SEAS SCHOOL FOR ENVIRONMENT AND SUSTAINABILITY
UNIVERSITY OF MICHIGAN

# Great Lakes Federal Marine Protected Areas: Designating and Managing for Success

## Client Organizations:

**National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries**
Ellen Brody (ellen.brody@noaa.gov)

**Parks Canada, Protected Areas Establishment and Conservation**
Scott Parker (scott.parker@pc.gc.ca)

## U-M SEAS Team:

**Graduate Student Team**
seas-greatlakesmpa@umich.edu

Alexis Rolling (rollinga@umich.edu), Cassandra McHugh (clmchugh@umich.edu),
Ian Stone (ianstone@umich.edu), Sophie Bryden (sbryden@umich.edu),
Willy Pevec (wpevec@umich.edu)

**Faculty Adviser**
Mike Shriberg (mshriber@umich.edu)

April 2024

# Disclaimer

Any opinions, statements, findings, recommendations, and conclusions we express within this report are solely those of the authors and do not necessarily reflect the positions, opinions, and policies of the National Oceanic and Atmospheric Administration (NOAA) or Parks Canada.

# Acknowledgements

We would first like to acknowledge that this project would not have been possible without the support of our wonderful family and friends.

We would like to thank our faculty advisor, Mike Shriberg, for his constant support and guidance throughout this project. Mike's expertise has played a crucial role in the project's development and our team's growth over the last 16 months. We value and appreciate his dedication to creating an enriching environment and for his unwavering belief in our team.

We would like to especially thank our clients, Ellen Brody and Scott Parker, and their respective employers, NOAA and Parks Canada, for entrusting us with this project. Ellen and Scott's vision, advice, and collaboration have been integral to the success of our project, and we appreciate how welcoming and supportive both have been. We would also like to thank the National Marine Sanctuary Foundation and the Cooperative Institute for Great Lakes Research for their funding support.

We would like to extend our gratitude to everyone that we spoke to throughout our project, particularly our interviewees. Their participation and contributions of time, perspectives, and knowledge were invaluable. This project would not have been possible without their support. We value our collaborators' and interviewees' enthusiasm for the Great Lakes and hope to embody that kind of passion in our future endeavors.

Finally, we would like to thank the University of Michigan School for Environment and Sustainability for providing the institutional foundation and funding for our project.

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# Common Abbreviations and Acronyms

**CBD:** UN Convention on Biological Diversity
**CNMCAA**: Canada National Marine Conservation Areas Act
**FFNMP**: Fathom Five National Marine Park
**GBF:** Kunming-Montreal Global Biodiversity Framework
**GLFC**: Great Lakes Fisheries Commission
**GLIFWC**: Great Lakes Indian Fish and Wildlife Commission
**GLPAN**: Great Lakes Protected Areas Network
**GLRI**: Great Lakes Restoration Initiative
**GLWQA**: Great Lakes Water Quality Agreement
**IJC**: International Joint Commission
**IUCN**: International Union for the Conservation of Nature
**KBIC:** Keweenaw Bay Indian Community
**LAMP**: Lakewide Action Management Plans
**LSMNCA**: Lake Superior National Marine Conservation Area
**MPA**: Marine Protected Area
**NL**: National Lakeshore
**NMCA**: National Marine Conservation Area
**NMS**: National Marine Sanctuary
**NMSA**: National Marine Sanctuaries Act
**NOAA**: National Oceanic and Atmospheric Administration
**NP**: National Park
**NPS**: National Park Service
**OECM**: Other Effective Area Based Conservation Measures
**PA**: Protected Area
**PC**: Parks Canada
**RFI**: Request for Information
**SAC**: Sanctuary Advisory Council
**SON**: Saugeen Ojibway Nation
**TBNMS**: Thunder Bay National Marine Sanctuary
**US:** United States
**WSCNMS:** Wisconsin Shipwreck Coast National Marine Sanctuary

