maintenance. Additional challenges include potential political tensions, especially around efforts to adapt state curricula to address modern, often complex, environmental topics, as discussed earlier. Without intentional communication and engagement with critical decision-makers, this initiative risks being derailed. Lastly, it is imperative for there to be inclusive, transparent, and collaborative decision-making processes. Without such a process, the involvement of multiple decision-makers may inadvertently hinder progress instead of supporting it.

*Decision Makers:* Michigan’s Department of Natural Resources, Governor’s Office, State Board of Education for Michigan & The Great Lakes Fisheries Trust fund. In addition to the programs shared above, Michigan Sea Grant can play a critical role in the development of a Great Lakes-based curriculum for Michigan schools.

*Application:* In addition to the programs mentioned above, Thunder Bay National Marine Sanctuary (TBNMS) is a prime example of the benefits and importance of having educational opportunities within communities throughout Michigan. Prior to the integration of TBNMS in Alpena few residents

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<sup>46</sup> “Inspiring Freshwater Stewards.” Center For Great Lakes Literacy, Center For Great Lakes Literacy, 16 Apr. 2025, [cgl.org/](https://cgl.org/).

<sup>47</sup> “Great Lakes in My World: 9-12.” Alliance for the Great Lakes, Alliance for the Great Lakes, 2012, [greatlakes.org/wp-content/uploads/2019/07/Great-Lakes-in-My-World-9-12.pdf](https://greatlakes.org/wp-content/uploads/2019/07/Great-Lakes-in-My-World-9-12.pdf).

visited the lake their community resides on. TBNMS provided opportunities for students to visit Lake Huron such as mapping the bottomlands and the placement of shipwrecks. These are invaluable experiences, that with the expansion of the above programs, could be a more universal experience.

**“Most important thing is really thinking about how we engage youth through their learning and in Great Lakes – meaningful Great Lakes education experiences or projects or opportunities that are going to not only enhance their learning, but also bring them in as a human that lives in a community that has something to contribute.”**

## Coastal Zone

### *4. Strengthen Regional Planning Organizations and Council of Governments for Coastal Resilience*

A recurring message from interviewees was the critical role Regional Planning Organizations (RPOs) and Councils of Governments (COGs) play in bridging the capacity gap for small municipalities. These planning groups have deep, long-standing relationships with local governments, often serving as essential liaisons between the state and municipalities. Interviewees emphasized that local governments frequently lack the resources, staffing, or expertise to secure grants or develop coastal resiliency plans independently. Planning regions, however, step in to provide the necessary support and guidance to ensure projects are initiated and completed successfully. As one interviewee described:

**“Our vision is conservation driven by engaged and empowered communities...involving people, caring about, and actively protecting natural resources. It’s not always easy. It takes a lot of time and a lot of deep relationships to do that. I’ve really appreciated the trajectory or the trends that we’re seeing over time when it comes to local leaders – whether that’s in a township or a small city or a school - it has just really improved over 20 years. People are much more proactive and think about this differently and are willing to get involved in natural resources.”**

Currently, RPOs and COGs receive funding from a mix of state, federal, and local sources, but many operate on tight budgets, limiting their ability to offer dedicated staff for coastal resilience and biodiversity initiatives. Michigan should increase state funding for RPOs and COGs and establish a partnership framework to promote collaboration between state departments and planning regions for coastal resilience planning. Designating network coordinators within each planning region and relevant state agencies would strengthen the Michigan Association of Region’s (MAR) efforts by facilitating more cohesive engagement between municipalities and state departments. This will help ensure that *Michigan the Beautiful* initiatives reach coastal communities while also supporting biodiversity and habitat restoration efforts.

These regional entities can also support efforts to build and strengthen relationships between local governments and Tribal nations, who often have similar priorities. While local governments do not have a treaty obligation to consult with Tribes, collaboration can advance shared goals related to habitat protection, cultural resource preservation, and climate adaptation. Supporting relationship-building between Tribes and municipalities is essential in places where governance and jurisdictional boundaries are complex or overlapping.



Regional coordinators can help identify shared priorities and promote best practices for Tribal engagement in local and regional planning. Including Tribal perspectives early in coastal resilience in biodiversity initiatives ensures that strategies are more inclusive, place-based, and aligned with Indigenous stewardship values.

Expanded regional support would enable RPOs and COGs to play a key role in landscape-scale biodiversity planning, protecting critical coastal habitats and maintaining wildlife corridors. These regional hubs are uniquely positioned to integrate biodiversity priorities into local planning efforts by facilitating habitat assessments, promoting green infrastructure, and encouraging the adoption of nature-based solutions that reduce climate risks while enhancing ecosystem health. Additionally, RPOs and COGs can provide critical technical expertise and planning capacity to ensure environmentally sound decision-making at the local level. Beyond general training and resources, these organizations can directly assist municipalities in incorporating coastal resilience and biodiversity considerations into comprehensive plans, zoning updates, and permitting decisions for near-shore structures, ensuring that resilience principles are embedded in local governance. Strengthening this network will improve the state's capacity to protect and connect vital ecosystems across Michigan's Great Lakes coastal areas, and increase the amount of protected areas for biodiversity stewardship long-term, contributing to *Michigan the Beautiful's* goals.

To optimize collaboration, the state should revisit lessons from the Governor Snyder-era Regional Prosperity Initiative (RPI), which provided \$2.5 million annually for regional planning across 10 regions but was not included in the state budget after Governor Whitmer took office and has not been

reintroduced since.<sup>48</sup> We heard from three coastal planning regions and other involved stakeholders that while the RPI increased funding for regional projects, realigning the state into 10 regions disrupted the established 14 planning regions. Aligning future initiatives with the original 14 regions would preserve long-standing relationships and minimize disruptions. We recommend restoring RPI-level funding and expanding it to fully support the 14 existing regions, with at least one dedicated coastal resilience and biodiversity coordinator per region.

Minnesota's Regional Development Organizations (RDOs) provide a useful model for scaling up support of local efforts. The program receives about \$4 million annually in state support for regional coordination and community development services across 11 planning regions. A similar investment in Michigan would enable RPOs and COGs to offer ongoing training in biodiversity and coastal resiliency planning, host regional summits to align efforts with MtB goals, and include Tribal co-stewardship and Indigenous ecological knowledge as essential elements of coastal resilience planning. These regional coverings could serve as platforms for cross-jurisdictional collaboration and knowledge sharing among municipalities, state agencies, and Tribal governments.

*Potential Benefits:* Increases capacity for small municipalities to access state and federal grants by reducing administrative and technical barriers. Strengthens long-term community engagement by leveraging RPOs' and COGs' established trust with local governments. Promotes more cohesive coastal resilience planning at a regional scale by ensuring state resources and expertise are accessible to municipalities, and enhances biodiversity and habitat protection by integrating coastal resilience planning with conservation goals. Improves the delivery of

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<sup>48</sup> Michigan FY 2014 Budget (59 PA 2013).

*Michigan the Beautiful* initiatives to coastal communities.

*Potential Barriers:* Requires additional resources and staff, which may face budgetary or political hurdles. Risk of regional variation in the effectiveness of coordinators, depending on existing local capacity and resources.

*Decision Makers:* The Governor's Office and the House and Senate Appropriations Committees who control the budget and approve new funding. EGLE and the Coastal Zone Management Office for distributing grants, assisting local communities, and managing the program.

*Application:* Like all coastal communities, Alpena, Sault Ste. Marie, and Muskegon rely on their respective regional planning group. In Alpena, expanded funding for the Northeast Michigan Council of Governments (NEMCOG) could enhance its ability to assist communities in integrating biodiversity and coastal resilience strategies into planning efforts for Thunder Bay and surrounding wetlands. In Sault Ste. Marie, the Eastern Upper Peninsula Regional Planning & Development Commission (EUPRPDC) serves a region with complex governance structures involving local, state, Tribal, and federal stakeholders. Additional capacity within EUPRPDC could improve coordination between municipalities, Bay Mills Indian Community, Sault Ste. Marie Tribe of Chippewa Indians, and agencies such as the Army Corps of Engineers to advance shoreline stabilization efforts and protect habitat connectivity in the St. Marys River System. In Muskegon, the West Michigan Shoreline Regional Development Commission (WMSRDC) supports planning efforts across Lake Michigan's eastern shore. With increased resources, WMSRDC could assist Muskegon and surrounding townships in integrating coastal

resilience into ongoing waterfront redevelopment and green infrastructure projects. Enhanced funding would enable WMSRDC to facilitate the development of comprehensive shoreline management strategies that balance economic growth with ecosystem protection.

### 5. Develop a "Great Lakes Forever Pledge"

Interviews consistently emphasized the need to equip Michigan's coastal communities with tools, best management practices, and guidance to enhance resiliency in homeowner and community planning efforts. Interviewees highlighted the public enthusiasm garnered by the Lake Huron Forever initiative, which has empowered communities along Lake Huron's coast to adopt effective coastal resiliency measures.<sup>49</sup> Inspired by this model, the proposed Great Lakes Forever Pledge aims to serve as a state-wide coastal resilience commitment. This initiative would empower Michigan's coastal communities to take actionable steps toward environmental stewardship that supports biodiversity while addressing pressing challenges such as shoreline erosion, stormwater runoff, and habitat loss – working towards *Michigan the Beautiful* goals. The Great Lakes Forever Pledge would follow a similar structure to the successful Michigan Green Communities Challenge (MGC) – a voluntary program embraced by cities and townships across the state that helps local governments benchmark sustainability progress through shared learning and state-support resources.<sup>50</sup> Like the MGC Challenge, the Great Lakes Forever Pledge would create a tiered or action-based system for communities to self-assess, commit to best practices, and track their progress over time in coastal resilience and habitat protection.

<sup>49</sup> Lake Huron Forever. Accessed January 24, 2025. <https://lakehuronforever.org/>.

<sup>50</sup> "Complete the Michigan Green Communities Challenge." Michigan Green Communities, December 13, 2024. <https://migreencommunities.com/challenge>.

The strength of the MGC model lies in its emphasis on peer learning, state support, and local ownership – principles that would guide the Great Lakes Forever Pledge.

Participating communities in the pledge would gain access to tools, guidance, and funding through a proposed “Great Lakes Trust Fund” (see Recommendation 10). This approach emphasizes voluntary, community-driven conservation efforts, with the state offering resources and expertise, while local communities lead implementation tailored to their unique needs. By creating collaboration rather than imposing mandates, the pledge would encourage broader buy-in and local ownership of conservation goals. Communities could proudly feature their participation on their websites or in local materials, strengthening their identity and fostering a sense of community around the Great Lakes – an important heritage shared by all Michiganders. Integrating the pledge with broader marketing efforts such as the Pure Michigan campaign could amplify this sense of unity and pride in Michigan’s coastal communities.

The Great Lakes Forever Pledge would integrate resources from Michigan Sea Grant’s Coastal Resilience Resource Hub, drawing on existing tools and research for effective implementation.<sup>51</sup> We recommend this pledge include:

### **1. Develop Resilient Shoreline Ordinances:**

Utilize the Best Practices in Great Lakes Shoreline Management: A Guide for Michigan Municipalities (developed by Michigan Sea Grant and University of Michigan Sustainability Law Clinic) to help communities develop resilient shoreline ordinances. Adopt the shoreline ordinance that works best for the community based on the guidance in the document.

For instance, communities would be encouraged to ban shoreline armoring or provide justification for retaining its use.

**2. Educate Local Officials:** Require a community-determined subset of locally appointed and elected planning officials to complete MSU Extension’s Citizen Planner online course and review Michigan Association of Planning’s Coastal Resilience webinars. These programs will equip even townships without professional planners with foundational knowledge of best management practices. (Note: The Coastal Planning module for the Citizen Planner Program is in development.)

### **3. Conduct Community Resilience**

**Assessments:** Conduct a self-assessment of community resilience using tools such as the Sustainable Small Harbors Toolkit and Tactics Guidebooks, the MEDC Redevelopment Ready Community Resiliency Guide, etc.

Communities would then develop action plans based on their assessments to strengthen local resiliency.

**4. Implement Clean Marina Practices:** Require municipal marinas and harbors to complete Michigan’s Clean Marina Course and become a certified Great Lakes Clean Marina.

**5. Mitigate Stormwater Runoff:** Communities should conduct stormwater assessments to evaluate the impacts of roads and impervious surfaces on local water bodies. Promote the use of nature-based solutions for coastline and water quality protections as appropriate.

**6. Bolster Invasive Species Control:** Utilize the Coastal Restoration Toolkit to train staff and officials on invasive species management and develop action plans for their control and removal.

### **7. Enhance Wetlands Protections and**

**Restoration:** Assess, protect, and restore coastal

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<sup>51</sup> “Coastal Resilience Resource Hub.” Michigan Sea Grant. Accessed January 25, 2025. <https://www.michiganseagrant.org/coastal-resilience-resource-hub/>.



wetlands using EGLE's Wetland Mapping and Prioritization Tools. Communities would evaluate existing wetlands for their ecological function and vulnerability, strengthen local wetland ordinances to restrict development in or near wetlands, and identify and pursue opportunities for wetland restoration.

Implementing these practices will protect crucial coastal ecosystems and prevent overdevelopment along the shoreline. Increased coastal resilience not only safeguards communities from coastal hazards but also supports the protection and restoration of natural shorelines by conserving habitats essential for native species. By incentivizing communities to adopt these measures, the Great Lakes Forever Pledge aligns with MtB, contributing to protecting Michigan's coastal ecosystems. These actions enhance biodiversity by promoting nature-based solutions, restoring coastal habitats, and mitigating threats such as shoreline erosion and invasive species.

Communities such as Alpena, Bay City, Au Gres, and the Charter Township of Oscoda have already demonstrated how local action plans can lead to greater coastal protections and community-driven conservation efforts.

The pledge could be facilitated primarily by Regional Planning Organizations (RPOs) and Council of Governments (COGs) (as recommended by Recommendation #4) ensuring that the local and regional leaders take the lead in driving these efforts. This would foster a more unified approach, tapping into existing relationships and capacity at the regional level. The state's role would be to provide the necessary resources and tools, but the pledge itself would be grounded in local and regional ownership.

*Potential Benefits:* This pledge would build capacity, foster stewardship, and unify Michigan's small coastal communities under shared goals of environmental protection and resiliency. It offers a timely

opportunity to leverage the current political momentum and strengthen state and local capacity for climate adaptation, particularly as federal funding for climate resilient projects faces uncertainty.

*Potential Barriers:* The voluntary nature of the pledge may reduce its prioritization by both state and local municipalities. Local officials might hesitate to adopt it if they perceive that residents don't view these issues as critical. It would hold communities to a high bar, potentially creating a limiting factor.

*Decision Makers:* Michigan DNR, EGLE, and local units of government to adopt the pledge.

*Application:* Each coastal community in Michigan faces its own unique challenges that could be addressed through the voluntary commitment of the pledge. Alpena has already demonstrated willingness and effectiveness of this model through its participation in the Lake Huron Forever initiative, which has helped the city strengthen local conservation efforts and implement nature-based solutions. This illustrates how a similar statewide pledge could provide other coastal communities with the tools and resources to advance coastal resilience. Expanding this model through the Great Lakes Forever Pledge would allow more communities to access technical guidance and best practices tailored to their specific shoreline challenges. In Sault Ste. Marie, the pledge would provide a structured approach to balancing economic activity with ecosystem health. The EUPRPDC could leverage the pledge to help local governments to conduct community resilience assessments, strengthen shoreline protections, and implement clean marina practices that improve water quality. The city's reliance on commercial navigation and tourism makes stormwater management and erosion control critical priorities. In Muskegon, where ongoing waterfront redevelopment presents both opportunities and challenges for long-term

resilience, the pledge would support sustainable coastal planning. WMSRDC could help integrate resilient shoreline ordinances into planning efforts, ensuring new development prioritizes natural infrastructure and erosion mitigation.

## ***6. Develop and Implement an Action Plan to Address Coastal Hazards***

Protecting Michigan's shorelines from coastal hazards is essential to achieving the goals of *Michigan the Beautiful*, which aims to conserve, connect, and restore 30% of the state's lands and waters by 2030. Addressing coastal hazards such as shoreline erosion and flooding through forward-thinking policies, is critical to protecting Michigan's coastal ecosystems and preventing long-term environmental and economic harm. Without proactive measures, interventions such as shoreline armoring will continue to threaten the integrity and biodiversity of Michigan's shoreline, putting at risk not only the states' sandy beaches and significant coastal ecosystems, but also the very places where people experience the Great Lakes.

Under Part 325 of the Natural Resources and Environmental Protection Act (NREPA), property owners can currently receive emergency permits for seawall installations when Great Lakes water levels exceed the Ordinary High Water Mark.<sup>52</sup> While this provides immediate relief, seawalls exacerbate long-term erosion, threatening adjacent properties and public trust resources. According to an interviewee, "One of the greatest threats to the Great Lakes coasts is the hardening of shorelines, which impacts biodiversity and is not effective in protecting shorelines during high water levels and climate change impacts".

The 2015-2020 high water period highlighted the need for innovative policy-based solutions. The complexity of this topic – shoreline erosion – demands forward-thinking policies to protect Michigan's shorelines and communities from recurring high-water events, as this coastal professional notes,

"Great Lake shorelines for the most part are comprised of loose sands and gravels that are highly erodible ... As lake levels fluctuate up and down, especially when they're high, chew away at the shoreline. So there's a background rate of recession along much of Michigan's Great Lakes coastlines ... shoreline recession is a huge problem because **people want to build really close to the water's edge, especially when the lakes are low, then when the lakes come back up, they panic.** They want to build sea walls and try to stop that natural process; but then that destroys the natural beaches and becomes a huge ongoing expense".

### **1. Convene a Comprehensive Stakeholder Planning Process with the State Legislature**

Convene a comprehensive stakeholder planning process that includes both state legislators and agencies like the Department of Natural Resources and EGLE. This initiative would educate participants on the complexities of shoreline erosion, conservation trade-offs, and the importance of protecting the Great Lakes using expert knowledge and existing resources. Key topics should include but are not limited to:

- The long term implications and futility of armoring and its negative impact on Michigan's Great Lakes.<sup>53</sup>

<sup>52</sup> "High Water Levels: Frequently Asked Questions." Tip of the Mitt Watershed Council, 2005. <https://watershedcouncil.org/wp-content/uploads/2023/07/2005-Shoreline-Protection-Great-Lakes-Water-Levels.pdf>.

<sup>53</sup> "Resilient Coastal Communities Planning Guide." Michigan.Gov, Department of Environment, Great Lakes, and Energy, May 2023, [www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Programs/WRD/Coastal-Management/Resilient-Coastal-Communities-Planning-Guide.pdf](https://www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Programs/WRD/Coastal-Management/Resilient-Coastal-Communities-Planning-Guide.pdf)

- The potential role of managed retreat, including lessons from other state programs.
- Trade-offs in conservation efforts & nature-based solutions, such as the balance between protecting beaches and protecting infrastructure.<sup>54, 55</sup>

To ensure widespread understanding of complex topics faced by communities along Michigan shorelines, it is imperative to establish a working group to engage state legislators and stakeholders in a dialogue regarding the viability of managed retreat as a long-term strategy for addressing erosion and protecting the Great Lakes. This discussion should include specifics such as cost, determinant factors for financial responsibility (i.e., the state, homeowners, etc.), and policies to buy out high-risk properties. Michigan is reaching a tipping point along its shoreline, it is imperative to initiate discussions surrounding the topic of managed retreat as it will likely be a tool requested by shoreline property owners, meaning Michigan needs to start developing its approach to this topic.<sup>56</sup>

## 2. Amend Part 325 and 323 to Clarify State Authority Beyond the Ordinary High Water Mark

Amend Part 325 and 323 to explicitly assert the state's authority to regulate land beyond the OHWM.<sup>57</sup> This amendment should intend to remove the

elevation-based standard, ultimately reinforcing the state's interest in protecting the shoreline above the OHWM, allowing for dynamic shoreline protections. Amending Part 325 and 323 is vital for Michigan to achieve its conservation goals – these amendments would ensure increased protection of Michigan's coastline, particularly its vulnerable coastal ecosystems, by enabling more dynamic shoreline management.<sup>58</sup> For one of Michigan's most important natural resources to be effectively protected, policy must evolve to account for shifting environmental conditions and long-term resilience. Strengthening regulations beyond the Ordinary High Water Mark (OHWM) would prevent unchecked development from hindering future intervention efforts, ensuring that conservation strategies remain adaptable while mitigating further harm to sensitive coastal ecosystems and the communities that depend on them.