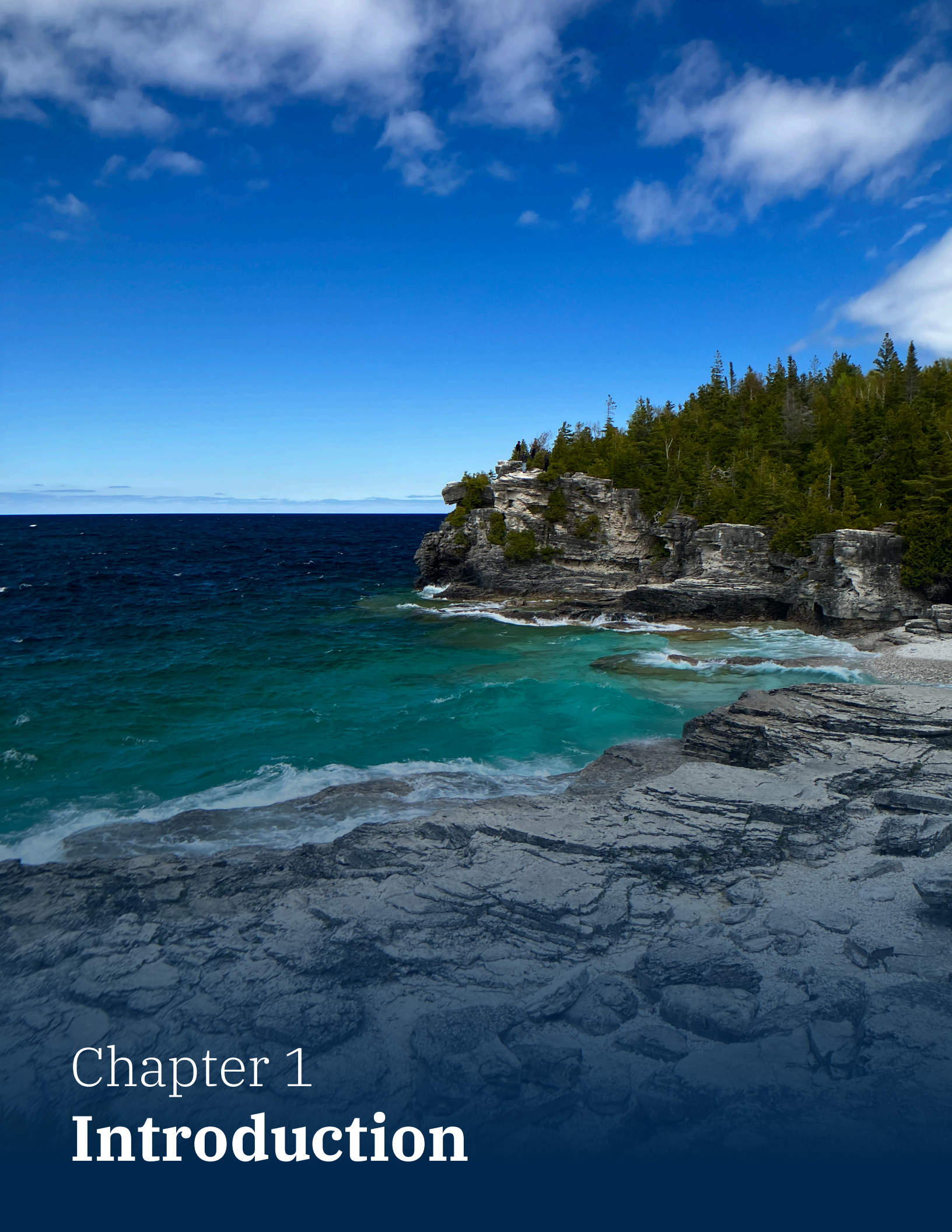
# Executive Summary

As the world's largest surface freshwater system, the Laurentian Great Lakes provide essential habitats to thousands of species, drinking water for over 40 million people, and significant economic and cultural value to the residents of Canada, the US, and Indigenous Nations. To address biodiversity loss, Canada and the US have each committed to protecting 30% of lands, marine waters, and freshwater by 2030 (i.e., 30x30) through the Global Biodiversity Framework and America the Beautiful initiative, respectively. US and Canadian progress towards achieving 30x30 targets in freshwater systems lags behind progress in oceans. Marine protected areas (MPAs) are one of many strategies both the US and Canada have deployed to protect aquatic ecosystems and cultural resources and could be a significant tool for achieving 30x30 targets in the Great Lakes.

We worked with the National Oceanic and Atmospheric Administration (NOAA) and Parks Canada to evaluate how their Great Lakes MPA programs are positioned to achieve 30x30 targets. Our primary goals were to (1) assess the values federal MPAs currently provide for the Great Lakes and (2) evaluate ways for NOAA and Parks Canada to achieve a more cohesive, collaborative, and effective Great Lakes MPA network. As part of an integrated evaluation, we reviewed agency, academic, and gray literature; conducted 33 semi-structured interviews with agency staff, researchers, environmental advocacy leaders, citizens of Indigenous Nations, and local stakeholders; and developed supporting maps. To create evaluation criteria, we reviewed and synthesized nine existing protected area evaluation frameworks. Our analysis focused on NOAA's National Marine Sanctuaries (NMSs) and Parks Canada's National Marine Conservation Areas (NMCAs).

Reviewing NOAA's and Parks Canada's MPA program goals, we found that while each agency's national goals generally align with 30x30 goals, the agencies have opportunities to develop a set of binational outcomes specific to the Great Lakes. We observed consistent support for the agencies' bottom-up approaches to siting and designation. However, the agencies have an opportunity to advance connectivity by developing a regional strategy concerning other effective area-based conservation measures (OECMs), which achieve conservation outcomes without having express conservation goals. Additionally, while NOAA's and Parks Canada's informal and formal partnerships with other organizations are important for governance, the agencies can strategically build on existing partnerships (e.g., with fishery managers) to expand the conservation impact of MPAs. Monitoring and evaluation of MPAs is critical for adaptive management and demonstrating conservation outcomes, but existing monitoring programs are resource-limited. NOAA and Parks Canada can supplement monitoring programs through strategic qualitative evaluations, academic partnerships, and emerging technologies. Finally, although Great Lakes MPAs provide significant educational and research benefits, opportunities exist to expand educational outreach to urban communities and promote research that advances climate change mitigation, fisheries management, and demonstrating conservation performance.

While MPAs benefit Great Lakes ecosystems and communities, the full potential of MPAs remains largely untapped. We hope our report will help NOAA and Parks Canada bolster their strategies to reach conservation goals and demonstrate the value of MPAs in the Great Lakes.



Chapter 1

# Introduction

Shared by Canada, the United States (US), Indigenous Nations, eight US states, and two Canadian provinces, the Laurentian Great Lakes are the world's largest freshwater system and provide essential economic, ecological, and cultural benefits to the region. The Great Lakes are the drinking water source for over 40 million people and are the backbone for a $6 trillion regional economy, of which the lakes are directly responsible for more than 1.5 million jobs and $60 billion in wages annually (Great Lakes Commission [GLC], 2024). The Great Lakes ecoregion supports more than 3,500 plant and animal species, including 139 native fish species, many of which are unique to the region, and serves as a migration corridor for hundreds of bird species (GLC, 2024; Great Lakes Fishery Commission [GLFC], 2024a; Youngman, et al., 2017). Beyond their economic and ecological value, the Great Lakes have remained culturally significant to the region's residents since humans first migrated to the region. More than 120 Indigenous Nations and tribes have resided in the basin for centuries, preceding European colonization, and these nations have maintained cultural, spiritual, subsistence, and economic ties to the Great Lakes (Anishinabek, 2015).

Despite their value, the Great Lakes, their ecosystems, and their surrounding communities face multiple threats, such as climate change, inequitable access to nature areas, habitat loss and biodiversity decline, aquatic invasive species, pollution, and development. The risks posed by each threat have changed over time and continue to change. While Canada and the US have remediated several legacy toxic chemical releases within Areas of Concern (AOCs) - sites officially designated as degraded (see Figure 1) - the risks from many pollutants, such as excess nutrients and emerging contaminants, persist and, in some cases, are intensifying (International Joint Commission [IJC], 2023). Due to increasing development and hardening of shore infrastructure, the lake's natural shorelines are disappearing at an "alarming rate" (IJC, 2023). Of the 139 native fish species in the Great Lakes, 61 species are considered threatened or endangered by at least one of the lakes' governing institutions (GLFC, 2024a). Many of these threats are interconnected. For example, climate change, pollution, and habitat loss can all lead to biodiversity decline, and the resulting loss of species can in turn adversely affect Indigenous Nations and local communities that rely on healthy fisheries.

Canada and the US have employed several strategies to protect Great Lakes water quality, ecosystems, and resources from threats. One strategy that is crucial yet undervalued is establishing Marine Protected Areas (MPA). MPAs conserve the existing values of an aquatic area, such as species, critical habitats, and cultural resources, through active site management and restrictions on certain harmful activities, similar to a terrestrial national park (NP). As the old proverb goes, "an ounce of prevention is worth a pound of cure." In the context of ecology, research supports that proverb: "the most cost-effective way to ensure the maintenance of ecological function in a landscape is to avoid degrading the landscape in the first place" (IPBES, 2019). While restoration is necessary to improve the ecosystem health of AOCs and other degraded areas of the Great Lakes, establishing MPAs is essential for conserving the Great Lakes ecosystems that have not been degraded by human actions. However, MPAs are not just beneficial for conserving existing ecosystems and resources, for MPAs can also provide benefits to communities and ecosystems in areas that have dealt with legacy threats. Besides their conservation value, MPAs have brought economic resources to communities, generated research opportunities, and promoted education and awareness concerning aquatic ecosystems (Marcos, et al., 2021).