Amending Part 325 and 323 aligns with the goals of *Michigan the Beautiful* by ensuring stronger, more adaptive shoreline protections that support long-term conservation efforts. Explicitly stating the state's authority to regulate land beyond the OHWM would reinforce Michigan's commitment to protecting its coastal ecosystems, preventing erosion, and enhancing resilience. By moving away from an elevation-based standard, this amendment would allow for more dynamic, science-based shoreline protections that contribute to the state's broader 30x30 conservation targets. An alternative to amendment is formulating policy changes that will have the same impact yet will be separate from opening up these pieces of legislation.

<sup>54</sup> Richard K. Norton, Guy A. Meadows, Oday Salim, Matthew Piggins, Phillip Washburn & Lauren A. Week, *Armor or Withdraw? Likely Litigation and Potential Adjudication of Shoreland Conflicts Along Michigan's Shifting Great Lake Coasts*, 12 Mich. J. Env't. & Admin. L. 153 (2023), <https://repository.law.umich.edu/mjela/vol12/iss2/2>

<sup>55</sup> "Coastal Resilience Resource Hub." Michigan Sea Grant. Accessed January 25, 2025. <https://www.michiganseagrant.org/coastal-resilience-resource-hub/>.

<sup>56</sup> "New Guide to Help Michigan Communities Address Shoreline Armoring along Coastline." Michigan Sea Grant, Michigan Sea Grant, 19 Nov. 2024, [www.michiganseagrant.org/blog/2024/11/19/new-guide-to-help-michigan-communities-address-shoreline-armoring-along-coastline/](http://www.michiganseagrant.org/blog/2024/11/19/new-guide-to-help-michigan-communities-address-shoreline-armoring-along-coastline/).

<sup>57</sup> "Ordinary High Water Mark (OHWM)." SOM - State of Michigan, Michigan's Department of Environment, Great Lakes, and Energy, 2025, [www.michigan.gov/egle/about/organization/water-resources/submerged-lands/ordinary-high-water-mark-ohwm](http://www.michigan.gov/egle/about/organization/water-resources/submerged-lands/ordinary-high-water-mark-ohwm).

<sup>58</sup> "Shoreland Management." SOM - State of Michigan, Michigan's Department of Environment, Great Lakes, and Energy, 2025, [www.michigan.gov/egle/about/organization/water-resources/shoreland-management](http://www.michigan.gov/egle/about/organization/water-resources/shoreland-management).



### 3. Expand the High-Erosion Program

Amend Part 323 to expand the High-Risk Erosion Program (HREP) to include areas eroding at ½ foot per year, rather than the current 1-foot threshold.<sup>59</sup> This would significantly broaden the program's reach and improve its effectiveness, allowing for proactive protection measures within a larger scope of vulnerable areas.

Expanding HREP aligns with the goals of *Michigan the Beautiful* by proactively protecting Michigan's shorelines and ensuring long-term resilience against erosion and climate change impacts. By lowering the threshold from 1 foot to ½ foot per year, this amendment would help extend protections to additional vulnerable coastal areas, helping to protect critical habitats, infrastructure, and communities. Updating the HREP supports Michigan's broader 30x30 conservation commitment by prioritizing sustainable shoreline management and bettering the state's ability to respond to environmental challenges in a dynamic fashion. As stated above, a potential alternative to amendment is formulating policy changes that will have the same impact yet will be separate from opening up these pieces of legislation.

### 4. Increase Staffing and Resources for Coastal Management at State Level

Expand staffing within the High-Risk Erosion Program and the Michigan Coastal Management Program to address erosion and planning needs effectively. This includes but is not limited to, increasing the number of permitting staff, upgrading staff technical training, leveraging new technologies such as aerial mapping and GIS tools, and providing on-call expertise to assist local governments in making informed decisions. Enhanced staffing would also

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<sup>59</sup> "High Risk Erosion Areas: Program and Maps." SOM - State of Michigan, Michigan's Department of Environment, Great Lakes, and Energy, 2025, [www.michigan.gov/egle/about/organization/water-resources/shoreland-management/high-risk-erosion-areas](http://www.michigan.gov/egle/about/organization/water-resources/shoreland-management/high-risk-erosion-areas).

improve EGLE's capacity to manage erosion trade-offs and implement stewardship management strategies.

### 5. Stricter Development Codes to Protect Ecologically Sensitive Coastal Areas

Strengthen coastal protections by expanding the Critical Dunes Act to limit any further development in ecologically sensitive dune systems and high-risk erosion zones. The action is similar to the Federal Flood Risk Management Standard, under President Biden, which demands that federally funded projects avoid flood-prone areas unless no other viable alternatives exist.<sup>60,61</sup>

Expanding the Critical Dunes Act aligns with the MtB initiative by protecting Michigan's most ecologically sensitive coastal areas, ensuring they remain protected as part of the state's 30x30 conservation commitment. By limiting new development in vulnerable dune ecosystems and high-risk erosion zones, this policy reinforces and strengthens MtB's goal(s) of conserving, protecting, and restoring Michigan's natural landscapes. Strengthening these policy-protections would not only prevent further degradation of coastal habitats but also support resilience-based planning that does not harm the integrity, beauty or welfare of Michigan's coastal ecosystems.

- By expanding the Critical Dunes Act, Michigan could implement policies that prohibit new development in vulnerable coastal and dune ecosystems. This would serve as a political vehicle

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<sup>60</sup> "Critical Dunes Area Program." SOM - State of Michigan, Michigan's Department of Environment, Great Lakes, and Energy, 2025, [www.michigan.gov/egle/about/organization/water-resources/sand-dunes/critical-dunes](http://www.michigan.gov/egle/about/organization/water-resources/sand-dunes/critical-dunes).

<sup>61</sup> "Federal Flood Risk Management Standard (FFRMS): FEMA Policy 206-24-005." Federal Emergency Management Agency, Federal Emergency Management Agency, Sept. 2024, [www.fema.gov/sites/default/files/documents/fema\\_floodplain-management\\_ffrms-policy\\_092024.pdf](http://www.fema.gov/sites/default/files/documents/fema_floodplain-management_ffrms-policy_092024.pdf).

for preventing development along Michigan's shoreline while ensuring that any existing structures adhere to stricter building codes to withstand flooding, storm surges, and erosion.

- Expanding the Critical Dunes Act could allow for the integration of resilience-based planning, requiring that any permitted development minimizes harm to coastal ecosystems and participates with Michigan's climate adaptation goals.

By reinforcing these regulations, Michigan can proactively protect its shoreline, prevent further erosion damage, and promote policy-based solutions that encourage long-lasting coastal resilience.

*Potential Benefits:* Provides the state an opportunity to further protect Michigan's coastline habitats and increase ecosystem biodiversity; offers potential to further connect with and provide education regarding shoreline hardening and its implications. Initiating discussions regarding managed retreat and the tradeoffs of shoreline hardening at the legislative level with a working group will provide Michigan with the foundation necessary to ensure effective policy.

*Potential Barriers:* Amending Part 323 and 325 to include an Adaptive Coastal Setback Policy presents extensive political challenges. Opening the statute for changes could lead to unintended negative consequences, specifically if throughout the legislative process opposition arises, which is not enticing for the state legislature to take on. Opposition to increased protections poses a credible threat to the legislative process – opening up these statutes places the current state of coastal protections at risk. In addition, to the chance of losing coastal protections instead of gaining, localities might perceive these actions as state overreach. This perception could play a significant role as a barrier to

the successful adoption of this recommendation.

Given these concerns, some proposed policy changes may be better addressed through separate legislation or alternative mechanisms. For the above amendments or alternative solutions to be successful it is important to prioritize early and consistent collaboration with local leaders to ensure community support for these initiatives, while acknowledging the authority of local government. Ultimately, any proposed legislative change requires careful consideration and framing, significant and strategic engagement with relevant partners, and the shared understanding of why these policy changes matter in order to build community buy-in.

*Decision Makers:* Michigan's Department of Natural Resources, EGLE, Michigan Legislature, Local Government and Community Leaders.

*Application:* Michigan's Eastern Upper Peninsula Regional Planning & Development put together a vital resource called, Raising Awareness of Coastal Hazards in the Eastern U.P. The story map outlines the ways Michigan's shoreline is changing, how climate change is exacerbating erosion and disrupting ecological processes along Michigan's coast, and ultimately complicating patterns of erosion, while underscoring the importance of adaptive strategies to protect Michigan's shoreline.<sup>62</sup> This resource showcases the importance of this recommendation and how it's essential for the state to support community leaders in their endeavors to enact local-level adaptive coastal plans, while also prioritizing implementing adaptive coastal strategies at the state level when there is a political opportunity.

Presently, the manner with which coastal zoning is implemented and received by coastal communities

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<sup>62</sup> "Raising Awareness of Coastal Erosion Hazards in the Eastern U.P." Experience ArcGIS, Eastern Upper Peninsula Regional Planning and Development, EGLE & NOAA, 2024, [experience.arcgis.com/experience/828d28f184ef46809078ab82b26b61f9/?views=View-19](https://experience.arcgis.com/experience/828d28f184ef46809078ab82b26b61f9/?views=View-19).

such as Muskegon can result in miscommunication in regards to the jurisdiction of who regulates new developments across the state's coastline. The current statutes have allowed Michigan to protect various parts of its extensive coastline and coastal communities, yet, when the political will and political opportunity arises, it is imperative that law reflects the present and future needs of the citizens, environment and state. Adding legislation and having conversations that allow for greater coastline protections will ensure that Michigan satisfies its goals stated within its *Michigan the Beautiful* plan, while also supporting coastal communities in their endeavors to navigate the allowance of human activity along the coast while protecting the natural environment and critical ecosystems of the state.

## Mechanisms to Increase Protections

**“The State needs to increase its capacity for stewardship across its divisions”**

### 7. Expand and Revitalize the State Natural Area Program to include Coastal Natural Areas

In an effort to expand the State of Michigan's capacity for coastal biodiversity conservation and stewardship while pursuing its 30x30 goals; the Michigan DNR should revitalize the State Natural Area (SNA) program, broaden its funding and staffing capacity, and expand it to include more coastal natural areas. In Michigan, and elsewhere, State Natural Areas (or Heritage Areas in some states) are designated corners of existing public (and sometimes private) land that highlight the best examples of a state's natural heritage. The Michigan DNR defines a natural area as “areas that have retained the best examples of Michigan's native landscapes, ecosystems, natural

communities or scenic qualities”.<sup>63</sup> A revitalized SNA program would be able to protect more of the best examples of Michigan's unique natural communities, thus broadening the DNR's capacity for coastal and terrestrial biodiversity stewardship. It would also broaden DNR's capacity to improve infrastructure at existing SNAs where appropriate, like parking areas, trails and interpretive signage. Thus, increasing opportunities for research, education and recreation at SNAs while familiarizing more Michiganders with the state's unique natural communities. The stated goal of the *Michigan the Beautiful* initiative is to conserve, connect, and restore at least 30% of Michigan's lands and waters by 2030; which can be achieved both through expanding the public lands footprint, and by “improving” existing public lands or making them “more productive”. To this end, we heard through our interviews and research a desire for the State of Michigan to increase its capacity for biodiversity stewardship as it works toward the 30x30 goals (Foundational Principle #2). Revitalizing and expanding the SNA program is a strong avenue through which to do that.

Michigan does have an existing State Natural Area program that “helps to protect, preserve, and restore Michigan's and the Great Lakes Region's natural heritage.” However, the program is unfunded and underutilized, it's laid dormant for 16 years, with the last SNA designated in 2009. In the past, the program has been an effective tool for preserving the best examples of Michigan's coastal and terrestrial ecosystems, but now the program has no dedicated funding or staff. Previously, the managing division within which State Natural Areas fell (i.e. Forest Resources Division for SNAs on State Forest Land, Wildlife Division for SNAs within State Game Areas, etc.) has been responsible for SNA management. Additionally, an external State Natural Areas

<sup>63</sup> “Michigan Natural Areas.” SOM - State of Michigan. Accessed April 19, 2025. <https://www.michigan.gov/dnr/places/natural-areas>.



Advisory Board previously existed to help advise the SNA program. However, through analysis of publicly available DNR documents and through information gathered through our interview process, it appears that neither the dedicated staff and funding, nor the State Natural Areas Advisory Board, exists anymore. This means that new SNAs are no longer dedicated, and existing SNAs often lack signage, trails, and property stewardship. As a result, while Michigan is the natural resources gem of the Midwest, its State Natural Area program lags behind neighboring Great Lakes states.

**“There’s also this increased need for capacity to implement biodiversity stewardship.”**

In other Great Lakes states, State Natural/Heritage programs serve to promote and protect the state’s best examples of its unique natural communities. As outlined by Foundational Principle #4, Michigan needs to lead, not lag behind, its neighbors when it comes to natural areas/natural heritage areas. Despite the fact that Michigan boasts more public land than any neighboring state,<sup>64</sup> currently Michigan has only 45 SNAs (15 of which could be considered coastal (Figure 4)), compared to 147 in Ohio,<sup>65</sup> 290 in Indiana,<sup>66</sup> 622 in Illinois,<sup>67</sup> and 166 in Minnesota.<sup>68</sup> Wisconsin has the largest and oldest State Natural Area program in the country with 687 Natural Areas

covering almost 400,000 acres.<sup>69</sup> By this measure, Michigan has significantly less capacity than neighboring states to steward and preserve significant biodiversity hotspots along its coasts and elsewhere. The Michigan DNR does note that its State Forests do host an array of “High Conservation Value Areas” specifically on State Forest land such as Ecological Reference Areas, legally dedicated Wilderness and Wild Areas, Dedicated Habitat Areas, Dedicated Management Areas, Natural Rivers, Critical Dunes and Coastal Environmental Areas.<sup>70</sup> However, it is hard to find substantive public information about each of these designations, and they leave other categories of public land like State Parks, State Game Areas and State Recreation Areas unaccounted for. Additionally, in other states like Wisconsin, this array of designations would collectively fall under the jurisdiction of the State Natural Area program.

Wisconsin’s SNAs are on both state-owned public land, federally owned public land, or publicly accessible private land such as conservancies, educational institutions, or government entities. Areas not owned by the Wisconsin DNR but meet SNA guidelines still remain in ownership of the original entity, such as the US Forest Service. While the State of Michigan has more public land than Wisconsin - including more National Forest land - it does not create a proportional number of its own SNAs, and it does not coordinate with partners like the US Forest Service to co-designate SNAs. Currently in Michigan, SNAs are only on state-owned public land. The program could either continue this approach or broaden to recognize prime examples of Michigan’s natural communities on private land or federal public land.

<sup>64</sup> “Protected Areas Database of the United States (PAD-US) 4.0 Vector Analysis and Summary Statistics” (U.S. Geological Survey), accessed April 3, 2025, <https://catalog.data.gov/dataset/protected-areas-database-of-the-united-states-pad-us-4-0-vector-analysis-and-summary-statistics>.

<sup>65</sup> “Division of Natural Areas & Preserves | Ohio Department of Natural Resources,” accessed February 14, 2025, <https://ohiodnr.gov/discover-and-learn/safety-conservation/about-ODNR/nature-preserves/division-of-nature-preserves>.

<sup>66</sup> “DNR: Nature Preserves: Nature Preserves,” accessed February 14, 2025, <https://www.in.gov/dnr/nature-preserves/nature-preserve/>.

<sup>67</sup> “Natural Areas Inventory,” accessed February 14, 2025, <https://naturalheritage.illinois.gov/naturalareasdivisions/illinois-natural-areas-inventory.html>.

<sup>68</sup> “Minnesota Scientific and Natural Areas,” Minnesota Department of Natural Resources, accessed February 14, 2025, <https://www.dnr.state.mn.us/snas/index.html>.

<sup>69</sup> “State Natural Areas | Wisconsin DNR,” accessed February 14, 2025, <https://dnr.wisconsin.gov/topic/StateNaturalAreas>.

<sup>70</sup> Michigan Department of Natural Resources. “Protecting Rare and Unique Michigan Lands.” ArcGIS StoryMaps, March 16, 2023. <https://storymaps.arcgis.com/stories/72a6414120334fa3b89242dfb7886d81>.

In order to expand the SNA Program to include more coastal SNAs, the DNR would not need to purchase new land. There are ample opportunities to create new SNAs on land currently managed by the DNR. However, land acquisitions made with the intention of the creation of new SNAs could be one method by which the DNR could make gains toward its 30x30 goal. In this sense, revitalizing the SNA program can be seen both as a means for achieving additions to conserved land in the state, and as a means for more robustly conserving existing state lands. For the nomination and selection of new SNAs, the DNR could create the Natural Areas Coordinator position within the Department, and it could reestablish the Natural Areas Advisory Board which in the past helped advise the Department’s decisions on natural areas. Alternatively, the DNR could follow Wisconsin’s model, creating a standalone division for SNA program management. In Wisconsin, the Department’s Bureau of Natural Heritage Conservation manages the state’s 687 SNAs and is advised by an 11 member Natural Areas Preservation Council – not dissimilar to Michigan’s past Natural Areas Advisory Board.

There is no existing geospatial data available to find existing State Natural Areas, so using descriptors online and Google Maps, our GIS team mapped out existing locations:

**Figure 4. Existing State Natural Areas**



Michigan Natural Areas point data from Calvin Floyd, 2025. Map visualization by AiLi Pigott and Longyu (Ciara) Xue, 2025.

Because a disproportionate number of rare species are associated with Michigan’s coastal communities, it is important to prioritize coastal communities for SNA dedication. Legally dedicated natural areas typically consist of one or more natural communities.

Michigan Natural Features Inventory (MNFI), the organization tasked with preserving the state’s natural heritage, defines a natural community as “an assemblage of interacting plants, animals, and other organisms that repeatedly occurs under similar environmental conditions across the landscape and is predominantly structured by natural processes rather than modern anthropogenic disturbances”.<sup>71</sup>

According to MNFI, Michigan’s coastal natural communities include Great Lakes Coastal Marshes, Coastal Fens, Open Dunes, Great Lakes Barrens, Interdunal Wetlands and more. These communities contain immense species diversity and are biodiversity hotspots across the state. Dedicating greater resources to conserving these natural areas and providing access for education and recreation can go a long way in furthering biodiversity stewardship for Michigan’s coasts. Often, these natural communities lie within State Parks, Forests and Recreation areas, but they lack legal designation to ensure their protection and stewardship. The SNA program could be a strong avenue through which to offer these areas stronger legal status.

**“There’s a disproportionate number of rare species that are associated with our coastal systems.”**

While our recommendation specifically pertains to coastal natural communities, a broadening of the SNA program across Michigan’s land base would significantly increase the Michigan DNR’s capacity for biodiversity stewardship in pursuit of its 30x30 goals. Choosing which areas are best suited for legal

<sup>71</sup> “Michigan Natural Features Inventory.” Natural Community Classification - Michigan Natural Features Inventory. Accessed April 19, 2025. <https://mnfi.anr.msu.edu/communities/classification>.

designation as an SNA would behoove the DNR to work closely with MNFI to determine which areas highlight the best examples of Michigan's native landscapes according to the MNFI community rankings.<sup>72</sup> By collaborating with MNFI to identify and designate priority natural areas, the DNR can ensure that it is prioritizing coastal biodiversity stewardship while working toward the 30x30 goals.

**“If you’re maintaining the protection of your coastal dunes and your coastal wetlands, and your Great Lakes islands, and you’re increasing capacity for stewardship in these places, that’s going to go a long way for coastal resilience.”**

*Potential Benefits:* Expanding and revitalizing the State Natural Area program would broaden the State of Michigan's capacity for biodiversity conservation and stewardship on existing state lands, complimenting the current Ecological Reserve Area program and past Biodiversity Conservation Planning Process. While State Natural Areas in Michigan and other states are typically created on existing protected public and private lands, the expansion of Michigan's State Natural Area program could be used as a mechanism to acquire new lands and waters for protection, thus helping to achieve the 30x30 goals. Revitalization of the SNA program by increasing staffing and capacity (Foundational Principle #2) could create opportunities to add interpretive and educational signage at existing SNAs and provide infrastructure improvements such as trails, interpretive signs and parking areas, thus expanding educational, research and recreation opportunities. SNA program expansion would help protect vulnerable coastal natural communities such as coastal wetlands, Great Lakes marshes, dunes, river mouths and Great Lakes islands – which hold a disproportionate amount of the state's biodiversity.

<sup>72</sup> “Michigan Natural Features Inventory.” Natural Community Classification - Michigan Natural Features Inventory. Accessed April 19, 2025. <https://mnfi.anr.msu.edu/communities/classification>.