Beyond local and regional efforts to conserve Great Lakes resources and ecosystems, nations have signed the Global Biodiversity Framework (GBF), an international agreement committing each signatory nation to protect 30% of its land and waters by 2030 (i.e., 30x30 goals). We discuss these 30x30 conservation goals in greater depth in Chapter 2, but it is important to note that both Canada and the US have committed to their own 30x30 goals, even though the US is not an official signatory to the GBF. In addition to setting conservation targets, the GBF defines essential elements that conservation areas must possess to be counted towards a nation's 30x30 target. These elements include equitable governance, ecological representativeness, connectivity, recognition of Indigenous and traditional rights and lands, and demonstrated biodiversity conservation outcomes (United Nations [UN], 2022a). Because designating MPAs within the Great Lakes is a key part of Canadian and US efforts to achieve their respective 30x30 conservation goals, we seek to assess how well the current system of Great Lakes MPAs aligns with 30x30 goals what opportunities exist for MPA management agencies to advance their MPAs towards the 30x30 targets.


**Figure 1.** Map showing Canadian and US AOCs in the Great Lakes region. As the legend indicates, stars indicate AOCs that have been delisted, triangles indicate AOCs "in recovery," and circles indicate AOCs that are not yet in recovery (IJC, 2021).

## 1.1 - Background on MPAs

The International Union for the Conservation of Nature (IUCN) has established broadly accepted definitions for conserved and protected areas (PAs). “Conserved areas” is a broader term, encompassing both PAs and other effective area-based conservation measures (OECMs). Per the IUCN, a PA is a “clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values” (Protected Planet, 2024). Each component of this definition effectively establishes a criterion by which to measure whether the IUCN would consider a conserved area a PA. For example, “clearly defined” implies that a PA has a demarcated border, whereas “recognized” indicates that a PA has an identified and accepted governing body. An OECM is a “geographically defined area other than a PA, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in-situ conservation of biodiversity, with associated ecosystem functions and services and where applicable, cultural, spiritual, socio–economic, and other locally relevant values” (UN, 2018). Conservation organizations have begun considering OECMs in their accounting to formally recognize the conservation contributions of areas not considered traditional PAs. Potential OECMs might include conservation easements within an agricultural field or well-managed fisheries. The core difference between PAs and OECMs is that PAs have an explicit primary conservation objective, whereas OECMs deliver conservation outcomes, regardless of the area’s management objective (Lemieux et al., 2022). Nations can establish PAs and OECMs for any ecosystem. Some PAs are entirely terrestrial, some are primarily terrestrial but have boundaries and regulations that extend into a water body, and other PAs are wholly aquatic, which the IUCN would consider MPAs.

Definitions of what types of areas constitute an MPA vary. The Canadian government considers an MPA as part of the ocean or Great Lakes that is “legally protected and managed to achieve long-term conservation” (Fisheries and Oceans Canada, 2023). In an executive order calling for expansion of the US MPA system, the Clinton administration provided a similar MPA definition: “any area of the marine environment (including the Great Lakes) that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein” (Exec. Order No. 13158, 2000). The IUCN has defined an MPA as an area in a marine or freshwater environment that meets all the criteria within the PA definition (Day, et al., 2012). Various characteristics of the aquatic environments make defining and delineating MPAs more difficult than doing so for terrestrial PAs. These characteristics include vertical variation along the water column, multiple jurisdictions covering different parts of the water column, currents and tides, lack of visibility of conserved features, boundary demarcation, and connectivity (Day, et al., 2012). We should note that “MPA” is a catch-all term that includes PAs in freshwater lakes and estuaries, even though these areas are not technically in the “marine environment.” For the purposes of our report, we use the IUCN definition for an MPA: an area in a marine or freshwater environment that is a “clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values” (Protected Planet, 2024).

Not all PAs and MPAs have the same goals, and PAs and MPAs vary widely in terms of their conservation objectives and levels of protection. Given this variation, conservation groups have

found it helpful to organize PAs and MPAs into different categories. The IUCN PA categories, as presented in Table 1, are one of most widely used standards for organizing PAs and MPAs. Although the IUCN originally defined these categories in 1994, various organizations still use the categories to account for PAs and MPAs. For example, the Protected Planet conservation database, administered by the IUCN and UN Environment Program, employs the IUCN categories to indicate each site's general management objective. One key characteristic related to level of protection and unique to MPAs, is how much fishing is permitted. Some MPAs prohibit fishing entirely (i.e., "no-take" areas), some MPAs allow small-scale subsistence fishing with gear restrictions, and other MPAs allow significant commercial fishing activities with few restrictions. Additionally, PAs and MPAs do not just conserve ecological and natural features. The US and Canada have designated several PAs and MPAs with the intent of conserving cultural and historical sites, such as battlefields and shipwrecks, and areas with geological significance.

**Table 1.** Summary descriptions of IUCN management categories (Dudley, 2008).

| IUCN Category | Category Description |
|---|---|
| Ia<br>Strict Nature Reserve | "Strictly protected for biodiversity and also possibly geological/ geomorphological features, where human visitation, use and impacts are controlled and limited to ensure protection of the conservation values." |
| Ib<br>Wilderness Area | "Usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, protected and managed to preserve their natural condition." |
| II<br>National Park | "Large natural or near-natural areas protecting large-scale ecological processes with characteristic species and ecosystems, which also have environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities." |
| III<br>Natural Monument or Feature | "Areas set aside to protect a specific natural monument, which can be a landform, sea mount, marine cavern, geological feature such as a cave, or a living feature such as an ancient grove." |
| IV<br>Habitat or Species Management Area | "Areas to protect particular species or habitats, where management reflects this priority. Many will need regular, active interventions to meet the needs of particular species or habitats, but this is not a requirement of the category." |
| V<br>Protected Landscape or Seascape | "Where the interaction of people and nature over time has produced a distinct character with significant ecological, biological, cultural and scenic value: and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values." |
| VI<br>Protected Areas with Sustainable Use of Natural Resources | "Areas which conserve ecosystems, together with associated cultural values and traditional natural resource management systems. Generally large, mainly in a natural condition, with a proportion under sustainable natural resource management and where low-level non-industrial natural resource use compatible with nature conservation is seen as one of the main aims" |

Within the Great Lakes Basin, Canada, the US, states, and provinces have all designated a variety of sites that can be considered either a PA or MPA. Currently, 27% of the Great Lakes coastline and 9.4% of Great Lakes waters fall within some sort of PA (GLPAN, 2021). On the US side of the border, the National Oceanic and Atmospheric Administration (NOAA) currently administers four Great Lakes MPAs: two National Marine Sanctuaries (NMS) (with two additional proposed NMS) and two National Estuarine Research Reserves (NERRs) (with one additional proposed NERR). The NMS sites cover large expanses of open aquatic habitats, whereas the NERRS conserve coastal wetlands and small strips of coastal waters (NOAA Office of Coastal Management, n.d.-a; NOAA Office of Coastal Management, n.d.-b). The US National Park Service (NPS) manages National Lakeshores (NLs) and two National Parks (NPs) in the Great Lakes. While the NLs are predominantly terrestrial, the boundaries of one of the NP sites, Isle Royale, extend 7.24 km (4.5 miles) into Lake Superior (NPS, 2016). Several US states manage state bottomland preserves along the lakeshores, but these preserves only cover the submerged lands of the lake.

In Canada, Parks Canada administers most of the Canadian Great Lakes MPAs, which comprise NPs and National Marine Conservation Areas (NMCAs), including Fathom Five National Marine Park and Lake Superior NMCA, both of which cover significant extents of open aquatic habitat (Parks Canada Agency, 2024). Additionally, the Canadian Wildlife Service administers some small National Wildlife Areas, intended to conserve wildlife and their habitats, and Ontario oversees 30 provincial parks along the Great Lakes that seek to conserve species and habitats and offer recreational and educational opportunities (Government of Ontario, 2023). None of the Canadian Wildlife Areas or Ontario provincial parks include significant portions of the lakes. In Figure 2, we provide a map of all these PAs and MPAs, along with the corresponding type of governing institution (federal, state, or other) for each area, and, in Figure 3, we provide a similar map and show the IUCN category for each site.