Additionally, expanding and revitalizing the SNA program would put the State of Michigan on par with our neighboring states that have particularly strong natural area/heritage program (see Foundational Principle #4). Finally, the revitalization of Michigan's SNA program should be viewed as an opportunity to reevaluate how the program engages with the Tribes of Michigan as rights holders, and values their Traditional Ecological Knowledge. Michigan's Tribal Nations should have a seat at the table as decision-makers in the State Natural Area program process, and opportunities for co-stewardship of SNAs should be pursued. For example, a seat(s) on Michigan's Natural Area Advisory Board could be reserved for Tribal members, and the Tribal Nation's of Michigan could play a role in the proposal and designation of new SNAs.

*Potential Barriers:* Adequate funding and resources are essential for the success of this initiative. In the past, the SNA program was part of the DNR's general operating budget. Presumably, the Michigan Natural Resources Trust Fund could be tapped as a resource for the acquisition and maintenance of SNAs. Were the state Great Lakes Trust Fund (see Recommendation #10) to be implemented, this could also be used for the acquisition and maintenance of coastal SNAs. In addition to funding and resources, the redesignation of certain state lands as State Natural Areas could impose restrictions on activities previously permitted, such as hunting, trapping, and the use of recreational vehicles. Proper engagement and planning with these user groups would be essential to the success of this program. In Wisconsin, for example, allowed recreational activities vary from SNA to SNA, depending on specific site attributes.<sup>73</sup> The legal designation of SNAs within existing public lands could also spark concern from certain industry groups, such as the timber industry. However, this would only be a concern for those SNAs that lie on

<sup>73</sup> “State Natural Areas | Wisconsin DNR,” accessed April 3, 2025, <https://dnr.wisconsin.gov/topic/StateNaturalAreas>.



State Forest land, which would likely be less common than SNAs that lie within State Parks and Recreation Areas.

*Decision Makers:* The primary authority for the revitalization of Michigan’s SNA program would likely be the DNR’s Office of Public Lands. Once the program was restarted, staffing and management would likely fall to one of the DNR divisions that deals directly with land management like the Wildlife Division, Forest Resources Division, or the Parks and Recreation Division. Alternatively, the DNR could create a new division dedicated to the management of the SNA program. Either way, close collaboration with Michigan Natural Features Inventory would ensure that the Department is identifying and designating priority natural areas for coastal and terrestrial biodiversity. Wisconsin’s SNA program would be worth emulating.

The program is managed by the Wisconsin Department of Natural Resources’ Bureau of Natural Heritage Conservation, which is housed in the Fish, Wildlife and Parks Division, and overseen by the 11 member Natural Areas Preservation Council. Funding for the program comes from the DNR’s general budget, as well as the Knowles-Nelson Stewardship program; a fund established in 1989 to “preserve important natural communities, protect water quality and fisheries, and expand opportunities for outdoor recreation”.<sup>74</sup> While the Wisconsin DNR’s Biennial Agency Budget Request does not include a specific line item for the State Natural Area program, it does request \$5,000,000 annually for “Department Land Acquisition,” which could plausibly account for additions to the SNA program.

*Application:* Many of Michigan’s coastal communities - such as Alpena, Sault Ste. Marie and Muskegon - lie adjacent to public lands that hold

some of the best, most pristine examples of the State’s natural communities. However, without an active State Natural Area program, these special areas within State Parks and Forests can go unrecognized and thus underutilized. The legal designation as a State Natural Area both protects the natural community and makes it more accessible for local community members and visitors for education, research, and recreation. If State Natural Areas were more common in coastal State Parks, for example, area schools could more easily use the natural area for recreational and educational purposes.

## 8. Expand the State Underwater Preserve System

Expanding Michigan’s Underwater Preserve System presents an opportunity to align the system with MtB’s goals to conserve, connect, and restore the state’s waters while addressing gaps in biodiversity protection. Strengthening the existing program and enlarging the footprint of the Preserve System would allow Michigan to capitalize on an established framework rather than starting from scratch. The current system consists of 13 preserves covering approximately 7,200 square miles (8.27%) of bottomlands – a significant portion of the 24.23% of Michigan’s waters that fall under some degree of protection, but these waters are not protected for biodiversity stewardship. A series of acts within the Natural Resources and Environmental Protection Act established the system (Public Act 152 of 1980), grants protection and guarantees recreational access (Public Act 452 of 1988), and prohibits theft and disruption of shipwrecks within the preserves (Public Act 451 of 1994).

At present, the Underwater Preserve System is unfunded, underutilized, and primarily serves as a sport diving resource rather than a conservation tool.

<sup>74</sup> “Stewardship | Wisconsin DNR,” accessed March 17, 2025, <https://dnr.wisconsin.gov/topic/Stewardship>.

The system is overseen by a nonprofit that supports sport diving around shipwrecks in the preserves. Our recommendation is for the State of Michigan to take a more active role in managing the Preserve System for both biodiversity conservation and recreation while expanding its scope to include ecologically and culturally significant areas. Doing so would increase the effectiveness of the existing system and get closer to Michigan's 30x30 goals by broadening protections and recreation opportunities. Amending the legislative framework and modernizing the designation process could establish ecological criteria, protect ecologically critical habitats, enhance connectivity between preserves, and formally count the designated sites toward biodiversity protection – ensuring continued access for all user groups without impinging on recreational and commercial fishing rights. However, not all areas within the Underwater Preserve System must be expanded for biodiversity conservation – some may be better suited to cultural recognition, recreational use, or co-management approaches based on local priorities. Expansion of the system – both physically and legislatively – would require an assessment of ecological value and potential impacts on Consent Decree fisheries agreements, some of which our GIS analysis illustrates below.

Amending NREPA to explicitly include ecological significant spawning reefs, sinkholes, and Indigenous archaeological sites would proactively protect critical habitats and enhance the ecological significance of the existing preserve system. If legislative updates allow for these sites to be managed with biodiversity stewardship in mind, the 8.27% of Michigan's Great Lakes already within the preserve system (and included in our analysis of 24.23% of protected waters) could be formally counted toward biodiversity conservation goals. Expanding the system would also promote non-disruptive recreation while fostering collaborative management and research.

As one interviewee who works closely on restoration projects noted:

**“It costs a lot less to preserve something, to protect or conserve something, than it does to restore it. But we just tend to always be on the catch upside, you know, that’s how conservation works... it’s easier to convince somebody to improve something than it is to keep it in the state it is”.**

To ensure the expanded system meets its conservation potential, increased designations must come with adequate resources, as outlined in Foundational Principle #2. Highlighting the importance of building capacity, another interviewee stated:

**“Designation means nothing without the capacity to do something about it. And if you don't have a true [program] that's staffed by people who are skilled in biodiversity stewardship, then they are just paper parks.”**

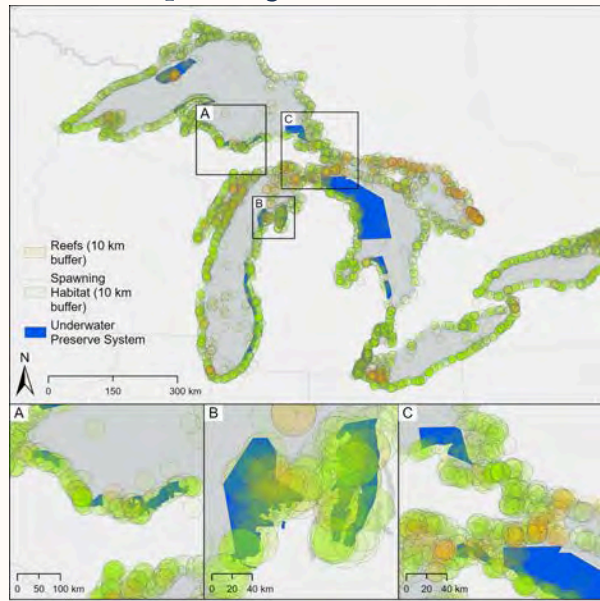
This recommendation balances ecological protection with continued recreational access, providing a bipartisan, feasible alternative to creating entirely new marine protected areas. Expanding the system would also enhance bottomland mapping efforts, such as those led by GLOS and GLAHF, contributing to a more comprehensive understanding of Michigan's underwater resources. The increased focus on bottomland study, driven by the expansion, could lay the foundation for a future Great Lakes Bottomland State Park, as proposed in Recommendation #3. Whether the Preserve System remains separate or is incorporated into a future state park, expanding protections now would provide a critical stepping stone.

Importantly, we recognize that efforts to expand protections must be carried out in ways that respect

and uphold the treaty-protected rights of Tribal nations to hunt, fish, and gather in these waters. While expanding the system can support biodiversity goals, it must not limit existing usufruct rights or impose conservation approaches that conflict with Tribal priorities. Some Tribes may welcome additional protections for culturally significant sites or spawning habitats, while others may have concerns about how new designations could affect governance, access, or recognition. These tensions deserve careful attention and underscore the need for early and ongoing consultation with Tribal governments, as outlined in Foundational Principle #1.

Our GIS team completed a proximity analysis to visualize where ecologically significant sites exist relative to existing preserve system sites. Using a buffer radius of 10 km, we visualized coastal areas that contain the greatest density of reefs and fish spawning habitats. We highlight three key areas where the expansion could enhance connectivity, protect significant spawning sites and reefs, and increase the system’s overall ecological value.

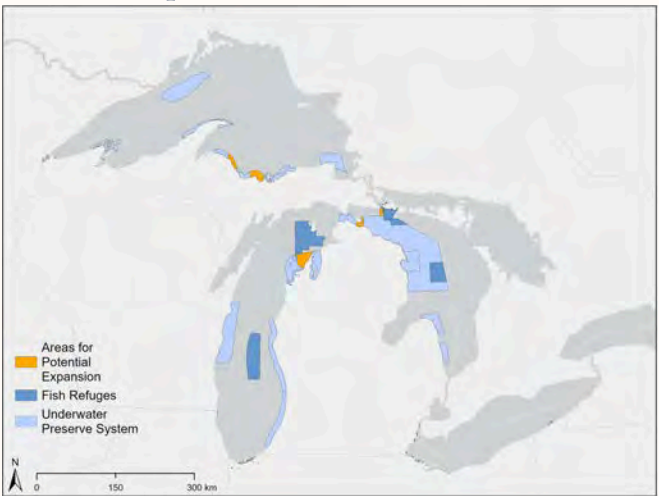
**Figure 5. Existing MUPS overlaid with Locations of Spawning Sites and Reefs**



Reef point data from GLAHF, 2020; fish spawning point data from GLC, 2019; Underwater Preserve System polygon data from NOAA, 2022. Map visualization by AiLi Pigott and Longyu (Ciara) Xue, 2025.

Submaps A, B, and C provide a closer look at potential areas where the Underwater Preserve System could be expanded to protect key spawning sites, reefs, other critical habitats, and thus increase connectivity. In A, we propose connecting three isolated areas of the Underwater Preserve System to create a large contiguous Underwater Preserve System area within Lake Superior along the northwestern Upper Peninsula. In B, we propose connecting two large areas of the Underwater Preserve System, enhancing ecological connectivity between Grand Traverse Bay and Lake Michigan. In C, we propose connecting two Underwater Preserve Areas that currently overlap with areas of fish refuges. Expanding protections in these areas would increase Michigan’s total protected Great Lakes waters from 24.23% to 25.41%, demonstrating how targeted expansion, guided by ecological criteria, can strengthen conservation efforts while maintaining recreational and commercial access.

**Figure 6. Existing Protected Areas with Areas of Potential Expansion**



Fish refuge polygon data from Shannon Brines, 2025; Underwater Preserve System polygon data from NOAA, 2022. Map visualization by AiLi Pigott and Longyu (Ciara) Xue, 2025.

*Potential Benefits:* Expanding the Preserve System strengthens the impact of an existing framework rather than requiring the creation of a new program.



It allows Michigan to formally count 8.27% of currently protected bottomlands toward 30x30 biodiversity goals by updating NREPA to include ecological protection. This expansion enhances conservation management of ecologically significant bottomlands, including spawning reefs and sinkholes, and increases recreational opportunities while ensuring that expanded protections do not limit user group access.<sup>75, 76</sup> Additionally, it creates opportunities for collaborative co-management planning with Tribes who have usufruct rights to the Great Lakes, leading to enhanced protection of both ecological and Indigenous cultural sites.<sup>77</sup> In some cases, this could mean co-designating areas that support both biodiversity and cultural values, while in others it may mean preserving Tribal leadership in stewarding specific regions. Expansion of the system provides an opportunity to elevate Indigenous knowledge and governance alongside scientific management, if Tribes choose to participate. Supporting long-term pollution control and water quality improvements, this initiative protects critical habitats before degradation necessitates costly restoration. Furthermore, expanding bottomland and fishery research benefits commercial and recreational fisheries and supports local coastal economies.

*Potential Barriers:* Expansion must be carefully planned to ensure that increased protections do not unintentionally restrict access or usage rights for stakeholders and rights holders. Mapping and protecting significant spawning beds and reefs could

increase fishing pressure in these areas, requiring strategic management decisions. The term “preserve” may be misleading if it suggests exclusionary policies; ensuring expanded protections also enhance recreational access is crucial. Without sufficient resources or clear objectives, new designations risk becoming underutilized, much like the current systems. As another interviewee pointed out:

“Do you need to have it designated to something to invest the resources? ... Anytime you draw a line on the map, people either get really excited or really upset. **If you have a line that doesn’t mean anything, then it kind of undermines the whole principle of doing it.**”

*Decision Makers:* Expanding the State’s Underwater Preserve System would require an amendment to the State of Michigan’s Natural Resources and Environmental Policy Act. Such an amendment could authorize the expansion of the Preserve System to include ecological and cultural resources, and it would delegate authority to either DNR or EGLE to manage the Preserve System. Consultation with Tribal nations would be necessary.

*Application:* Expanding and enhancing the Preserve System would protect Michigan’s underwater resources while ensuring access for all user groups across the state. By shifting management priorities beyond sport diving to include biodiversity stewardship and sustainable recreation, the system could better serve all Michiganders. Additionally, increased research and cooperative management could benefit commercial and recreational fisheries while strengthening local economies. Ensuring that expansion efforts align with collaborative stewardship principles would also create a model for future Great Lakes conservation initiatives.

<sup>75</sup> J. Ellen Marsden et al., “Lake Trout Spawning Habitat in the Great Lakes — a Review of Current Knowledge,” *Journal of Great Lakes Research*, International Conference on Restoration of Lake Trout in the Laurentian Great Lakes, 21 (January 1, 1995): 487–97, [https://doi.org/10.1016/S0380-1330\(95\)71120-0](https://doi.org/10.1016/S0380-1330(95)71120-0).

<sup>76</sup> “Submerged Sinkhole Ecosystems in Northern Lake Huron | Teaching Great Lakes Science,” accessed March 17, 2025, <https://www.michiganseagrant.org/lessons/lessons/by-broad-concept/earth-science/data-sets/submerged-sinkhole-ecosystems-in-northern-lake-huron/>.

<sup>77</sup> “Archeological Evidence of Human Activity Found beneath Lake Huron,” *University of Michigan News*, June 9, 2009, <https://news.umich.edu/archeological-evidence-of-human-activity-found-beneath-lake-huron/>.

## 9. Prioritize Manoomin (Wild Rice) Stewardship in Future Conservation Planning Efforts

We recommend that the DNR and partners prioritize Manoomin (wild rice) in 30x30 conservation planning efforts by strengthening partnerships with Michigan's Tribes while conserving critical coastal wetlands like Great Lakes marshes. Manoomin is sacred to the Anishinaabe of the Great Lakes region. However, post-European settlement, habitat degradation and altered hydrology have led to the decline of Manoomin across the state (see Appendix A - subheading "Successful Great Lakes Protection and Restoration Measures"). In prioritizing further restoration, the DNR and partners should build on the success of the Michigan Wild Rice Initiative (MWRI) and the resulting *We all live together in a good way with Manoomin: Stewardship Guide* to prioritize Manoomin in its future land and water management efforts – allowing the Tribes of Michigan to guide further progress.<sup>78</sup> We heard from interviewing Tribal staff that this initiative is a prime example of a partnership of reciprocity between the Tribes, the state and other partners, that prioritized proactive engagement, and can serve as a model for future collaboration.

In addition to its cultural significance, wild rice (*Zizania aquatica*) is a state threatened species found in the globally imperiled Great Lakes marsh natural community (one of Michigan's coastal wetland communities).<sup>79</sup> The MNFI abstract for Manoomin notes that habitat protection and maintenance of wetland hydrology, including in Great Lakes coastal marshes, is an important management

recommendation for the species.<sup>80</sup> It is also important to note that these coastal wetlands play an important role in increasing coastal resilience to climate change, particularly in their resilience to rapid changes in Great Lakes water levels (see Appendix A).

By stewarding and protecting these Great Lakes marshes, the state can in turn revitalize Manoomin beds which once thrived across Michigan. Use of Michigan's State Natural Area program (see Recommendation #7) is one avenue through which this could be achieved, though not the only one. While our recommendation focuses on coastal Manoomin restoration, inland lakes and streams also remain important habitat for Manoomin. As such, as the DNR and partners determine which places are most important to conserve, connect and restore in pursuit of 30x30, there will likely be ample opportunities across the state to prioritize Manoomin communities. Additionally, with Manoomin becoming Michigan's official State Native Grain in 2023, now is the time for the DNR to invest time and resources into revitalizing Manoomin communities around the state. Both Minnesota and Wisconsin have also designated Manoomin as their state grain or native grain. Associated with these designations each state has ramped up their prioritization of Manoomin stewardship. Michigan has taken a big step in designating Manoomin as its State Native Grain, but now the state must lead, not lag behind, its neighbors and also build on progress to collaborate with Tribal partners to properly steward Manoomin going forward (Foundational Principle #4).

*Potential Benefits:* By prioritizing Manoomin in future conservation planning efforts in pursuit of 30x30, the state and partners can accomplish three primary things. One; build on the success of the MWRI to prioritize relationship-building, strengthen

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<sup>78</sup> "ITCMI," *We All Live Together in a Good Way Manoomin Stewardship Guide*, accessed April 4, 2025, <https://www.itcml.org/wp-content/uploads/2025/02/Manoomin-Stewardship-Guide-FINAL-2.17.2025.pdf>.

<sup>79</sup> "Great Lakes Marsh - Michigan Natural Features Inventory," accessed April 3, 2025, <https://mnfi.anr.msu.edu/communities/description/10671/great-lakes-marsh>.

<sup>80</sup> "Zizania Aquatica (Wild Rice) - Michigan Natural Features Inventory," accessed April 3, 2025, <https://mnfi.anr.msu.edu/species/description/15796/Zizania-aquatica>.

relationships of reciprocity and engage in proactive collaboration with Michigan's Tribal Nations. Two; revitalize an ecologically and culturally important species in Manoomin by conserving imperiled Great Lakes marsh communities (see Recommendation #7). Finally, three; make our coasts more resilient to climate change by increasing the amount and quality of our coastal wetlands.

*Potential Barriers:* Significant time and resources have been dedicated to Manoomin restoration by the Michigan Wild Rice Initiative. Given the progress that MWRI has already accomplished and engagement DNR has had in the process to date, DNR's efforts could focus on providing backbone support to the MWRI from the state and to actively pursuing the goals and objectives outlined in We all live together in a good way with Manoomin: Stewardship Guide. The barriers to further implementation of Manoomin restoration are outlined thoroughly in the Manoomin Stewardship Guide. By implementing the Guide, the DNR and partners can ensure that these barriers are addressed.

*Decision Maker:* The DNR Office of Public Lands has the authority to determine how it prioritizes areas for conservation, connection and restoration in pursuit of 30x30 goals. However, continued collaboration with rights holders and stakeholders through the MWRI to determine how best to prioritize Manoomin stewardship going forward is critical. Michigan's Anishinaabe Nations have the retained usufruct treaty right to gather and harvest Manoomin on ceded lands and waters across the state. Should the DNR pursue the prioritization of further Manoomin stewardship in planning efforts for 30x30, increased collaboration with Tribal, local public and private entities is important in order to expand the breadth of Manoomin stewardship across the State. This measure would both demonstrate the State's recognition of the importance of Manoomin to the

Tribes of Michigan, and would likely help lower the risk of overharvest and vandalism from the public. Once again, the DNR and partners should build upon the Michigan Wild Rice Initiative. Which, as we heard from our interviews, is a strong example of a partnership of reciprocity that models the type of proactive planning and collaboration that prioritizes relationship-building between the Tribes, the state, and other partners (Foundational Principle #1).

*Application:* Prioritizing Manoomin stewardship in future conservation efforts in Alpena, Sault Ste. Marie and Muskegon can benefit biodiversity stewardship in these communities as well as strengthen relationships with area Tribes. In particular, in Sault Ste. Marie and Muskegon where partners are actively working to restore imperiled coastal natural communities, managers should consider the past presence of Manoomin when determining how best to proceed with restoration. Such planning should be conducted alongside appropriate rights holders and partners.

## 10. Establish a State Great Lakes Trust Fund

A recurring theme in stakeholder interviews was the significant barriers coastal communities face in accessing state and federal funding for resilience projects. High match requirements, limited grant-writing capacity, and delays in fund distribution make it challenging for small communities to secure resources, leaving their immediate needs unmet. One interviewee noted that despite increasing environmental challenges, current funding mechanisms often fail to deliver resources when communities need them the most. And given the increased uncertainty of federal funding for climate resilience, Michigan has a critical opportunity to take a leadership role in increasing funding opportunities and ensuring coastal communities – especially smaller, rural, and tribal communities – have access to the resources they need.



To address these systemic challenges, we propose the creation of a state-managed Great Lakes Trust Fund. This fund would provide a stable, reliable source of financial resources dedicated to supporting coastal resilience planning, habitat restoration, water quality protections, Great Lakes open waters projects, and Great Lakes public engagement and education initiatives. Importantly, the fund would prioritize equitable access, directing resources to communities and projects facing the greatest social and physical risks. It would serve as a critical funding mechanism to implement the full suite of recommendations in this report.

Michigan has a strong precedent for conservation trust funds. The Natural Resources Trust Fund (NRTF), established in 1976, has successfully funded thousands of conservation and recreation projects using state-generated revenue from oil, gas, and mineral leases. The State Park Endowment Fund (SPEF), established in 1994, directs funding to support Michigan's state parks. When the NRTF reached its \$500 million legal cap in 2011, revenue began flowing into the SPEF, which itself has a legal cap of \$800 million. In 2020, Michigan voters approved Proposal 1, which removed the NRTF cap and redirected overflow funds back to it once the SPEF reaches its cap. Additional trust fund models include the Great Lakes Fisheries Trust (GLFT) – created from a Natural Resource Damage Assessment (NRDA) settlement – which supports fisheries restoration through a board-managed structure with state, tribal, and nonprofit representation. Similarly, Minnesota's Legacy Fund (created via a voter-approved sales tax increase) has provided sustained investment in clean water, parks, and habitat restoration in that state. Given Michigan's history of public support for conservation initiatives (evidenced by the 85% approval of Proposal 1 in 2020 to renew

the NRTF<sup>81</sup>) this trust fund could gain bipartisan support if framed as a strategic, long-term investment in Michigan's future. Unlike the current NRTF model – which limits direct grant access to state and local units of government – this proposed trust fund should also be accessible to nonprofit organizations and tribal entities. Broadening eligibility could help overcome local capacity barriers and empower trusted NGOs already leading land and water protection projects across the state. By allowing these groups to apply directly for funding, Michigan could accelerate progress toward its 30x30 goals and expand the scope of conservation in areas where local government leadership is limited.

There are several potential pathways to establish this trust fund, all of which would require a ballot measure. We outline five options:

### **1. Redirect Excess State Park Endowment**

**Funds:** Create a ballot initiative to amend the existing revenue structure to direct overflow funds from the SPEF to the proposed Great Lakes Trust Fund once the SPEF reaches its \$800 million cap. Redirecting these surplus revenues would create a third, complementary stream of dedicated natural resources funding focused specifically on Great Lakes protection and resilience.

### **2. Impose a Severance Tax on Imported Carbon:**

While politically challenging, this option could generate substantial revenue by taxing industries that contribute to carbon emissions and climate-related damage to Great Lakes shorelines. Currently, Michigan's severance tax applies only to natural resources extracted within the state.<sup>82</sup>

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<sup>81</sup> "Michigan Proposal 1, Use of State and Local Park Funds Amendment (2020)." Ballotpedia, November 3, 2020. [https://ballotpedia.org/Michigan\\_Proposal\\_1,\\_Use\\_of\\_State\\_and\\_Local\\_Park\\_Funds\\_Amendment\\_\(2020\)](https://ballotpedia.org/Michigan_Proposal_1,_Use_of_State_and_Local_Park_Funds_Amendment_(2020)).

<sup>82</sup> "Severance Tax." Taxes. Accessed February 17, 2025. <https://www.michigan.gov/taxes/business-taxes/misc/severance>.

Expanding this tax to include imported carbon would extend its scope beyond in-state extraction activities. This approach would align with broader efforts to reduce carbon emissions by discouraging the importation of carbon-intensive fuels while also establishing a dedicated revenue source for the Great Lakes Trust Fund.

### **3. Increase Sales Tax by a Fractional Amount:**

Modeled after Minnesota's Legacy Fund and specifically the Clean Water Fund, a small sales tax increase (e.g. 0.05 - 0.1%) could generate dedicated funding for water conservation, coastal resilience, and shoreline protection. Minnesota's Clean Water Fund, established through the 2008 Clean Water, Land, and Legacy Amendment, allocates one-third of its revenue to support water quality protection, watershed management, and restoration activities.<sup>83</sup> Since 2010, the Clean Water Fund has allocated over \$1.8 billion in funding to various state agencies.<sup>84</sup> This model offers clear evidence of the long-term benefits of a dedicated fund to improve water resources with tangible results. Given Michigan's strong connection to the Great Lakes, voters may be willing to support this as a direct investment in water security. If Michigan's sales tax (currently 6%) was increased by the same amount as Minnesota's Legacy Amendment (three eighths of one percent), sales tax revenue would increase by approximately \$800-\$825 million per year.<sup>85</sup>

### **4. Launch with a One-Time State-Directed Payment Matched by Philanthropic**

**Contributions:** Kick start the trust fund with an initial one-time state-directed payment, sourced

from a NRDA, the state budget surplus, environmental fines, or unspent appropriations from past fiscal years. This initial funding would be matched by philanthropic contributions. Establishing the fund with diverse initial capital sources ensures flexibility while also demonstrating cross-sector commitment to safeguarding the Great Lakes. Philanthropic contributions would not only enhance the fund's size, but also attract further investments in long-term coastal resilience.

### **5. Establish a Voluntary State Income Tax**

**Checkoff:** A small opt-out \$5 checkoff on the Michigan state income tax form could provide an additional revenue stream for the fund. While this mechanism would not raise significant revenue, it has precedent in Michigan and could serve as a public engagement tool, allowing residents to demonstrate direct support for Great Lakes conservation.

It's important to note that if the Great Lakes were designated as a State Park (outlined in Recommendation #2), they would become eligible for funding through the State Park Endowment Fund – one of the fastest and most feasible ways to increase support for projects that enhance Great Lakes resilience.

*Potential Benefits:* Provides stable, long-term funding – creates a reliable source of funding to build capacity in coastal communities for generations. Increases and encourages stewardship and unifies small coastal communities across Michigan through shared goals and collaborative action. Leverages the current political moment to build state and local capacity for climate adaptation, especially as federal funding for climate resilient projects is at risk.

*Potential Barriers:* The process to establish a trust fund will require a ballot measure, which may

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<sup>83</sup> "Clean Water Fund." Minnesota Pollution Control Agency. Accessed January 24, 2025. <https://www.pca.state.mn.us/air-water-land-climate/clean-water-fund>.

<sup>84</sup> "Clean Water Fund." Minnesota's Legacy. Accessed January 24, 2025. <https://www.legacy.mn.gov/clean-water-fund>.

<sup>85</sup> "State of Michigan Revenue Source and Distribution." House Fiscal Agency Committee. Accessed January 24, 2025. [https://house.mi.gov/hfa/PDF/RevenueForecast/Source\\_and\\_Distribution\\_Dec2024.pdf](https://house.mi.gov/hfa/PDF/RevenueForecast/Source_and_Distribution_Dec2024.pdf).

encounter political or public resistance depending on the funding mechanism selected, and would cost millions of dollars. This risk underscores the importance of careful framing and strategic communication to highlight the fund's long-term benefits for Michigan residents.

*Decision Makers:* There are two mechanisms to place this on the ballot. The Michigan Legislature (House and Senate) could draft and approve legislation to place a ballot measure before voters to establish the trust fund and determine its funding mechanism. Alternatively, the ballot measure could be initiated through a citizen petition process. Michigan DNR would likely administer the trust fund, similar to its role with the Natural Resources Trust Fund.

*Application:* The proposed Great Lakes Trust Fund would provide essential support for communities such as Alpena, Muskegon, and Sault Ste. Marie to implement localized solutions for shoreline protection, water quality improvements, and habitat restoration. Alpena has already demonstrated a strong commitment to coastal resilience, working alongside the Thunder Bay National Marine Sanctuary. Increased funding would allow the city to expand existing projects, mitigate erosion and stormwater runoff in Thunder Bay, and enhance accessibility for smaller-scale conservation efforts often overlooked by larger federal grant programs. Sault Ste. Marie could use additional funding to upgrade stormwater management infrastructure, support tribal and community-led habitat restoration, and strengthen economic and environmental resilience planning, critical for safeguarding the shipping industry. Muskegon is reshaping its identity beyond its industrial past but now faces legacy pollution challenges, shoreline development pressures, and funding uncertainties. While the city is eager to delist from the Area of Concern program, doing so would reduce access to federal restoration funds. A

dedicated trust fund would allow Muskegon to complete restoration projects while maintaining long-term financial support for water conservation and coastal resilience.



**Table 5. Recommendations Summary**

Recommendation	Summary	Decision Maker	Impact on MtB
#1 Utilize the Great Lakes as the Central Messaging Strategy for MtB	<b>Challenge:</b> Inconsistent state messaging on conservation limits public engagement. <b>Recommendation:</b> Make the Great Lakes the central theme of MtB to unify messaging across agencies. <b>Key actions:</b> (1) develop a Great Lakes-centered messaging framework, (2) strengthen interagency collaboration, and (3) enhance public engagement with targeted materials.	Michigan DNR Office of Public Lands and relevant agency divisions responsible for conservation messaging and public engagement.	Ensures a cohesive, statewide messaging approach to conservation, aligning agency efforts and enhancing public engagement via the most popular natural and cultural resource
#2 Create a Great Lakes Bottomland State Park with Associated Great Lakes Education Center	<b>Challenge:</b> Michigan lacks a dedicated public space and education center to highlight the significance of the Great Lakes bottomlands. <b>Recommendation:</b> Establish a Great Lakes Bottomland State Park and an associated Great Lakes Education Center <b>Key actions:</b> (1) pass legislation to create a symbolic state park for bottomlands, (2) develop a Great Lakes Education Center at an existing coastal state park, 4) initiate outreach efforts by funding Great Lakes specialists and educational materials	Michigan DNR Parks and Recreation Division.	Expands public awareness and engagement with Great Lakes conservation, strengthening MtB by increasing stewardship and supporting research on Great Lakes ecology, underwater archaeology, and coastal resilience.
#3 Empower Youth Stewardship Through Great Lakes Education Initiatives	<b>Challenge:</b> Limited access to environmental education programs reduces youth engagement with Michigan's natural resources, threatening long-term stewardship. <b>Recommendation:</b> Expand and enhance Great Lakes environmental education programs <b>Key actions:</b> (1) expand existing resources such as the GLSI and Nature Awaits program, (2) integrate Great Lakes-specific curriculum into Michigan's academic standards.	Michigan DNR and the Michigan Legislature	Cultivates future environmental stewards, fosters equitable access to nature-based education, strengthens Michigan's 30x30 goals, and enhances awareness of MtB.
#4 Strengthen Regional Planning Organizations and Council of Governments for Coastal Resilience	<b>Challenge:</b> Limited regional capacity hinders coastal resilience efforts. <b>Recommendation:</b> Strengthen RPOs and COGs to support local implementation of MtB initiatives. <b>Key actions:</b> (1) increase state funding for RPOs and COGs, (2) designate regional coordinators to improve municipal-state collaboration, and (3) facilitate MtB through RPOs and COGs.	The Governor's Office, the House and Senate Appropriations Committees, and EGLE for distributing grants.	Ensures coastal communities have the capacity and support to implement biodiversity and resilience initiatives tied to MtB at a regional scale.



Recommendation	Summary	Decision Maker	Impact on MtB
#5 Develop and Implement a “Great Lakes Forever Pledge”	<p><b>Challenge:</b> Coastal communities need to enhance resilience and biodiversity without state mandates.</p> <p><b>Recommendation:</b> Establish a Great Lakes Forever Pledge as a voluntary program for local governments.</p> <p><b>Key actions:</b> (1) provide resources, best practices, and technical support, (2) integrate shoreline ordinances, stormwater management, invasive species control, and clean marina practices, and (3) build on the success of the Lake Huron Forever initiative.</p>	Michigan DNR and EGLE.	Equips coastal communities with tools to enhance resilience, protect biodiversity, and implement nature-based solutions, ensuring long-term stewardship of Great Lakes shorelines under MtB.
#6 Develop and Implement an Action Plan to Address Coastal Hazards	<p><b>Challenge:</b> Michigan's shorelines are threatened by coastal erosion and shoreline hardening, with current policies exacerbating long-term environmental and economic risks.</p> <p><b>Recommendation:</b> Develop an action plan to address coastal hazards by advancing coastal protection policy.</p> <p><b>Key actions:</b> (1) convene a comprehensive stakeholder planning process, (2) amend Part 325 and 323 to expand state authority, (3) expand the high-risk erosion program, and (4) increase coastal management staffing and resources</p>	Michigan DNR, EGLE, and the State Legislature	Increases ability to protect Michigan's coastal ecosystems from hazards while maintaining public access and property rights.
#7 Expand and Revitalize the State Natural Area Program to include Coastal Natural Areas	<p><b>Challenge:</b> Michigan lacks a robust SNA program, limiting biodiversity conservation and stewardship, particularly in coastal natural communities.</p> <p><b>Recommendation:</b> Revitalize and expand the SNA program to include more coastal natural communities, enhancing stewardship, public access, and educational opportunities while aligning with Michigan's 30x30 conservation goals.</p> <p>• <b>Key actions:</b> (1) increase funding and staffing for the program, (2) work with MNFI to identify priority areas, and (3) establish stronger legal protections for coastal SNAs.</p>	Michigan DNR Office of Public Lands	Boosts biodiversity conservation, leading the state towards 30% protections, and enhances public access for education and recreation.



Recommendation	Summary	Decision Maker	Impact on MtB
#8 Expand the State Underwater Preserve System	<p><b>Challenge:</b> The current State Underwater Preserve System is underfunded, underutilized, and focused on recreation rather than ecological conservation.</p> <p><b>Recommendation:</b> Expand and enhance the MUPS to include ecological criteria and protections, including ecologically significant sites.</p> <p><b>Key actions:</b> (1) amend NREPA to increase ecological protections, (2) increase funding and staff capacity for DNR or EGLE to manage and support the system, and (3) physically expand to increase connectivity between sites.</p>	Michigan politicians amend NREPA and delegate authority to DNR or EGLE to manage.	Including ecological criteria would allow the MUPS protected areas to contribute more significantly to the percent of Great Lakes protected. Physical expansion would increase the percentage.
#9 Prioritize Manoomin (Wild Rice) Stewardship in Future Conservation Planning Efforts	<p><b>Challenge:</b> Manoomin is an imperiled species and culturally significant to Indigenous communities, requiring dedicated stewardship for revitalization and protection.</p> <p><b>Recommendation:</b> Prioritize Manoomin stewardship in future land and water management efforts, building on the Michigan Wild Rice Initiative and the Tribal-State Manoomin Stewardship Plan.</p> <p><b>Key actions:</b> (1) integrate Manoomin restoration into DNR planning, focusing on coastal marshes, (2) collaborate with Tribal rights holders, and (3) leverage the new designation of Manoomin and the official State Native Grain.</p>	Michigan DNR	Enhance biodiversity stewardship, increasing the percentage of coastal area protected, and strengthen Tribal-State relationships.
#10 Establish a State Great Lakes Trust Fund	<p><b>Challenge:</b> Coastal communities face barriers in accessing state and federal funding for resilience projects.</p> <p><b>Recommendation:</b> Establish a Great Lakes Trust Fund to provide stable, long-term financial support for projects that protect and enhance the resiliency of the Great Lakes.</p> <p><b>Key actions:</b> (1) prioritize equitable funding for communities facing the greatest social and physical risks, (2) explore funding mechanisms, and (3) model the fund after successful programs.</p>	The Michigan Legislature and DNR to administer the trust fund.	Dedicated funding source to implement MtB initiatives and strengthens ability to meet MtB goals by overcoming financial barriers.



# Prioritization

## *Purpose and Approach*

To determine an implementation strategy for our recommendations, we developed a prioritization matrix. Criteria were selected based on our four key areas of focus: enhancing biodiversity, improving coastal management, strengthening education and engagement, and increasing funding. Each recommendation is assessed based on its impact to biodiversity, feasibility of implementation, coastal community impact, and user group access.

To aid in interpretation, a color scale indicates the level of impact: blue denotes high impact, purple denotes medium impact, and green denotes low impact. A gradient scale differentiates the expected time-frame of impact: short-term (within one year), intermediate-term (two to four years), or long-term (five or more years). Each criterion has specific definitions of High, Medium, and Low impact, as outlined in the table key below. This tool enables users to compare recommendations and determine the order in which they should be adopted or promoted.

**Table 6. Prioritization Matrix**

Color Gradient Code		
Low-Impact	Medium-Impact	High-Impact
Long-Term	Long-Term	Long-Term
Intermediate-Term	Intermediate-Term	Intermediate-Term
Short-Term	Short-Term	Short-Term

Recommendation	Criteria			
	Impacts to Biodiversity	Feasibility of Implementation	Coastal Community Impact	User Group Access
#1 Utilize the Great Lakes as the Central Messaging Strategy for MtB	Low	High	Medium	Low
#2 Create a Great Lakes Bottomland State Park with associated Great Lakes Education Center	Medium	Low	High	Medium
#3 Empower Youth Stewardship Through Great Lakes Education Initiatives	Low	High	Medium	High
#4 Strengthen Regional Planning Organizations and Council of Governments for Coastal Resilience	Medium	Medium	High	Low
#5 Develop and Implement a "Great Lakes Forever Pledge"	High	High	High	High
#6 Develop and Implement an Action Plan to Address Coastal Hazards	High	Low	High	Low
#7 Expand and Revitalize the State Natural Area Program to include Coastal Natural Areas	High	High	Medium	Medium
#8 Expand the State Underwater Preserve System	High	Low	Medium	Low
#9 Prioritize Manoomin (Wild Rice) Stewardship in Future Conservation Planning Efforts	High	Medium	Low	Medium
#10 Establish a State Great Lakes Trust Fund	Medium	Low	High	High



**Table 7. Criteria Definitions**

Criteria	Color Definition	Gradient Definition
<b>Impacts to Biodiversity</b>	<p>Recommendations that have an impact on biodiversity</p> <ul style="list-style-type: none"> <li>• High = high positive impact</li> <li>• Medium = some positive impact</li> </ul> <p>Low = no impact</p>	<p>Timescale estimates at which impacts are seen</p> <ul style="list-style-type: none"> <li>• Short-term = increases biodiversity in 1 year</li> <li>• Intermediate-term = increases biodiversity in 2-4 years</li> </ul> <p>Long-term = increases biodiversity in 5+ years</p>
<b>Feasibility of Implementation</b>	<p>Feasibility of implementing/requirements for implementation</p> <ul style="list-style-type: none"> <li>• High = alternation of existing program</li> <li>• Medium = DNR &amp; other state agencies program/implementation</li> </ul> <p>Low = ballot or legislation changes</p>	<p>Timescale estimate at which the recommendation can be implemented</p> <ul style="list-style-type: none"> <li>• Short-term = can be implemented in 1 year</li> <li>• Intermediate-term = can be implemented in 2-4 years</li> </ul> <p>Long-term = can be implemented in 5+ years</p>
<b>Coastal Community Impact</b>	<p>Recommendations that have an impact on coastal communities: increased tourism, promoting local stewardship, community engagement, education</p> <ul style="list-style-type: none"> <li>• High = high amount positive impacts</li> <li>• Medium = some positive impacts</li> </ul> <p>Low = little impacts on the community</p>	<p>Timescale estimates at which impacts are seen</p> <ul style="list-style-type: none"> <li>• Short-term = evidence of impact within 1 year</li> <li>• Intermediate-term = evidence of impact within 2-4 years</li> </ul> <p>Long-term = evidence of impact within 5+ years</p>
<b>User Group Access</b>	<p>Recommendations that increase user group access to resources</p> <ul style="list-style-type: none"> <li>• High = increase access for all users</li> <li>• Medium = increases access from some users</li> </ul> <p>Low = does not increase access</p>	<p>Timescale estimates at which impacts are seen</p> <ul style="list-style-type: none"> <li>• Short-term = increased access within 1 year</li> <li>• Intermediate-term = increased access within 2-4 years</li> </ul> <p>Long-term = increased access within 5+ years</p>



Our research focuses on increasing the percentage of Great Lakes protection with the goal of enhancing biodiversity through both direct expansion of conserved waters, and through more wholesale changes to how Michigan stewards its Great Lakes waters and coasts. Recommendations target different stakeholders, working together to increase protection at various scales and timelines. Some recommendations can have an immediate high impact on biodiversity, directly advancing Michigan towards 30% protection while other recommendations may have longer timelines for when their impacts would be most apparent. Long-term goals should not be overlooked, as the current political climate in Michigan may be favorable for certain programs over others. Given federal funding uncertainties and administration changes, prioritizing programs with guaranteed impact is essential for the State. This matrix serves as a tool for analyzing the timescale and extent of impacts for each of our recommendations.