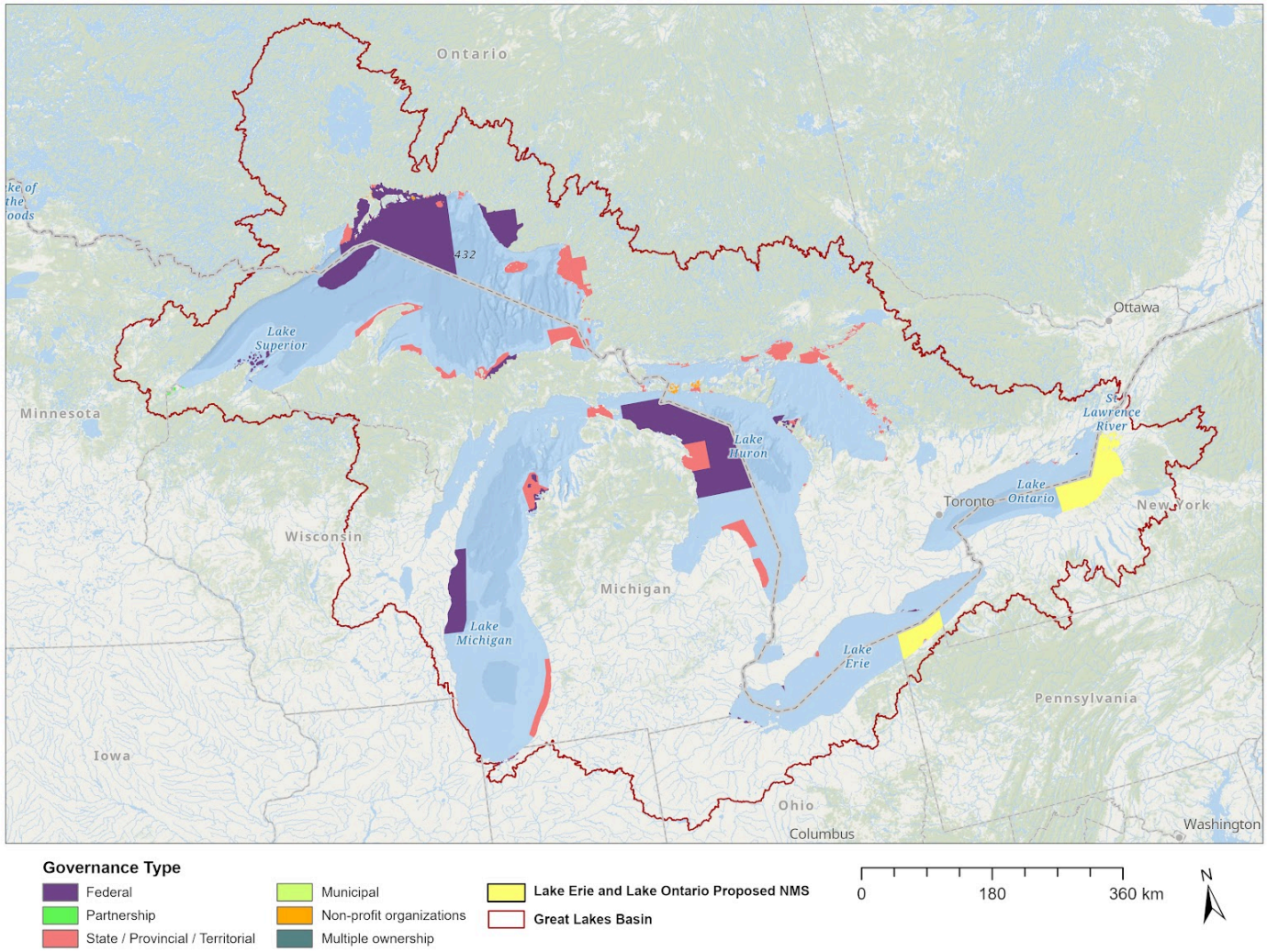



**Figure 2.** Map of Great Lakes PAs and MPAs indicating the type of governing institution for each site (Sources: MPA Inventory, 2024; CPCAD, 2024; NOAA, 2024; Great Lakes Commission, 2022).

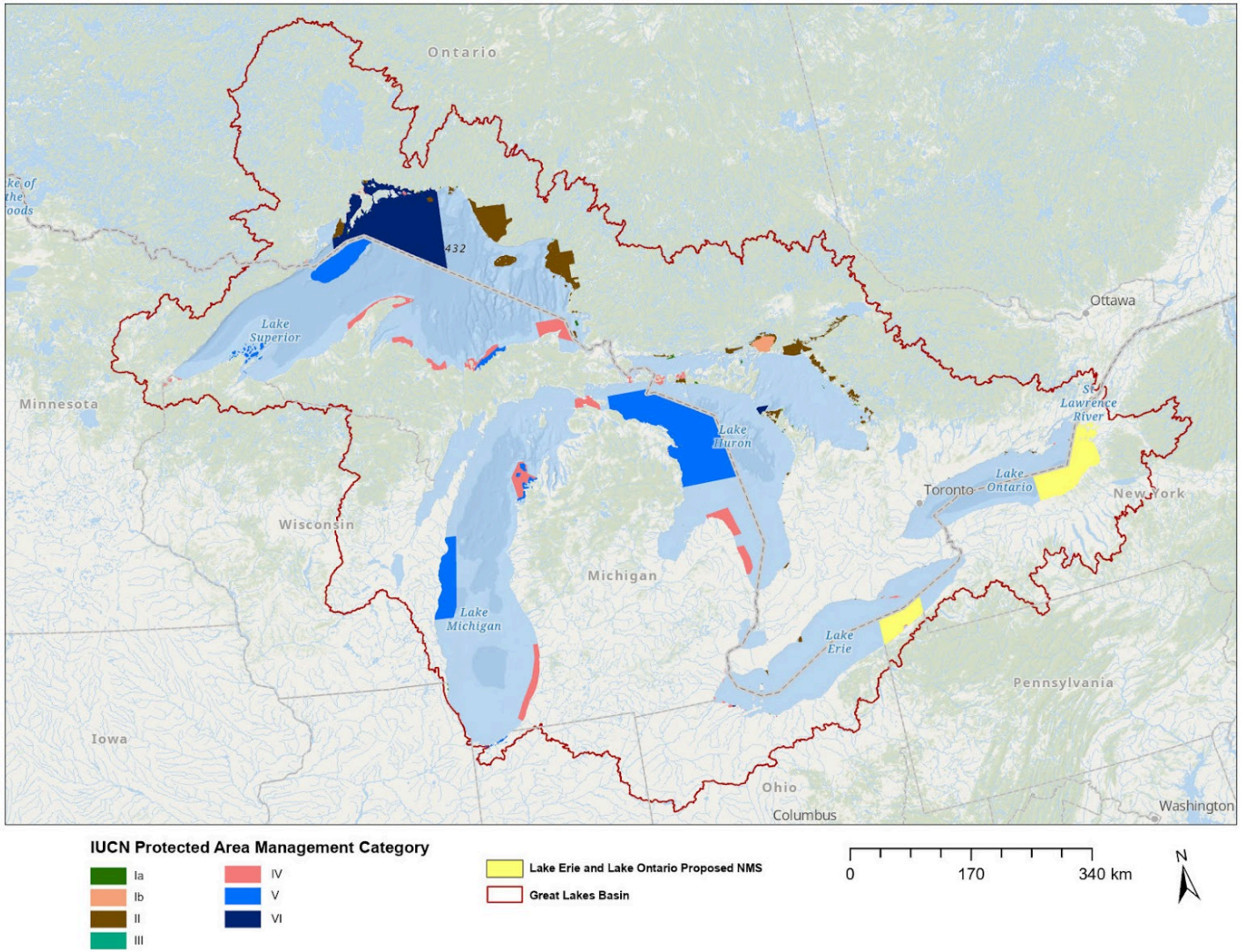



**Figure 3.** Map of Great Lakes PAs and MPAs indicating the IUCN category for each site (Sources: MPA Inventory, 2024; CPCAD, 2024; NOAA, 2024; Great Lakes Commission, 2022).

Because our clients represent federal agencies (NOAA and Parks Canada), we have focused our analysis on federal MPAs within the Great Lakes (Figure 4). In other words, we focus on conservation areas that meet the IUCN's PA definition and have some form of primary aquatic conservation objective. The sites that meet these criteria include:

- Thunder Bay National Marine Sanctuary (NOAA)
- Wisconsin Shipwreck Coast National Marine Sanctuary (NOAA)
- Lake Superior National Estuarine Research Reserves (NOAA)
- Isle Royale National Park (NPS)
- Lake Superior National Marine Conservation Area (Parks Canada)
- Fathom Five National Marine Park (Parks Canada)

Although Isle Royale NP is predominantly a terrestrial PA, we elected to include Isle Royale NP as an MPA due to the park's 4.5-mile extent into the surrounding waters and submerged lands and the park's aquatic conservation objectives (NPS, 2016). Additionally, as shown in most of the maps in this report, NOAA and local community partners have proposed two new NMS sites - one in Lake Erie and the other in Lake Ontario. We have not expressly considered those sites in our analysis since the designation process for both proposed NMS sites are in progress.