This matrix provides a comparative tool, but it is important to recognize the interconnectedness of these recommendations – implementing only a select few will not achieve full Great Lakes integration into *Michigan the Beautiful*. A holistic approach is necessary, as each recommendation supports and reinforces the others. Building public and political buy-in is critical to ensuring successful implementation. However, in the case that not all recommendations can be implemented, this matrix provides a strategic guide to decision-making based on feasibility and impact.

## Scenario Planning

To complement the prioritization matrix, we developed a point-based scoring system to assess the implementation potential of each recommendation. Each received a composite score based on the four criteria and timeframe of impact. This resulted in a maximum possible score of 16 points per recommendation,

allowing us to compare recommendations under different prioritization scenarios. In a scenario where short-term and high-impact actions are prioritized, the highest scoring recommendations emerge as ideal starting points. This approach helps align decision-making with strategic goals – whether aiming for early wins, foundational investments, or long-term transformation.

**Table 8: Short-Term, High-Impact Scenario Point System**

Point System			
Time Scale Points		Impact Points	
Short-term	2	High-Impact	2
Intermediate-term	1	Medium-Impact	1
Long-term	0	Low-Impact	0

Using this framework, the following scores were calculated:

1. Recommendation #7: Revitalize the SNA Program = 14 points
2. Recommendation #5: Great Lakes Forever Pledge = 11 points
3. Recommendation #8: Expand the MUPS = 10 points
4. Recommendation #1: Great Lakes as the Central Messaging Strategy = 9 points
5. Recommendation #4: Strengthen RPOs and COGs = 9 points
6. Recommendation #9: Prioritize Manoomin = 9 points
7. Recommendation #2: Great Lakes Bottomland State Park & Ed Center = 8 points
8. Recommendation #10: Great Lakes Trust Fund = 6 points
9. Recommendation #3: Empower Youth Stewardship Education Initiatives = 5 points
10. Recommendation #6: Coastal Hazards = 4 points

Recommendations scoring 10-14 points are high-impact and offer short-term returns. These would be ideal for a first phase of *Michigan the Beautiful* as they demonstrate visible progress, build public trust, and establish credibility in the MtB program.

Recommendations with scores between 6-9 indicate strong impact but either have longer timelines or are more complex implementation barriers. These would be best suited for a second or third phase, when capacity has been built and foundational steps are in place. Scores under 6 reflect structural or long-lead efforts such as institutional changes. These actions are critical to ensuring MtB's goals persist past 2030, even if their visible benefits come later. Their inclusion in a third phase would recognize their strategic value.

### **Phase 1: Early Action**

These recommendations scored highest under the short-term, high-impact scenario and should be implemented first. They offer visible results, are relatively feasible, and help build public trust in the MtB program

- Rec #7: Revitalize the SNA Program (14 points)  
Combines high feasibility with strong biodiversity outcomes. A revitalized SNA program would directly expand protected areas and can be rapidly deployed with renewed state support.

- Rec #5: Great Lakes Forever Pledge = 11 points.  
A highly feasible voluntary program that fosters a stewardship culture across user groups and supports border MtB messaging efforts.

- Rec #8: Expand the MUPS = 10 points.  
Leverages an existing program with clear biodiversity and cultural heritage value. Highly feasible and shows visible results.

### **Phase 2: Intermediate Priorities**

Recommendations #1, #2, #4, and #9 scored moderately, indicating potential for meaningful impact but requiring more time or coordination. These efforts may not yield immediate conservation acreage but will create the governance infrastructure, narrative framing, and tribal partnerships needed to ensure MtB is truly inclusive and transformative. They are well-suited for follow-up implementation once early actions lay the groundwork.

### **Phase 3: Long-Term Foundations**

Recommendations #3, #6, and #10 received lower scores under this scenario but represent structural investments in education, climate resilience, and funding. While their benefits unfold over longer timelines, early planning and coalition building are essential for future success.

This scenario planning framework provides a flexible and actionable roadmap to align resources, political opportunities, and community readiness with the MtB vision. It enables decision-makers to phase implementation based on urgency, feasibility, and long-term value – adapting as needs evolve.



# Conclusion

With 3,288 miles of Great Lakes shoreline and 38,000 square miles of open Great Lakes waters and bottomlands, the State of Michigan plays a major role in determining the health and vitality of 20% of the world's freshwater. This responsibility, and our connection to the Lakes, is a profound unifying force. We heard from Michiganders all over the state from a wide array of backgrounds about the importance of, and strategies for, Great Lakes coastal and open water conservation. While it is a challenge to incorporate all of these perspectives, a successful statewide conservation effort like *Michigan the Beautiful* will be far more robust if it does so. Our work strives to meet this standard.

In striving to successfully address the pressing challenges facing the coastal and open waters of the Great Lakes, it is imperative that the state not only incorporates the perspectives of diverse stakeholders, but that it makes room at the decision-making table for rights holders from Michigan's Anishinaabe Nations. Without meaningful inclusion of Indigenous perspectives and Traditional Ecological Knowledge, there can be no truly successful implementation of stewardship plans for these significant ecosystems. Indigenous communities have been stewarding the Great Lakes since time immemorial, and they continue to provide vital knowledge for their continued stewardship. Honoring Tribal sovereignty and self-determination while valuing Traditional Ecological Knowledge and bringing Indigenous voices to the table should be central to sustained conservation planning efforts in Michigan. Most importantly, relationship-



building and proactive partnerships of reciprocity should supersede transactional, reactive consultations. Co-stewardship and proactive consultation policies addressed in our report provide pathways to formalizing Indigenous leadership in conservation efforts, ensuring that these perspectives are not only heard but embedded in decision-making.

Equally important to the success of *Michigan the Beautiful* is the prioritization of Michigan's communities and their input through initiatives designed to gather and act on community feedback. Listening to the needs and insights of Michigan's residents must shape the state's approach. Our case study locations showcased inspiring examples of perseverance, where community trailblazers not only identified local needs but also adapted their strategies to reflect the priorities and aspirations of their communities. These leaders overcame challenges, mobilized resources, and forged innovative paths forward. Our Coastal Zone Policy & Planning recommendations aim to provide the necessary resources and support for communities to lead localized conservation efforts. Additionally, the proposed Great Lakes Trust Fund would create a sustainable funding mechanism to ensure coastal communities have access to long-term financial resources for resilience projects.

Michigan is the Great Lakes State, and its policies, initiatives, and programs can have a substantial impact on the health of the Lakes. The State of Michigan should view this responsibility as an opportunity to steward a vast and globally important resource. While the state has made significant strides in pursuit of more robustly stewarding the Lakes, there are new needs to be met and challenges to overcome. Michigan has the opportunity to lead the Great Lakes states in its ambition to conserve the Lakes in the face of the triple planetary threats of pollution, climate change, and biodiversity loss. *Michigan the Beautiful* is an

important opportunity to capitalize on that ambition and prioritize biodiversity conservation. Our report outlines some of the ways the state can lead in Great Lakes conservation on its path to 30x30. We outline bold methods for Michigan to lead, while our Mechanisms to Increase Protection recommendations would ensure that biodiversity commitments translate into real, measurable outcomes. Our work synthesizes the expertise and passion of individuals who have spent the majority of their lives working in and around the Great Lakes and their communities. The four Foundational Principles and ten Recommendations we deliver in this report offer concrete strategies to drive the future of Michigan's Great Lakes conservation. By implementing forward-thinking recommendations, prioritizing relationship-building over timelines, addressing capacity gaps, broadening access to the Great Lakes, and leading our neighboring Great Lakes states, Michigan has an opportunity to reclaim its role as a national leader in protecting the Great Lakes. Doing so will benefit both the state and its coastal and open waters for generations to come.



# Limitations

The limitations of this project span political, methodological, and technical challenges. Political pushback and public perception pose significant barriers, particularly in building consensus around the definition of “conservation” and determining what qualifies as part of the conservation network. Differing stakeholder interpretations, especially regarding freshwater ecosystems such as the Great Lakes, could complicate agreements and slow progress. Methodologically, selecting a representative sample and securing responses from the vast number of Great Lakes professionals in Michigan presents logistical difficulties. The GIS team faced challenges acquiring relevant, up-to-date spatial data, which impacted the accuracy of our spatial analyses. Additionally, some datasets were privately owned and not available for download therefore, we had to create our own shapefiles, or exclude data from our analysis. Moreover, integrating spatial analysis with policy recommendations required close collaboration and continuous refinement to ensure alignment with project goals.



# Appendices

## *Appendix A - Literature Review*

### **Threats to Biodiversity**

The Great Lakes ecosystem supports an incredible variety of life, including over 140 bird species, 160 freshwater fish species, and numerous reptiles, amphibians, and coastal native plants that rely on the region's waters and coasts for survival.<sup>86</sup> The health and diversity of these populations are critical for maintaining ecosystem resilience in the face of climatic changes and other pressures. However, the Great Lakes are facing significant threats, including from invasive species, habitat degradation and fragmentation, and pollution. These stressors disrupt ecological balance and negatively affect human communities that rely on the ecosystem for economic and social benefits.

### **Loss of Coastal Wetlands and Critical Natural Communities**

Some ecosystems are considered biodiversity hotspots that are home to a disproportionate amount of species and critical habitat. Many of Michigan's Great Lakes coastal natural communities fall into this category. This means that high value has been, and should continue to be placed, on preserving and protecting these ecosystems. According to Michigan Natural Features Inventory, the coastal natural communities of Michigan include Great Lakes marshes (and river mouths), interdunal wetlands, coastal fens, open dunes, Great Lakes barrens, sand and gravel beaches, limestone cobble shores,

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<sup>86</sup> "Native Species and Biodiversity." Michigan Sea Grant. Accessed January 18, 2025. <https://www.michiganseagrant.org/topics/ecosystems-and-habitats/native-species-and-biodiversity/>.



sandstone, cobble shores, volcanic cobble shores, limestone bedrock lakeshores, sandstone bedrock lakeshores, granite bedrock lakeshores, and volcanic bedrock lakeshores.<sup>87</sup>

In particular, Great Lakes marshes (coastal wetlands) play a vital role in Michigan's Great Lakes biodiversity.<sup>88</sup> These wetlands support an array for insects, amphibians, mammals, birds and plant life, and it is estimated that more than 80 species of fish use coastal wetlands at some point in their life cycle and 50 species rely entirely on these systems for spawning, nursery habitat and refuge. This includes sportfish such as northern pike, yellow perch and walleye.<sup>89</sup> The State of Michigan estimates that 50% of its coastal wetlands have been lost since before European settlement with some parts of the state losing close to 90%.<sup>90</sup>

Coastal wetlands also hold significance for Michigan's Indigenous communities. Coastal wetlands are critical habitat for Manoomin (wild rice), which is central to the culture, livelihood and identity of the Anishinaabe of the Great Lakes region.<sup>91</sup> Manoomin (*zizania aquatica*) is also a "threatened" species in Michigan and was adopted as Michigan's State Native Grain in 2024.<sup>92</sup> Historically, Michigan's coastal wetlands have fostered abundant Manoomin beds, but the loss and degradation of coastal wetlands has

led to the loss and degradation of the Manoomin beds. Michigan's coastal wetlands hold deep ecological and cultural value, and serve as biodiversity hot spots for Michigan's Great Lakes coastal and open waters.

## Invasive Species

Invasive species pose one of the most prominent threats, with the Great Lakes being considered the "most heavily invaded freshwater ecosystem in the world".<sup>93</sup> Of the current 188 non-native species in the region, 34% are classified as invasive, meaning they harm native species, disrupt ecosystems, and negatively impact human health.<sup>94</sup> Sea lamprey, which entered the upper four Great Lakes through the Welland Canal in 1921, have decimated populations of predatory fishes such as lake trout, reducing annual harvests from 15 million pounds in the 1950s to just 300,000 pounds by the 1960s.<sup>95</sup> Zebra and quagga mussels, introduced through ballast water in the 1980s, have drastically altered lake ecosystems by depleting phytoplankton and zooplankton, collapsing food webs, and causing massive benthic algal blooms by increasing water clarity and promoting light penetration.<sup>96</sup> Control efforts have significantly reduced invasives' toll on native fish populations, but these programs require constant vigilance and sustained funding to remain effective.

## Pollution

Since the industrial revolution, pollution has long threatened the health of the Great Lakes, with industrial activities introducing heavy metals such as mercury, lead, and copper into the

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<sup>87</sup> "Natural Community Classification - Michigan Natural Features Inventory," accessed March 10, 2025, <https://mnfi.anr.msu.edu/communities/classification>.

<sup>88</sup> REG 05 US EPA, "Why Monitoring of the Great Lakes Coastal Wetlands Is Important," Collections and Lists, January 11, 2017, Canada, Great Lakes, <https://www.epa.gov/great-lakes-monitoring/why-monitoring-great-lakes-coastal-wetlands-important>.

<sup>89</sup> *Ibid.*

<sup>90</sup> "Coastal Wetlands: Highly Dynamic Ecosystems, Aesthetic Marvels," accessed April 2, 2025, <https://www.michigan.gov/egle/newsroom/mi-environment/2022/05/19/coastal-wetlands-highly-dynamic-ecosystems-aesthetic-marvels>.

<sup>91</sup> "Great Lakes Marsh - Michigan Natural Features Inventory," accessed April 3, 2025, <https://mnfi.anr.msu.edu/communities/description/10671/great-lakes-marsh>.

<sup>92</sup> "Bringing Back 'the Good Berry' - Efforts to Restore Manoomin, Michigan's Native Grain," accessed April 3, 2025, <https://www.michigan.gov/egle/newsroom/mi-environment/2024/08/20/bringing-back-the-good-berry-efforts-to-restore-manoomin>.

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<sup>93</sup> "Great Lakes Aquatic Invasive Species." The Nature Conservancy. Accessed January 18, 2025. <https://www.nature.org/en-us/about-us/where-we-work/priority-landscapes/great-lakes/great-lakes-aquatic-invasive-species/>.

<sup>94</sup> *Ibid.*

<sup>95</sup> "Sea Lamprey: A Great Lakes Invader." Great Lakes Fishery Commission. Accessed January 18, 2025. <https://www.glfc.org/sea-lamprey.php>.

<sup>96</sup> "Quagga & Zebra Mussels." Center for Invasive Species Research, September 28, 2022. <https://cistr.ucr.edu/invasive-species/quagga-zebra-mussels>.

water.<sup>97</sup> These contaminants persist in sediments and accumulate in fish, posing risks to both wildlife and human health.<sup>98</sup> Agricultural and sewage runoff, rich in phosphorus, has further exacerbated pollution, fueling harmful algal blooms (HABs) that produce toxins and create hypoxic zones, which kill fish and other aquatic life.<sup>99</sup> Another increasingly significant contaminant is per- and polyfluoroalkyl substances (PFAS), which are widely used in industrial applications, consumer goods, and firefighting foams leading to their introduction into water, soil, air, and biota.<sup>100</sup> Their persistence, bioaccumulative nature, and potential health risks to both wildlife and humans have led to heightened concern. Studies have documented PFAS contamination in fish, drinking water supplies, and wildlife across the region, with growing evidence linking exposure to adverse health effects such as immune system suppression, metabolic disruptions, and an increased risk of cancers.<sup>101</sup> A study in Wisconsin found that PFAS levels in male anglers' blood were linked to fish consumption from Areas of Concern, though other exposure sources were not accounted for.<sup>102</sup> In Canada, research indicated that PFAS posed lower risks than mercury, PCBs, or dioxins but suggested that existing fish consumption advisories might not be fully protective, particularly near PFAS-contaminated sites.<sup>103</sup>

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<sup>97</sup> Kari Lydersen, "Toxic Contamination Past and Present: Creating a Legacy," Alliance for the Great Lakes, October 4, 2020, <https://greatlakes.org/2020/10/toxic-contamination-past-and-present-creating-a-legacy/>.

<sup>98</sup> Szalinska, Ewa. "A Review of Heavy Metals Contamination within the Laurentian Great Lakes." *The Handbook of Environmental Chemistry*, June 22, 2020, 85–105. [https://doi.org/10.1007/698\\_2020\\_490](https://doi.org/10.1007/698_2020_490).

<sup>99</sup> Carmichael, Wayne W., and Gregory L. Boyer. "Health Impacts from Cyanobacteria Harmful Algae Blooms: Implications for the North American Great Lakes." *Harmful Algae* 54 (April 2016): 194–212. <https://doi.org/10.1016/j.hal.2016.02.002>.

<sup>100</sup> Michael Murray et al., "The Science and Policy of PFASs in the Great Lakes Region a ROADMAP for LOCAL, STATE and FEDERAL ACTION the Science and Policy of PFASs in the Great Lakes Region: A Roadmap for Local, State and Federal Action," 2019, <https://www.nwf.org/-/media/Documents/PDFs/NWF-Reports/2019/NWF-PFAS-Great-Lakes-Region.ashx>.

<sup>101</sup> *Ibid.*

<sup>102</sup> *Ibid.*

<sup>103</sup> *Ibid.*

More recently, concerns have grown over emerging pollutants such as macro- and microplastics, which leach harmful chemicals into the water and enter the food chain through biomagnification.<sup>104</sup> Stronger monitoring and continued research are needed to fully assess the magnitude, extent, and long-term ecological and human health impacts of PFAS contamination in the Great Lakes. Strengthening and coordinating monitoring efforts, particularly in fish, water, and sediment, will help determine exposure pathways and improve regulatory and remediation strategies.

## Areas of Concern

The US-Canada Great Lakes Water Quality Agreement defines Areas of Concern (AOCs) as "geographic areas designated by the Parties where significant impairment of beneficial uses has occurred as a result of human activities at the local level".<sup>105</sup> These sites, often referred to as the region's worst "toxic hotspots," suffer from pollution, habitat destruction, and other environmental stressors that threaten water quality, aquatic life, and surrounding communities.<sup>106</sup> AOCs are designated based on criteria such as contaminated sediments, degraded fish and wildlife populations, restrictions on drinking water consumption, and beach closures. Currently, there are 11 remaining AOCs in the Michigan portion of the Great Lakes Basin, 5 of which have management actions completed, while two others have been delisted.<sup>107</sup>

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<sup>104</sup> Cui, Rongxue, Shin Woong Kim, and Youn-Joo An. "Polystyrene Nanoplastics Inhibit Reproduction and Induce Abnormal Embryonic Development in the Freshwater Crustacean *Daphnia* Galeata." *Scientific Reports* 7, no. 1 (September 21, 2017). <https://doi.org/10.1038/s41598-017-12299-2>.

<sup>105</sup> Great Lakes Water Quality Agreement: Protocol amending the agreement between Canada and the United States of America on Great Lakes water quality, 1978, as amended on October 16, 1983, and on November 18, 1987: Signed September 7, 2012, entered into force February 12, 2013 § (2013).

<sup>106</sup> Jill Estrada, "NOAA-GLC Partnership - Great Lakes Commission," Great Lakes Commission, March 6, 2025, <https://www.glc.org/work/aocs>.

<sup>107</sup> US EPA, "List of Great Lakes AOCs," [www.epa.gov](http://www.epa.gov), August 30, 2021, <https://www.epa.gov/great-lakes-aocs/list-great-lakes-aocs>.

**Figure 7: Map of AOCs in Michigan**



(EPA; U.S. Great Lakes Areas of Concern Map. February 2023)

Impairment refers to changes in chemical, physical, or biological integrity of a water body, leading to issues such as restrictions on fish and wildlife consumption, degradation of fish and wildlife populations, drinking water limitations, beach closures, and habitat loss. Each AOC has its own unique challenges, and place-based, locally tailored solutions are the most effective for restoration. A Remedial Action Plan is required for each cleanup, outlining all management actions necessary for delisting.

### Climate Change Impacts

Due to anthropogenic climate change and increasingly shorter and warmer winters, since 1973, the number of frozen days on all five Great Lakes has declined. Ice duration has decreased at rates ranging from approximately one-fifth of a day per year in Lake Huron to nearly a full day per year in Lakes Ontario and Superior.<sup>108</sup> Overall, the Great Lakes now experience eight to 46 fewer frozen days compared to the early 1970s, with the decreases in Lakes Ontario and Superior being statistically significant.<sup>109</sup> Data from NOAA's Great Lakes Environmental Research Lab indicate that between 1973 to 2018 "Lake Superior, Huron, and Erie are losing ice cover more quickly than the other Great Lakes over this time

<sup>108</sup> US EPA, "Climate Change Indicators: Great Lakes Ice Cover," [www.epa.gov](https://www.epa.gov/climate-indicators/climate-change-indicators-great-lakes-ice-cover), March 30, 2021, <https://www.epa.gov/climate-indicators/climate-change-indicators-great-lakes-ice-cover>.

<sup>109</sup> *Ibid.*

period".<sup>110</sup> In Michigan, decreased ice cover worsens shoreline erosion, as ice typically protects coastal areas from intense waves during storms. In the water, certain fish species use ice for protection from predators and wind-induced turbulence during spawning season.<sup>111</sup> Another impact is that seasonal local economies depend on ice fishing and outdoor sports, which are only possible when the ice is thick and solid.<sup>112</sup> Lastly, lower water levels reduce connectivity between tributaries and lakes, disrupting fish migration, nutrient flow, and facilitates the spread of invasive species. Because some invasive species thrive in isolated waters where some native species struggle, they face less competition. Human activities such as boat transport, bait bucket releases, and ballast water continue to spread invasive species between disconnected water bodies. Reduced connectivity also disrupts predator-prey dynamics, which help invasives to grow unchecked.<sup>113</sup>

The relative lack of ice on the Great Lakes due to climate change and subsequent warmer waters and increased evaporation also increases the extent of evaporation from the lakes throughout the year. This alters seasonal stratification—the natural separation of lake water into distinct layers based on temperature and density. As surface temperatures rise, stratification begins earlier in the spring and lasts longer into the fall, creating a separation between the warm surface layer and cold bottom layer.<sup>114</sup>

<sup>110</sup> Wuebbles, Donald, et al. "An Assessment of the Impacts of Climate Change on the Great Lakes." Environmental Law & Policy Center, March 30, 2019. <https://elpc.org/wp-content/uploads/2020/04/2019-ELPCPublication-Great-Lakes-Climate-Change-Report.pdf>.

<sup>111</sup> "Why Low Ice Coverage on the Great Lakes Matters." NOAA Research . Accessed January 20, 2025. <https://research.noaa.gov/why-low-ice-coverage-on-the-great-lakes-matters>.

<sup>112</sup> *Ibid.*

<sup>113</sup> Rup, Michael P. et al, "Domestic ballast operations on the Great Lakes: potential importance of Lakers as a vector for introduction and spread of nonindigenous species." Canadian Journal of Fisheries and Aquatic Sciences 67, no. 2 (2010): 256-268.

<sup>114</sup> Wuebbles, Donald, et al. "An Assessment of the Impacts of Climate Change on the Great Lakes." Environmental Law & Policy Center, March 30, 2019. <https://elpc.org/wp-content/uploads/2020/04/2019-ELPCPublication-Great-Lakes-Climate-Change-Report.pdf>.



This prolonged stratification limits vertical mixing and prevents oxygen and nutrients from circulating throughout the water column. Therefore, oxygen in the hypolimnion becomes depleted and phosphorus is released into these deep layers, especially in eutrophic lakes. These nutrients remain trapped until the next turnover, at which point they can be redistributed into the photic zone and stimulate harmful algal blooms.

The prolonged warming also increases evaporation and intensifies stratification, destabilizing the lakes' thermal profiles. Cold-water species such as lake trout and whitefish, which depend on well-oxygenated, cooler water, face reduced habitat availability. As the surface warms and oxygen decreases in deeper waters, these species are confined to a narrow, stressed habitat, threatening their populations and Michigan's \$4.2 billion fishing economy.<sup>115</sup> As such, these changes pose a pressing environmental and economic concern.

The increased fluctuation of water levels, driven by climate-induced changes in precipitation and evaporation, create challenges for Michigan's shipping industry. Shallow waterways increase the cost of shipping due to the need for light loading of cargo ships: "as much as a 1 meter decrease in the levels of Lake Michigan-Huron results in 3.6% to 12.2% increases in shipping costs (1.9% to 7.4% increase for a 0.7 m drop)".<sup>116</sup> In addition to the shipping industry, low lake levels also have economic impacts on hydroelectric generation, water use, and waterfront property values.<sup>117</sup> Long-term low water levels in the Great Lakes often lead to human intervention, such as dredging and deepening

and deepening channels, which can have significant ecological impacts. Dredging disrupts aquatic habitats, destroying spawning grounds for fish and removing benthic organisms essential to the food web. It also stirs up sediments that may contain pollutants that reduce water quality.<sup>118</sup> Additionally, artificially deepened waterways alter natural water flow and nutrient transport, further impacting fish migration and wetland ecosystems.

Finally, it is important to note the effects of climate change on Great Lakes water levels. The greenhouse effect leads to a surplus in the global energy cycle. Because the energy cycle fuels the water cycle, this surplus means an amplification of the water cycle, both greater evaporation and greater precipitation. Put simply, a more energetic water cycle is a more chaotic water cycle - abnormally high precipitation in some places, and drought in other places. These effects on the water cycle are leading the Great Lakes to experience greater, and more frequent, water level fluctuations.<sup>119</sup> Decreased ice cover also impacts Great Lakes water levels. The lack of ice leads to both fewer ice days and thus exposes the water to greater evaporation, but it also exposes the water to greater warming. Most evaporation happens in the late fall and early winter when cold air sweeps over the still relatively warm and ice free lakes. So while Great Lakes water levels have always fluctuated, due to climate change, these fluctuations are more severe with higher highs and lower lows. This explains why the Great Lakes have experienced both record low levels and record high levels in the last 15 years.<sup>120</sup>

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<sup>115</sup> Michigan Department of Natural Resources, "More than 9.1 Million Fish Stocked in 2024 so Far," Michigan.gov, August 6, 2024, <https://www.michigan.gov/dnr/about/newsroom/releases/2024/08/06/fish-stocked-in-2024>.

<sup>116</sup> Wuebbles, Donald, et al. "An Assessment of the Impacts of Climate Change on the Great Lakes." Environmental Law & Policy Center, March 30, 2019. <https://elpc.org/wp-content/uploads/2020/04/2019-ELPCPublication-Great-Lakes-Climate-Change-Report.pdf>.

<sup>117</sup> *Ibid.*

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<sup>118</sup> Victoria L. G. Todd et al., "A Review of Impacts of Marine Dredging Activities on Marine Mammals," ICES Journal of Marine Science 72, no. 2 (November 4, 2014): 328–40, <https://doi.org/10.1093/icesjms/fsu187>.

<sup>119</sup> Gronewold, Andrew D., Vincent Fortin, Brent Lofgren, Anne Clites, Craig A. Stow, and Frank Quinn. "Coasts, water levels, and climate change: A Great Lakes perspective." Climatic Change 120 (2013): 697-711.

<sup>120</sup> "Lake Levels | GLISA," accessed April 3, 2025, <https://glisa.umich.edu/resources-tools/climate-impacts/lake-levels/>.

## Fisheries

Fisheries are a vital component of Michigan's economy and cultural identity, supporting commercial, recreational, and tribal interests. They contribute \$4.2 billion to the state's economy and sustain a \$7 billion industry overall, providing jobs, food, and recreation.<sup>121</sup> Tribal fisheries, in particular, are deeply connected to cultural heritage, sovereignty, and subsistence practice.<sup>122</sup> Managing these diverse interests requires a cooperative framework that balances ecological sustainability with economic and cultural priorities.<sup>123</sup>

The governance of Great Lakes fisheries is shaped by multiple stakeholders, rights holders, and institutions, including the Michigan Department of Natural Resources (DNR), the Great Lakes Fishery Commission (GLFC), and the GLFC Council of Lake Committees, which coordinate management across jurisdictions. The 2000 Consent Decree, recently updated in 2023, plays a critical role in defining the "allocation, management, and regulation of state and tribal fisheries in the 1836 Treaty waters of the Great Lakes".<sup>124</sup> This agreement involves the State of Michigan, tribal governments, and the U.S. government, ensuring that both tribal treaty rights and broader conservation goals are upheld. It establishes guidelines for managing several species, with a particular focus on lake trout and lake whitefish. Recreational and commercial fishers play a significant role in fisheries management, while tribal fishers, as rights holders, have legally recognized treaty protections that must be upheld alongside efforts to

maintain ecological integrity.

The GLFC and its associated Lake Committees provide a collaborative framework that supports science-driven decision-making across the Great Lakes.<sup>125</sup> These bodies help ensure that fisheries management remains adaptive and cooperative, rather than dictated by any single agency or political interest. As climate change, invasive species, and habitat loss present increasing challenges, it will be essential for DNR and its partners to continue working within this cooperative model to sustain the health and resilience of Great Lakes fisheries for all user groups.

## Coastal Erosion and Shoreline Recession

The Great Lakes shorelines are composed primarily of loose sand and gravel, making them highly susceptible to erosion. Michigan's shoreline is receding at a rate of approximately one foot per year, driven by natural erosional forces that have shaped the coastline for millennia "they are expected to persist through – if not be exacerbated by – global climate change".<sup>126</sup> Climate change is projected to accelerate these processes, leading to greater fluctuations in standing water levels, stronger storm surges, and greater shoreline instability, all of which exacerbate erosion and threaten coastal ecosystems. These evolving ecological dynamics are drastically impacting coastal infrastructure, private properties, and how coastal communities interact with their environment, often prompting property owners and communities to take extreme measures, such as shoreline armoring to protect built structures.

A significant challenge for Michigan is that 80% of its Great Lakes shorelines are privately owned, making shoreline management difficult.<sup>127</sup> In response to

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<sup>121</sup> Michigan Department of Natural Resources, "More than 9.1 Million Fish Stocked in 2024 so Far," Michigan.gov, August 6, 2024, <https://www.michigan.gov/dnr/about/newsroom/releases/2024/08/06/fish-stocked-in-2024>.

<sup>122</sup> "Fisheries and Aquaculture." Michigan Sea Grant. Accessed January 20, 2025. <https://www.michiganseagrants.org/topics/fisheries-and-aquaculture/>.

<sup>123</sup> James M. Hohman and Jason Hayes, "Balancing Michigan's Fishing Interests – Part 1," Mackinac Center, February 9, 2021, <https://www.mackinac.org/balancing-michigans-fishing-interests-part-1>.

<sup>124</sup> "2000 Great Lakes Consent Decree." Department of Natural Resources. Accessed January 20, 2025. <https://www.michigan.gov/dnr/managing-resources/fisheries/tribal/2000>.

<sup>125</sup> "Great Lakes Fishery Commission." Great Lakes Fishery Commission - About. Accessed January 20, 2025. <https://www.glfc.org/about.php>.

<sup>126</sup> Norton, Richard, Guy Meadows, Oday Salim, Matthew Piggins, and Phillip Washburn. "Armor or Withdraw? Likely Litigation and Potential Adjudication of Shoreland Conflicts Along Michigan's Shifting Great Lake Coasts." Michigan Journal of Environmental & Administrative Law 12, no. 2 (2023): 153. <https://doi.org/10.36640/mjeal.12.2.armor>.

<sup>127</sup> *Ibid.*

erosion and rising water levels, many property owners are armoring their shorelines with structures such as seawalls and riprap to protect their properties. This offers short-term protection to properties but in the long-run shoreline armoring structures disrupt natural coastal processes, accelerate downstream erosion, contribute to beach loss and habitat degradation, and ultimately fail unless maintained regularly at substantial cost. Additionally, shoreline armoring can intensify erosion on neighboring properties, creating a ripple of reactive shoreline hardening that degrades the natural resilience of the coastline.

Despite these increasing risks, Michigan currently lacks a cohesive policy framework for shoreline management beyond regulating development at the water's edge and within limited designated coastal areas, and it has delegated most of the authority and responsibility to manage Great Lakes coastal shorelands to coastal townships, cities, and villages. This results in fragmented and inconsistent policies along the coast. The Great Lakes Submerged Lands Act (GLSLA) and the Shoreland Protection Act (SPA) are two key regulations governing shoreline management in Michigan, but they function primarily as reactive policies. The GLSLA regulates activities below the ordinary high-water mark (OHWM), requiring and reviewing permits for shoreline protection structures to prevent harm to public trust resources.<sup>128</sup> It is considered reactive because it regulates shoreline protection structures only when property owners apply for permits, responding to requests rather than proactively managing coastal resilience. The SPA governs shoreline protection above the OHWM within designated high-risk erosion areas, allowing property owners to apply for emergency permits when faced with imminent erosion threats.<sup>129</sup> These laws prioritize property protection over long-term coastal resilience and do not consider or address the environmental impacts of shoreline armoring.

<sup>128</sup> Part 325, NREPA, MCL 324.32501 (1994).

<sup>129</sup> Part 323, NREPA, MCL 324.32301 (1994).

Local officials likely hesitate to restrict shoreline hardening due to private property rights concerns and economic pressures. Advocates for shoreline armoring often assert that high-value waterfront properties contribute significantly to local tax revenues, making shoreline regulation a politically sensitive issue.<sup>130</sup> However, the debate over shoreline hardening extends beyond local politics; it is fundamentally about the broader impact of individual property decisions on adjacent landowners and environmental resources. Hardening can accelerate erosion on neighboring properties and degrade critical habitats, leading to ecological consequences that affect fisheries, water quality, and public in the long-term.

To ensure long term success, the *Michigan the Beautiful* initiative must incorporate extensive education efforts and stakeholder engagement. For example, in efforts to mitigate the impact of housing and urban development on shoreline alterations, resources such as Michigan Sea Grant's Guide to Great Lakes Shoreline Management provide communities with knowledge on sustainable shoreline practices.<sup>131</sup> This is particularly important for Lake Erie, where up to 77% of the shoreline is hardened.<sup>132</sup> In Michigan, efforts to restore have showcased strong economic returns. For example, softening the shoreline of Muskegon Lake resulted in a 6:1 return on investment mostly influenced by increased property

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<sup>130</sup> Erin Fuller et al., "Protecting Michigan's Inland Lakes: A Guide for Local Governments," 2008.

<sup>131</sup> Michigan Sea Grant (MSG), and University of Michigan Environmental Law & Sustainability Clinic, "New Guide to Help Michigan Communities Address Shoreline Armoring along Coastline," November 19, 2024, <https://www.michiganseagrants.org/blog/2024/11/19/new-guide-to-help-michigan-communities-address-shoreline-armoring-along-coastline/>.

<sup>132</sup> Pearsall, D., P. Carton de Grammont, C. Cavaliere, C. Chu, P. Doran, L. Elbing, D. Ewert, K. Hall, M. Herbert, M. Khoury, D. Kraus, S. Mysorekar, J. Paskus and A. Sasson. "Returning to a Healthy Lake: Lake Erie Biodiversity Conservation Strategy. Technical Report" (October, 2012). The Nature Conservancy, Nature Conservancy of Canada, and Michigan Natural Features Inventory.



values.<sup>133</sup> These findings underscore the value of integrating nature-based solutions and economic planning into coastal restoration projects.

## Social Vulnerability

Social vulnerability refers to demographic, socioeconomic, and structural conditions that limit a community's ability to prepare for, respond to, and recover from hazards, disasters, and stressors.<sup>134</sup> In the context of climate change and conservation, these factors – such as poverty, disability, lack of access to transportation, and household composition – can shape how communities are affected by, and benefit from, environmental interventions. The Social Vulnerability Index (SVI), developed by the CDC, is a widely used tool for identifying communities that may be disproportionately impacted by environmental change and under-resourced in their ability to adapt.

Within the Great Lakes Basin, socially vulnerable communities are increasingly exposed to climate-driven threats such as fluctuating water levels, more intense storms, and water quality degradation due to harmful algal blooms. A recent study by researchers at the University of Minnesota Duluth mapped social vulnerability across the Basin and found that areas with the highest SVI scores are concentrated in regions likely to experience intensified climate impacts.<sup>135</sup> In Michigan, 387 coastal municipalities account for roughly 24% of the state's population. These communities tend to exhibit elevated levels of social vulnerability – including a 20% household poverty rate, significantly higher than the state

average of 14%<sup>136</sup> – and are projected to face increased flooding, infrastructure strain, and displacement as climate change accelerates.<sup>137</sup>

Investments in Great Lakes restoration have delivered measurable economic and ecological benefits, particularly in former AOCs such as Muskegon Lakes and White Lake. For example, habitat and shoreline restoration in Muskegon Lake has generated over \$66 million in increased property values and recreational use, representing a return of more than 6-to-1 on restoration investment.<sup>138</sup> However, these benefits have not always been equally shared. A 2023 study found that communities with higher environmental justice risk – such as low-income and racially diverse neighborhoods in Muskegon – have more limited access to shoreline amenities and were less likely to perceive improvements in environmental quality.<sup>139</sup> These disparities highlight a critical social vulnerability: the risk that underrepresented or underserved communities may not fully benefit from, or participate in, conservation and restoration efforts.

As Michigan advances the *Michigan the Beautiful* initiative, it must ensure that conservation strategies do not unintentionally marginalize the very communities most affected by environmental degradation. Many high-SVI communities along Michigan's Great Lakes Coastal rely on access to water resources for fishing, recreation, cultural practices, and economic livelihoods. Conservation designations that restrict access or exclude

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<sup>133</sup> Isely, Paul, et al. "A Socioeconomic Analysis of Habitat Restoration in the Muskegon Lake Area of Concern." *Journal of Great Lakes Research*, Elsevier, 5 Jan. 2018, [www.sciencedirect.com/science/article/abs/pii/S0380133017301983](https://www.sciencedirect.com/science/article/abs/pii/S0380133017301983).

<sup>134</sup> Flanagan, Barry E., Edward W. Gregory, Elaine J. Hallisey, Janet L. Heitgerd, and Brian Lewis. "A Social Vulnerability Index for Disaster Management." *Journal of Homeland Security and Emergency Management* 8, no. 1 (January 5, 2011). <https://doi.org/10.2202/1547-7355.1792>.

<sup>135</sup> Fergen, Joshua T., and Ryan D. Bergstrom. "Social Vulnerability across the Great Lakes Basin: A County-Level Comparative and Spatial Analysis." *Sustainability* 13, no. 13 (June 29, 2021): 7274. <https://doi.org/10.3390/su13137274>.

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<sup>136</sup> U.S. Census Bureau; American Community Survey, 2019 American Community Survey 5-Year Estimates, Table S1901 and DP05. <https://data.census.gov/table/ACSDP5Y2019.DP05>

<sup>137</sup> Gronewold, Drew, and Richard B. Rood. "Climate Change Is Driving Rapid Shifts between High and Low Water Levels on the Great Lakes." *The Conversation*, June 4, 2019.

<sup>138</sup> Isely, Paul, et al. "A Socioeconomic Analysis of Habitat Restoration in the Muskegon Lake Area of Concern." *Journal of Great Lakes Research*, Elsevier, 5 Jan. 2018, [www.sciencedirect.com/science/article/abs/pii/S0380133017301983](https://www.sciencedirect.com/science/article/abs/pii/S0380133017301983).

<sup>139</sup> Rylie Dorman et al., "Great Lakes for Whom? Community Outcomes in the Muskegon Lake and White Lake Areas of Concern," *Journal of Great Lakes Research* 49, no. 5 (August 8, 2023): 1166–78, <https://doi.org/10.1016/j.jglr.2023.07.008>.

communities along Michigan's Great Lakes Coastal rely on access to water resources for fishing, recreation, cultural practices, and economic livelihoods. Conservation designations that restrict access or exclude communities from decision-making processes can exacerbate existing inequalities. To be successful and just, the 30x30 framework must center equity by ensuring that vulnerable communities have a seat at the table, benefit from restored ecosystems, and gain protection from climate risks.

### **Successful Great Lakes Protection and Restoration Measures**

Industrial activity, urban expansion, and agricultural runoff continue to introduce contaminants that degrade water quality and disrupt aquatic ecosystems in Michigan's Great Lakes. Climate change exacerbates these challenges by intensifying storm events, increasing water temperatures, and altering precipitation patterns, all of which contribute to the spread of pollutants and further strain the Great Lakes' resilience. MtB could serve as a tool to strengthen and support these efforts and resources by providing long-term conservation protections that help prevent degradation and safeguards restoration efforts, ensuring all efforts are sustained and not undone. By looking at the existing resources, we can explore the opportunity of leveraging MtB to improve coordination and amplify conservation impact.

### **Tribal Resources**

The Anishinaabe of Michigan have been stewards of the Great Lakes since time immemorial. Today, the Tribes of Michigan - as well as the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) and Chippewa Ottawa Resource Authority (CORA) - steward important resources for further collaborative Great Lakes Great Lakes management. This includes GLIFWC's "Tribal Great Lakes Restoration," which highlights the important collaborative work that has arisen from the Great Lakes Restoration Initiative between Tribes, the federal government, and other

partners.<sup>140</sup> Keweenaw Bay Indian Community also has a deep wealth of publicly available resources relating to Great Lakes stewardship and more.<sup>141</sup> The Intertribal Council of Michigan's Manoomin Stewardship Guide highlights the Michigan Wild Rice Initiative's engagement on Manoomin stewardship planning across the state and between several Tribal and non-Tribal partners.<sup>142</sup> The Michigan Wild Rice Initiative (MWRI) offers both important guidance for Manoomin stewardship, and for how proactive and meaningful engagement between rights holders and non-Tribal partners can lead to robust and sustainable stewardship. The MWRI stands as a strong example of this type of collaboration.

### **Binational Resources**

The bipartisan nature of Great Lakes conservation efforts strengthens Michigan's ability to secure federal funding and legislative support for its 30x30 initiatives. Protecting the Great Lakes has historically received backing from both sides of the political aisle due to the region's economic, environmental, and cultural significance. The Great Lakes Water Quality Agreement (GLWQA) is a commitment between the U.S. and Canada to protect and restore the water quality of the Great Lakes. First signed in 1972 and last updated in 2012, it establishes binational priorities and coordinated actions to address issues such as invasive species, habitat degradation, and climate change impacts.<sup>143</sup> In 2012, this commitment was strengthened to prevent ecological harm and continue efforts to fight threats such as harmful

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<sup>140</sup> Tribal Great Lakes Restoration, accessed April 4, 2025, <https://glifwc.org/sites/default/files/uploads/documents/2024-07/Great%20Lakes%20Restoration.pdf>.

<sup>141</sup> "Resources | KBIC Natural Resources Department," accessed April 4, 2025, <https://nrd.kbic-nsn.gov/knowledge/resources/>.

<sup>142</sup> "ITCMI," Manoomin Stewardship Guide, accessed April 4, 2025, <https://www.itcml.org/wp-content/uploads/2025/02/Manoomin-Stewardship-Guide-FINAL-2.17.2025.pdf>.

<sup>143</sup> Great Lakes Water Quality Agreement: Protocol amending the agreement between Canada and the United States of America on Great Lakes water quality, 1978, as amended on October 16, 1983, and on November 18, 1987; Signed September 7, 2012, entered into force February 12, 2013 § (2013).

algae and toxic chemicals. Under the GLWQA, Lakewide Action and Management Plans (LAMPS) are developed, which are binational strategies developed under the Great Lakes Water Quality Agreement to restore and protect the health of each Great Lake.<sup>144</sup> They coordinate efforts with multiple stakeholders such as government agencies, NGOs, Indigenous nations, academic institutions, and communities. These plans provide a framework for identifying conservation targets, assessing threats, and prioritizing restoration efforts, and are focused on ecological factors that sustain the Great Lakes' health and resilience.

### Federal Resources

Clean water, healthy fisheries, and protected natural landscapes are essential for industries such as tourism, recreation, and agriculture, all of which contribute significantly to Michigan's economy. Because these resources benefit communities across the political spectrum, federal programs such as the Great Lakes Restoration Initiative (GLRI) have consistently received strong bipartisan support. Traditional bipartisan support could increase the likelihood that additional funding and policy measures can be created to achieve conservation goals, however, there is considerable uncertainty if federal support will continue at prior funding levels. The GLRI, a federal program launched in 2010 to accelerate efforts to protect and restore the Great Lakes ecosystem. Developed with input from states, Tribes, local governments, universities, businesses, and other stakeholders, the GLRI provides funding and coordination for projects that address the region's most pressing environmental challenges.

The GLRI funds projects related to toxic substances and AOCs, invasive species, nonpoint source pollution impacts on nearshore health, habitats and species, and foundations for future restoration

actions.<sup>145</sup> Along with the environmental benefits, the GLRI also produces economic benefits: "a 2018 University of Michigan study showed that every dollar of federal spending on GLRI projects between 2010 and 2016 will produce \$3.35 in additional economic activity in the Great Lakes region through 2036".<sup>146</sup> Currently, the GLRI Action Plan IV outlines the work for the next five years to improve Great Lakes' environmental challenges, achieve long-term goals, and meet their commitments to the GLWQA, including the main goals set for each lake in the LAMPS. In Michigan, for example, the GLRI works with the Southeast Michigan Resilience Fund through a public-private partnership to help communities and ecosystems become more resilient by controlling stormwater, improving water quality, restoring habitat, and making green spaces more usable and accessible. Partnerships such as this help prepare communities for growing environmental challenges such as development, climate change, invasive species, and pollution. It will be important to observe how these partnerships navigate the present political climate, as continued federal support is uncertain.

Another resource that can be leveraged are national parks. Michigan has five national parks: Isle Royale National Park, Pictured Rocks National Lakeshore, Sleeping Bear Dunes National Lakeshore, River Raisin National Battlefield Park, North Country National Scenic Trail, and Keweenaw National Historical Park. Of these, Isle Royale, Pictured Rocks, and Sleeping Bear Dunes are most relevant to aquatic and shoreline conservation. Isle Royale, located in Lake Superior, encompasses more than 400 islands and protects large coastal and aquatic habitats, including fish spawning

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<sup>144</sup> US EPA, "Lakewide Action and Management Plans for the Great Lakes," [www.epa.gov](https://www.epa.gov/greatlakes/lakewide-action-and-management-plans-great-lakes), September 25, 2015, <https://www.epa.gov/greatlakes/lakewide-action-and-management-plans-great-lakes>.

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<sup>145</sup> Great Lakes Restoration Initiative, "Great Lakes Restoration Initiative | U.S. Fish & Wildlife Service," [www.fws.gov](https://www.fws.gov/initiative/great-lakes-restoration-initiative), n.d., <https://www.fws.gov/initiative/great-lakes-restoration-initiative>.

<sup>146</sup> Great Lakes Restoration Initiative, "Action Plan IV | Great Lakes Restoration Initiative," GLRI US, accessed April 13, 2025, <https://www.glri.us/action-plan-iv>.



areas.<sup>147</sup> Pictured Rocks and Sleeping Bear Dunes, both along the shores of the Great Lakes, include protected dune ecosystems, forested watersheds, and undeveloped shorelines. These lands are managed under mandates from the National Park Service Organic Act, providing legal protections from development, industrial activity, and habitat degradation. By protecting shorelines, water quality, and habitats, national parks help secure some of the most significant coastal and open water systems in the state.

Michigan Islands National Wildlife Refuge, managed by the U.S. Fish and Wildlife Service, protects nine islands: “Pismire, Hat and Shoe Islands are part of the Beaver Island Archipelago in Lake Michigan and are managed by Seney National Wildlife Refuge. Sugar, Crooked, and Scarecrow Islands located in Thunder Bay near Alpena, Michigan, and Big and Little Charity Islands located in Saginaw Bay are managed by Shiawassee National Wildlife Refuge”.<sup>148</sup> These islands provide breeding grounds for colonial waterbirds and provide refuge for species of concern. The Michigan Islands National Wildlife Refuge is dedicated to conserving, managing, and restoring the nation’s fish, wildlife, plants, and their habitats through a network of protected lands and waters.<sup>149</sup> Because many of these islands are closed to the public year-round or seasonally during nesting periods, they are minimally disturbed and ecologically intact, making them a great resource to leverage to increase connectivity across aquatic and terrestrial environments.

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<sup>147</sup> National Park Service, “Significance - Isle Royale National Park (U.S. National Park Service),” <https://www.nps.gov/isro/learn/management/significance.htm>.

<sup>148</sup> U.S. Fish & Wildlife Service, “Michigan Islands National Wildlife Refuge | U.S. Fish & Wildlife Service,” <https://www.fws.gov/refuge/michigan-islands>.

<sup>149</sup> *Ibid.*

## State Resources

The Michigan Coastal Management Program (MCMP), managed by the Department of Environment, Great Lakes, and Energy (EGLE) works to protect the state’s coastlines through technical assistance and grant funding to assist coastal communities. Their goal is to inform communities about risks and options to mitigate coastal hazards, create healthy habitats, and support eco-tourism. MCMP’s collaborations have helped advance research on changing climate, methods for resilience planning methods, and developing sustainable coastlines in the state.<sup>150</sup>

Another state resource is the Michigan Invasive Species Grant Program, designed to manage invasive species in the Great Lakes. This program provides funding for projects that prevent, detect, eradicate, and control terrestrial and aquatic species in Michigan. It aims to prevent new species introductions, strengthen early detection networks, limit the spread of newly confirmed species, and manage already established invasive species.<sup>151</sup>

The Michigan Underwater Preserve System (MUPS) was established in 1980 with the designation of the state’s first underwater preserve in Lake Superior.<sup>152</sup> The sites in the MUPS are protected by Michigan Public Acts 152 of 1980, 452 of 1988, and Part 761 of Michigan Public Act 451 of 1994, which establish the preserves, guarantee recreational access to shipwrecks, and prohibit the removal or destruction of abandoned property on Great Lakes bottomlands.<sup>153</sup> As awareness of the importance of protecting underwater resources has grown, so has the system.

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<sup>150</sup> “Coastal Management.” Department of Environment, Great Lakes, and Energy. Accessed January 20, 2025. <https://www.michigan.gov/egle/about/Organization/Water-Resources/coastal-management>.

<sup>151</sup> The State of Michigan, “Michigan Invasive Species Grant Program,” Michigan.gov, 2023, <https://www.michigan.gov/invasives/grants/misgp>.

<sup>152</sup> “Michigan Underwater Preserves - Sites.” Department of Environment, Great Lakes, and Energy. Accessed January 20, 2025. <https://www.michigan.gov/egle/about/Organization/Water-Resources/submerged-lands/shipwrecks/michigan-underwater-preserves-sites>.

<sup>153</sup> *Ibid.*

It currently includes thirteen designated preserves, covering 7,200 square miles of Great Lakes bottomlands – approximately 18.9% of Michigan’s total bottomlands area. The existing legislative framework of the MUPS provides protection to these areas by prohibiting the removal or destruction of abandoned property, ensuring recreational access to shipwrecks, and preventing disturbances to the underwater cultural sites. Existing legislation granting protections to the MUPS presents an opportunity for MtB to strengthen ecological protections for underwater habitats and biodiversity and expand the preserve network to improve connectivity between protected sites. However, the MUPS faces significant challenges in funding and management. The preserves have been effective in protecting cultural and historical resources, such as shipwrecks, but there is “no funding for the program, and much of the effort to monitor the preserves is the result of volunteer work”.<sup>154</sup>

**Figure 8: Map of the MUPS**



(Underwater Preserve System polygon data from NOAA, 2022. Map visualization by AiLi Pigott and Longyu (Ciara) Xue, 2025.)

Even with the addition of new sites over the years, a lack of political will has left the system without dedicated funding or modernized management structures, despite its economic and cultural contributions including boosting tourism,

supporting local businesses, preserving maritime history, fostering recreational diving, and providing educational and research opportunities. Pushback from commercial fisheries and recreational fishing groups have prevented efforts to expand protections, with concerns over potential restriction of fishing activity within designated preserves. Collaborating with fisheries and including them in the decision-making process acknowledges their importance to Michigan’s Great Lakes economy and identity. Rather than imposing unilateral restrictions, collaboration can help develop an expansion strategy that provides ecological protections and doesn’t significantly impact fisheries.

The criteria for designating sites have remained unchanged since the 1980s. With the State’s renewed focus on protecting its natural resources, there is an opportunity to modernize the preserve system in a way that aligns with MtB and provides environmental protections.

### 30x30 Examples in Other States

We examined California and Illinois’ 30x30 programs and identified characteristics that present significant takeaways for MtB. California’s approach incorporates tribal leadership, Traditional Ecological Knowledge, and diverse funding models. Illinois demonstrates how voluntary conservation programs can engage private landowners in large-scale initiatives, which can serve as a useful example for a 30x30 program in Michigan. We present these examples in the following section and explore how Michigan can adapt and apply similar approaches to strengthen stakeholder collaboration, secure funding, and measure progress.

#### California

California was the first state to commit to and develop a 30x30 plan in October of 2020, through Governor Newsom’s Nature-Based Solutions Executive Order N-82- 20.

<sup>154</sup> FLOW Editor. “Getting to the Bottom of It: Marine Sanctuaries and Preserves Help Protect Bottomlands.” FLOW, October 17, 2024. <https://forloveofwater.org/great-lakes-marine-sanctuaries-preserves/>.

Comparing California's initial Pathways Report, published in 2022, with its latest Progress Report, demonstrates how efforts to expand marine conservation under the 30x30 initiative have only increased from 16% to 16.2% in the last two years. This limited progress could be due to the challenges of expanding conservation measures beyond the state's existing Marine Protect Area (MPA) network, such as: stakeholder conflicts, data limitations needed to make accurate conservation assessments, securing adequate funding for marine conservation, navigating the complexities of biodiversity threats and ecosystem services, and obtaining enough public and scientific input.<sup>155</sup>

A key takeaway from California's experience for MtB is the importance of engaging stakeholders early to build trust and reduce the possibility of conflicts. California's progress in marine conservation has been slow, with protected areas increasing by only 0.2% in two years, partly due to stakeholder negotiations involving Indigenous nations, commercial and recreational fishers, and conservationists. The delays show the challenges of balancing competing interests after a program is already launched. Michigan needs to be proactive about involving Indigenous nations, fishing communities, recreational users, and local governments from the onset. The DNR has proactively hosted listening sessions and workshops, online surveys, emails and other avenues to hear from different stakeholders to understand the impact and considerations that MtB needs to incorporate. The feedback received will help shape the "*Michigan the Beautiful: Pathways*" report that the DNR is currently developing.

For California, the Ocean Protection Council (OPC) is leading efforts to refine the definition of conservation areas, and is in process of developing a framework to guide the types and levels of marine

protections that can be included in California's definition of a 30x30 Conservation Area. California is expected to make more progress on conserving beyond their existing MPAs, as they hope to finalize the framework and make preliminary decisions on potential future 30x30 Conservation Areas.<sup>156</sup> California's developing framework that categorizes different levels of protection, serves as a strong example for MtB for adopting science-based framework to evaluate progress and stay accountable.

California had a robust budget designated for its 30x30 plan, with "\$768 million set aside for nature-based solutions, \$600 million for coastal resilience projects, \$645 million in habitat restoration, and \$105 million for wildlife corridors and fish passage projects".<sup>157</sup> In addition to this state funding, California leveraged federal funding through opportunities provided by the Land and Water Conservation Act. However, a potential limitation has been the uneven allocation of funds between land and water conservation efforts. The progress report indicates that land conservation has seen more measurable gains, with a 1.2% increase, while marine and freshwater conservation has lagged behind at just 0.2%, suggesting a greater focus and investment in water conservation.<sup>158</sup>

Despite California's strong initial funding commitments, recent budget constraints highlight the vulnerabilities of long-term conservation financing. As Governor Newsom worked to close a \$45-billion deficit, the state reduced its 30x30 allocation from

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<sup>155</sup> California Natural Resources Agency. "Pathways to 30x30 California: Annual Progress Report." 30x30 California, September 2024. [https://resources.ca.gov/-/media/CNRA-Website/Files/2024\\_30x30\\_Pathways\\_Progress\\_Report.pdf](https://resources.ca.gov/-/media/CNRA-Website/Files/2024_30x30_Pathways_Progress_Report.pdf).

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<sup>156</sup> Ocean Protection Council, "30x30: Conserving 30% of California's Coastal Waters by 2030 - California Ocean Protection Council," California Ocean Protection Council, January 7, 2025, <https://opc.ca.gov/30x30/>.

<sup>157</sup> O'Shea, Helen, and Kate Poole. "5 Takeaways on California 30x30 Report: Land and Freshwater." Natural Resources Defense Council, April 26, 2022. <https://www.nrdc.org/bio/helen-oshea/5-takeaways-california-30x30-report-land-and-freshwater>.

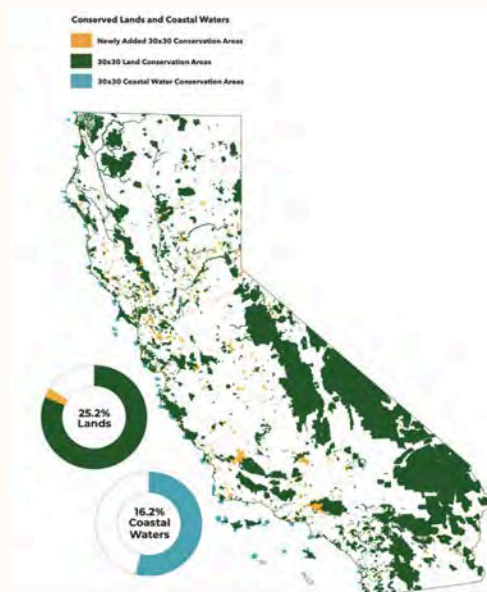
<sup>158</sup> California Natural Resources Agency. "Pathways to 30x30 California: Annual Progress Report." 30x30 California, September 2024. [https://resources.ca.gov/-/media/CNRA-Website/Files/2024\\_30x30\\_Pathways\\_Progress\\_Report.pdf](https://resources.ca.gov/-/media/CNRA-Website/Files/2024_30x30_Pathways_Progress_Report.pdf).



\$1.6 billion to \$1.3 billion.<sup>159</sup> While this still represents a significant investment, it signals potential instability, particularly as California and other states navigate shifting federal priorities of the current administration. The program is receiving support from the Inflation Reduction Act (IRA), but with the current federal administration, California's ability to continue leveraging the IRA is uncertain as the momentum of the America the Beautiful initiative is likely to slow. Any scaling back of federal conservation commitments could strain the state's capacity to meet its 30x30 targets.

MtB has an opportunity to learn from California's budget cuts and adjustments as Michigan develops its own 30x30 framework. While California still has a substantial 30x30 budget allocation, the reduction shows how vulnerable 30x30 programs can be to financial shifts. Michigan should take this into account by ensuring its 30x30 efforts are backed by diversified funding sources such as public, private, and philanthropic. This would give MtB greater financial stability and reduce dependence on a single funding source, such as federal grants, which are subject to policy changes and budget fluctuations. Learning from how California adapts to funding reductions to keep their 30x30 program moving forward will be a lesson in resilience planning and alternative funding strategies.

**Figure 9: Progress and Disparities of California's 30x30 Efforts**



(California Natural Resources Agency. "Pathways to 30x30 California: Annual Progress Report." 30x30 California, September 2024. [https://resources.ca.gov/-/media/CNRA-Website/Files/2024\\_30x30\\_Pathways\\_Progress\\_Report.pdf](https://resources.ca.gov/-/media/CNRA-Website/Files/2024_30x30_Pathways_Progress_Report.pdf).)

The integration of Indigenous Knowledge and Traditional Ecological Knowledge (TEK) and tribal collaboration has been integral to California's 30x30 planning. Tribal partnerships have been strengthened through support from the Tribal Nature-Based Solutions Grant Program, which will provide funding to support the return of approximately 38,950 acres for conservation to California Indigenous tribes.<sup>160</sup> Efforts such as the creation of Indigenous Marine Stewardship Areas, the first of which was designated in 2023 along the North Coast, show new and significant approaches to co-manage waters and incorporate TEK in conservation.

Michigan can apply similar approaches within by weaving TEK into MtB decisions and strengthening partnerships.<sup>161</sup> Collaborating with tribal nations to establish Indigenous-led conservation areas or

<sup>159</sup> Hayley Smith, "California Nears '30x30' Conservation Goal," Los Angeles Times, September 9, 2024, <https://www.latimes.com/environment/story/2024-09-09/california-nears-30x30-conservation-goal>.

<sup>160</sup> California Natural Resources Agency. "Pathways to 30x30 California: Annual Progress Report." 30x30 California, September 2024. [https://resources.ca.gov/-/media/CNRA-Website/Files/2024\\_30x30\\_Pathways\\_Progress\\_Report.pdf](https://resources.ca.gov/-/media/CNRA-Website/Files/2024_30x30_Pathways_Progress_Report.pdf).

<sup>161</sup> Koski, Jessica, Jen Vanator, Melonee Montano, Jennifer Ballinger, Valoree Gagnon, Jessica Lackey, Evelyn Ravindran, and Jessica L Jock. "Guidance Document on Traditional Ecological Knowledge." University of Minnesota, February 2021.

co-management frameworks for the Great Lakes could align MtB with tribal priorities. Additionally, Michigan could develop funding mechanisms similar to California's Tribal Nature-Based Solutions Grant Program to support tribal stewardship initiatives, promote land and water restoration efforts, and recognize the role of Indigenous communities in protecting Michigan's natural resources.

## Illinois

Driven by advocacy from high school students, Illinois launched its 30x30 initiative in 2021 through legislation and supported by the Illinois General Assembly. The Illinois 30 by 30 Conservation Task Force's 2022 report outlines the vision for conserving 30% of the state's land and water by 2030, including Illinois' portion of Lake Michigan.

Illinois' 30x30 strategy, outlined in the 30 by 30 Conservation Task Force, recognizes challenges such as sedimentation, nutrient runoff, and habitat loss in watersheds and aquatic systems. Illinois has leveraged programs such as the Conservation Reserve Enhancement Program (CREP) which have contributed to protecting riparian zones along the Illinois and Kaskaskia Rivers, with 33,500 easements protecting 90,000 acres, with considerable growth opportunity as the program is federally capped at 232,000 acres.<sup>162</sup> This program has helped improve water quality by reducing soil erosion and filtering pollutants before they reach major waterways. The Illinois Environmental Protection Agency (IEPA) has implemented green infrastructure projects in urban areas that include bioswales and wetland restoration as a way to manage stormwater and prevent nutrient overloading to nearby lakes and rivers.

Despite their efforts, the Illinois 30 by 30 Task Force report has not outlined standardized metrics to measure progress in conserving aquatic ecosystems,

particularly Lake Michigan and its connected waterways – something California does well. Without defined benchmarks, it's difficult to assess whether conservation efforts are achieving their intended goals of increasing biodiversity, restoring habitats, and bolstering ecological integrity. To be successful, Michigan needs to develop clear metrics to measure progress of *Michigan the Beautiful*. Both output (e.g. how much acreage is designated for conservation) and outcome (e.g. a reduction in harmful algae blooms or an increase in muskellunge populations) targets should be developed for the program to remain accountable and on track to meet its goals.

Illinois' water conservation efforts currently rely heavily on voluntary, short-term agreements with private landowners. Even though voluntary programs do not provide guaranteed permanence, these initiatives are fundamental to achieving the 30x30 targets as Illinois needs to engage private stakeholders, who own 96% of the state's land, to adopt conservation practices.<sup>163</sup> Expanding voluntary efforts implies creating incentives, providing technical support, and having sustained funding to ensure that voluntary engagement continues, a challenge that Illinois will have to face with this strategy.

Stakeholder engagement is essential for successful 30x30 frameworks, particularly when working with private landowners. Illinois' reliance on voluntary conservation programs highlights the importance of early engagement, as private landowners control 96% of the state's land. However, Michigan should recognize the limitations of short-term agreements and prioritize long-term voluntary conservation along its Great Lakes coast. While Illinois' 30x30 strategy heavily depends on voluntary efforts from private landowners, MtB can develop a framework for longer-term conservation commitments or provide stronger incentives for long-term participation.

Illinois' Task Force report outlines its strategy for

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<sup>162</sup> "Illinois 30 by 30 Task Force." Illinois Department of Natural Resources, September 2022. [https://www.ilga.gov/reports/ReportsSubmitted/3593RSGAEmail7224RSGAAttach30 by 30 task force final report.pdf](https://www.ilga.gov/reports/ReportsSubmitted/3593RSGAEmail7224RSGAAttach30%20by%2030%20task%20force%20final%20report.pdf).

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<sup>163</sup> *Ibid.*

building conservation capacity, which includes increased staffing, funding, and strategic management. Illinois will seek to increase long-term funding for conservation agencies, hire additional site and administrative staff to manage existing public lands and voluntary programs, and explore workforce initiatives. Illinois will also seek to increase its voluntary conservation program funding aimed to protect high-value lands and scaling agricultural incentives, given that 75% of Illinois area is agricultural land.<sup>164</sup> Additionally, strategies are proposed to improve water quality through the management of conservation areas, promoting collaboration between public and private sectors, and strategically acquiring new conservation areas by prioritizing areas that improve habitat connectivity, promote carbon sequestration, and strengthen climate resiliency.

Limited progress has been made since the release of Illinois' 30 by 30 Task Force report in 2022. The report outlined recommendations for conserving Illinois' lands and waters, including the ones previously mentioned, but there has been little follow-up from state leaders. The report seems to have been sidelined; it garnered little public attention, and there is a lack of updates from the Illinois Department of Natural Resources. At the local level, however, some progress has been made. Initiatives such as the Cook County Forest Preserves' ongoing restoration and management of natural areas, including efforts to improve water quality and habitat connectivity, have continued. In addition, local conservation groups, such as the West Cook Wild Ones, are working on creating native plant corridors to improve biodiversity and water conservation efforts. However, local efforts and successes are fragmented, and interest groups invested in Illinois' 30 by 30 initiative are frustrated by the lack of state

progress following the report's release.<sup>165</sup>

### **Applicable Frameworks for Protection**

California's Pathways to 30x30 framework highlights the value of regionally led conservation planning, ensuring that local conservation priorities align with community needs. By empowering regional leaders, municipalities, and conservation groups, California has strengthened stakeholder engagement and advanced conservation efforts. Michigan already has a strong foundation to build on and can further integrate local stakeholders, tribal nations, and land trusts into the *Michigan the Beautiful* initiative to ensure conservation efforts reflect regional priorities and respect stakeholder interests.

California's 30x30 strategy has also emphasized strengthening protections for existing conserved areas to support biodiversity and climate resilience. Michigan has similar opportunities to evaluate its Great Lakes bottomlands and marine protected areas to align them with broader conservation goals. Enhancing regulatory protections and improving management within state and federally managed waters would allow Michigan to expand its conservation impact without relying on solely new land acquisitions.

Additionally, tracking conservation progress and applying adaptive management strategies will be key to maintaining accountability and transparency in Michigan's 30x30 efforts. California's statewide conservation tracking system integrates spatial analysis and biodiversity data to guide decision-making. Michigan can implement a similar system to monitor protected areas, assess the health of Great Lakes ecosystems, and ensure conservation policies remain data-driven and responsive to emerging challenges.

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<sup>164</sup> "Illinois 30 by 30 Task Force." Illinois Department of Natural Resources, September 2022. [https://www.ilga.gov/reports/ReportsSubmitted/3593RSGAEmail7224RSGAAttach30 by 30 task force final report.pdf](https://www.ilga.gov/reports/ReportsSubmitted/3593RSGAEmail7224RSGAAttach30%20by%2030%20task%20force%20final%20report.pdf).

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<sup>165</sup> Ayres Fisher, Adrian. "Achieving 30x30: Percentages Matter, We're All in This Together, and What You Do to Help Counts Big-Time." Resilience, March 13, 2023. <https://www.resilience.org/stories/2023-03-13/achieving-30x30-percentages-matter-were-all-in-this-together-and-what-you-do-to-help-counts-big-time/>.



## ***Appendix B — Interview Protocol***

### **Informed Consent Statement**

Hi, my name is [X] and I am a master's student at the University of Michigan School for Environment and Sustainability working with Dr. Mike Shriberg, a faculty member. (Add in second person if present). Thank you so much for taking the time to speak with me/us today. As mentioned during our initial scheduling email, we are interested in your thoughts on Great Lakes coastal and open water management. We will be compiling this information into a report that will summarize a suite of recommended policy and programs priorities for future Great Lakes conservation efforts.

Before we begin, do I have your consent to record this interview?

This recording will only be used to help with data collection and will not be shared with anyone outside of the research team without your permission. Any identifiable information from this interview will be anonymized and remain confidential unless you provide explicit consent to share.

Great, thank you so much. Feel free to stop me at any time if you have any other questions or concerns, and/or if you'd like to end the interview.

### **Base Interview Questions**

- What is your role or title? What is your connection to Michigan's Great Lakes?
- Given that perspective, what do you see as the biggest threats to access, future consumptive uses, and managing these resources for the conservation of these systems and the fish and wildlife that depend on the integrity of the Great Lakes?
- Given these threats, what are your priorities for coastal and open water Great Lakes management and stewardship?

### *Appendix C — Interviewee Outreach Email*

Hello [NAME],

I am reaching out because [X] recommended we talk with you. I am part of a University of Michigan masters project team exploring Michiganders' priorities for future Great Lakes coastal and open water management for biodiversity conservation. Our team is conducting interviews with leaders and experts around the state who have a connection to Great Lakes stewardship planning.

Given your work on (add blurb specific to person), we believe you are an essential voice in this conversation. Would you be willing to participate in a semi-structured hour-long interview about stressors and priorities for coastal and open water Great Lakes management and conservation? If you are interested in participating, we will share more details and discuss potential dates.

Thanks so much for your time,

[Team Member Name]

## Appendix D — Dovetail Codebook

Parent Code	Parent Description	Child Codes	Child Description
<b>Implementation Barriers</b>	Obstacles that would prevent or limit the implementation of Michigan the Beautiful or a 30x30 plan.	Challenges	General challenges conservation planning currently has or would have in the future.
		Equity	Equity and justice issues related to conservation planning or state funded projects. Limited public access, exclusionary zones, etc
		Funding	Where lack of funding currently creates barriers, or would create barriers in the future.
		General Management	Lack of existing and consistent general management plans for stewardship projects.
		Capacity	Where lack of capacity (financial or human resources) currently creates barriers, or would create barriers in the future.
		Potential 30x30 Backlash	Potential backlash the state could receive from certain stakeholders/user groups specifically related to 30x30 messaging or related projects.
<b>Threats to Biodiversity</b>	Effects of human activities and environmental changes that reduce the variety of living organisms in the Great Lakes region.	Algae	Harmful algae blooms affecting water quality.
		Climate Change	Anthropogenic impacts of climate change on the Great Lakes ecosystem.
		Habitat Degradation	Causes of degrading coastal and reef habitats.
		Invasive Species	Consequences of the abundance of invasive species in the ecosystems, mechanisms to control, and preventative measures.
		Groundwater	Consequences of polluted ground water.
		Microplastics	Increased presence and impacts of microplastics in the Great Lakes.
		Environmental Pollution	Examples of human-caused pollution affecting water quality, ecosystems, and quality of life.
		Ice Coverage	Impacts of less annual ice coverage.
		Threats	General threats to biodiversity.



<b>GIS</b>	Related to geographic information systems, relevant data layers, visualization or modeling ideas, or technology.	StoryMap	Comments related to creating an ArcGIS StoryMap.
		GIS Resource	Helpful data layers or tools.
		Mapping	General mapping tips
		Modeling	Ways to model biodiversity and threats to biodiversity in a dynamic map.
		Field Methods	Various other remote sensing field methods like sonar data, ortho imagery, etc.
<b>Coastline</b>	Specifically referring to Michigan's coastal zone, starting at the Ordinary High Water Mark.	Dynamic Zoning	Adaptive setback measures and regulations to create a more flexible coastal zone - preparing for high water years before they occur.
		Flooding	Coastal areas that flood during storm surges, high water years, or because of poor infrastructure.
		Shoreline Naturalization	The process of restoring or maintaining native plants along the coast to create a buffer zone between water and developed areas.
		Shoreline Armoring	Building physical structures to protect shorelines from erosion. Includes sea walls, riprap, or bulkhead.
<b>Ecosystem</b>	Great Lakes ecosystem, ecosystem services, ecological diversity throughout the region.	Connectivity	Ecological connectivity allowing for movement of species, water, and energy across landscapes.
		Ecosystem	General comments about the Great Lakes ecosystem.
		Water Quality	Comments related to Great Lakes water quality, challenges the system faces, and ways to improve.
		Biodiversity Hotspot	A specific region or location in the Great Lakes ecosystem that has a high concentration of native species.
		Ecological Resources	Ecosystem services, benefits that humans receive from natural resources.

<b>Economy</b>	Economic activities in the Great Lakes and in Michigan specifically.	Fisheries	Challenges commercial fishermen face and recent changes to the industry.
		Shipping	Impacts and benefits of the Great Lakes commercial shipping industry.
		Economy	General comments about Michigan's economy.
		Industry	Prevalent industries in Michigan and how they impact the economy.
		Development & Land Use	Impacts of development on local communities and natural ecosystems.
<b>Recommendations</b>	Specific ideas for policy or program recommendations that increase stewardship and protect biodiversity in the Great Lakes.	Recommendations	General ideas for new policy for programs.
		Policy Ideas	Specific new policy ideas for increasing stewardship, protecting biodiversity, or anything related.
		Science Communication	Increase science communication efforts, messaging, connecting scientific research with local communities.
		Educational Programs	Advancing existing educational programs or creating new programs.
		Sustainable Tourism	Ways to increase and drive sustainable tourism throughout the state.
		Collaboration	Mechanisms to increase collaboration between the state, community organizations, local units government, stakeholders, etc
		Managed Retreat	A last resort, planned process to move existing development away from the coast.
		Michigan Natural Features Inventory	Ideas that increase the role of MNFI in state conservation projects and planning.
		Public Awareness	Processes to educate people on certain programs, resources available, or issues affecting their community.
		Technology Needs	Existing programs that are lacking or not meeting their targets because of a lack of technology or capacity needed at the local level.
		Network Coordinator	Referring to a specific need for a role dedicated to enhancing connection between various programs, organizations, and agencies all working to achieve a common goal.

		State Bottomland Preserves	Comments related to the idea of turning the Great Lakes bottomlands into a State Park.
		Restoration	Where existing ecological restoration projects have enhanced community livelihoods, and recommendations for locations of new projects.
<b>Existing Policies</b>	Existing policies or programs in place currently protecting Michigan's natural resources.	Current Policies	Existing policies in place.
		Area of Concern	Specific geographic location denoted as an EPA Area of Concern.
		EPA	Federal policies regulated by the EPA.
		National Estuarine Research Reserve	Network of protected areas designated to research estuarine systems, established in partnership with NOAA and the state.
		Marine Protected Areas	Referring to an existing MPA, or possibilities for new MPAs.
<b>Local Units of Government</b>	Comments that reflect the role of local units of governments, challenges they face, and existing mechanisms for protection under jurisdiction.	Local Units of Government	Programs and issues within the jurisdiction of local units of government.
		Community Development	Locally led development initiatives.
		Local Leadership	Initiatives started and continued by local leaders.
		Public Access	The right to ensure access to the coastline, maintaining public property along the coast.
		Tribes	Specifically relating to Tribal communities.
<b>Case Studies</b>	Comments specifically related to a case study location, or from an interviewee with relation to the case study location.	Alpena	
		Muskegon	
		Sault Ste. Marie	



## ***Appendix E — Focus Group Protocol***

The same process was followed for all three Focus Groups.

### Focus Group #1

Date and time: Monday November 11th, 2:30 to 3:30pm

Location: Virtual

Who: Interviewees

### Goals & Objectives:

1. Receive Data regarding GIS layers
2. Receive Feedback on 3 Recommendations (collaborative discussion)
3. Review Themes and Request Chat Feedback (to see if there is anything missing)

### Agenda:

- 1:30 - 2 - Prep
- 2 - 2:30 - Tech set up
- 2:30 - 2:35 - Introduction and project summary
- 2:35 - 3:01 - GIS
- 3:01 - 3:28 - Recommend

### ***Process Agenda***

Time	Activities & Objectives	Setup & Materials
2 - 2:30  Set Up	<ul style="list-style-type: none"><li>• Get room organized</li><li>• Zoom checked</li></ul>	<ul style="list-style-type: none"><li>- On individual computers</li><li>- Cailin screenshare and record</li></ul>
2:30 - 2:35  5 min  Primary facilitator: Cailin  Secondary facilitator: Calvin	Introduction <ul style="list-style-type: none"><li>• Give everyone the chance to introduce themselves in the chat, explain we don't have time to go around and share names</li><li>• Goals and Objective slide</li><li>• Community guidelines</li><li>• Reminder/status/update of our project<ul style="list-style-type: none"><li>○ <i>Michigan the Beautiful</i> explanation</li></ul></li></ul>	

2:35 - 3:01 26 min  Primary facilitator: AiLi  Secondary facilitator: Ciara  Note takers: Alicia Lauren	GIS Presentation <ul style="list-style-type: none"> <li>• 5 mins for overview</li> <li>• 20 mins for feedback <ul style="list-style-type: none"> <li>○ 5 mins for poll everywhere</li> <li>○ Discussion</li> </ul> </li> </ul>	
3:01 - 3:28  27 min  Primary facilitator: Calvin  Secondary facilitator: Cailin  Note takers: Alicia Lauren	Recommendation feedback <ul style="list-style-type: none"> <li>• 1 mins mini agenda</li> <li>• 5 mins break down of themes <ul style="list-style-type: none"> <li>○ What are we missing? <ul style="list-style-type: none"> <li>■ Throw it in the chat, if you have a specific question raise your hand</li> </ul> </li> </ul> </li> <li>• 7 min Expanding Underwater Preserve System <ul style="list-style-type: none"> <li>○ (1 min explanation)</li> <li>○ (5 min poll feedback)</li> <li>○ (1 min “anyone care to share?)</li> </ul> </li> <li>• 7 min State Natural Areas <ul style="list-style-type: none"> <li>○ (1 min explanation)</li> <li>○ (5 min poll feedback)</li> <li>○ (1 min “anyone care to share?)</li> </ul> </li> <li>• 7 min Great Lakes Forever Pledge - bond <ul style="list-style-type: none"> <li>○ (1 min explanation)</li> <li>○ (5 min poll feedback)</li> <li>○ (1 min “anyone care to share?)</li> </ul> </li> </ul>	<b>3 proposed recommendations</b> = We feel the most strongly that these will end up being included, and they provide for the greatest opportunity for feedback and discussion <ol style="list-style-type: none"> <li>1. Here’s the recommendation</li> <li>2. Here are the questions</li> <li>3. Does anyone have any more comments on this recommendation before we move on to the next one?</li> </ol>
3:28 - 3:30  Wrap up  Primary facilitator: Cailin  Secondary facilitator: Calvin	<ul style="list-style-type: none"> <li>• Thank you for time and input</li> <li>• We will be back in touch...</li> <li>• Reach out in the meantime if you have more specific thoughts</li> </ul>	

## *Poll Everywhere Questions*

### *GIS*

Rank the follow spatial layers based on relevance and importance to Great Lakes stewardship and management:

1. Locations of fish spawning habitat
2. Locations of reefs
3. Locations of coastal wetlands
4. Locations of high risk erosion areas
5. Locations of marine protected areas
6. Locations of national sanctuaries
7. Locations of underwater preserves
8. Locations of Michigan recreational water trails
9. Locations of beach access points
10. Locations of areas of concern
11. Locations of shorelands
12. Locations of Michigan State Parks

Open discussion:

- Are you surprised at the highest ranked data?
- Are you surprised at the lowest ranked data?
- Is there any data that you feel like is excluded from our list or that doesn't exist that you'd find useful in your work?

### Recommendations

Recommendation 1: Expanding Underwater Preserve System

Recommendation 2: Coastal State Natural Areas

Recommendation 3: Great Lakes Forever Pledge with State Bond Program

Questions:

1. What is your reaction to this recommendation?
2. What impact would implementing this recommendation have from your perspective?
3. Do you see any unintended consequences of this recommendation?

Respondents answer in Poll Everywhere, then openly discuss.



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