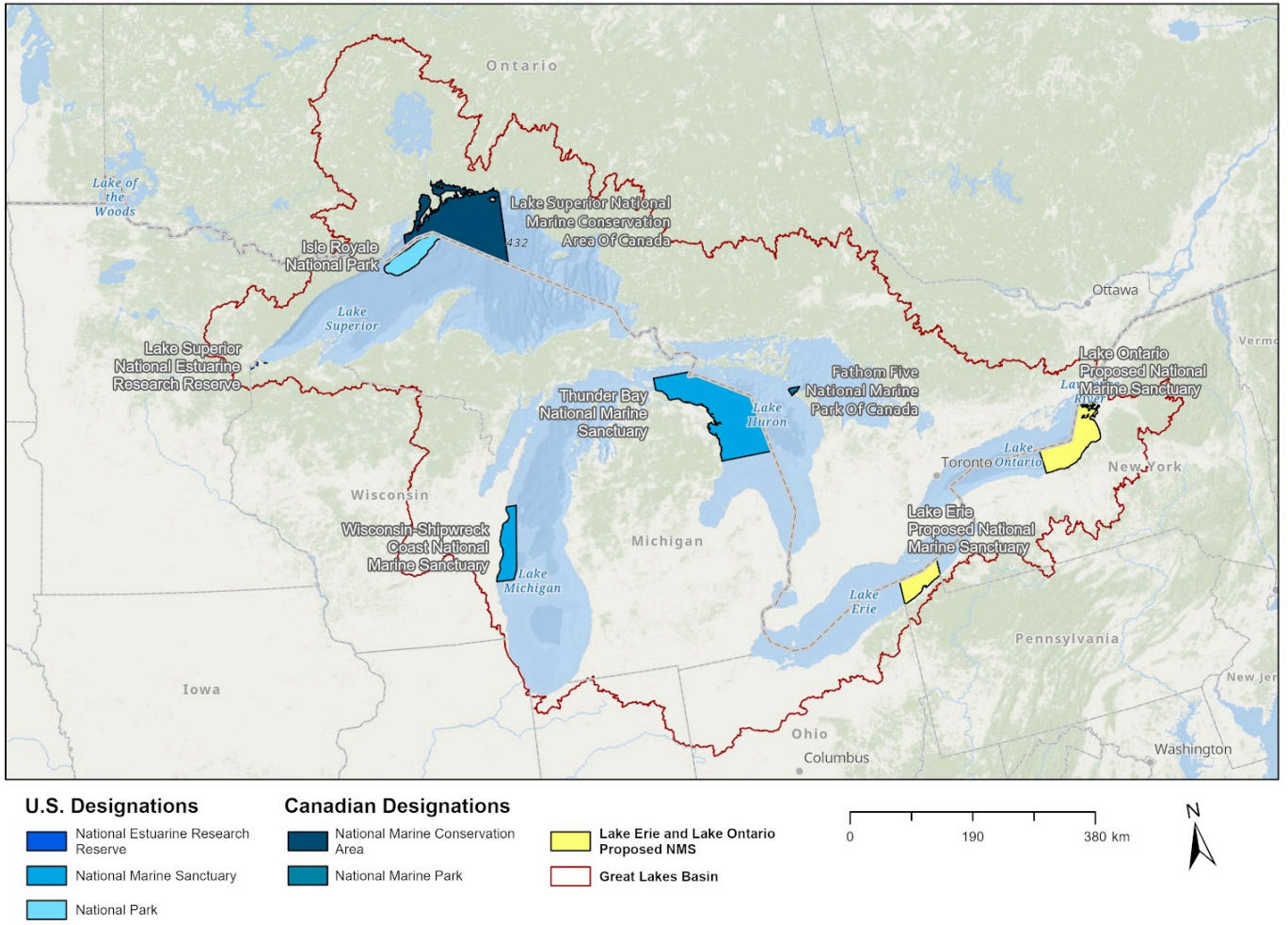



**Figure 4.** Map of Federal Great Lakes MPAs that we focus our analysis on (Sources: MPA Inventory, 2024; CPCAD, 2024; NOAA, 2024; Great Lakes Commission, 2022).

## 1.2 - Project Goals and Objectives

The overarching goals of this project were to assess the values federal MPAs currently provide for the Great Lakes and evaluate ways for NOAA and Parks Canada to achieve a more cohesive, collaborative, binational and effective Great Lakes MPA network, with enhanced involvement of local communities and Indigenous Nations. We established these goals within the context of national 30x30 conservation targets and used corresponding conservation frameworks to evaluate the MPA systems. Through achieving our goals, we hoped to assist NOAA and Parks Canada with demonstrating the value of MPA designation and management for communities and ecosystems and increasing public and decision maker awareness of the benefits of Great Lakes MPAs. We defined three main objectives to help us achieve our project goals:

- Objective 1: Recommend comprehensive strategies for NOAA and Parks Canada to enhance MPA management by documenting best practices and identifying approaches for each agency to integrate those practices to better protect the Great Lakes.
- Objective 2: Expand each NOAA's and Parks Canada's knowledge of how ecological connectivity, cross-border MPAs, and collaborative governance can help promote ecological value within the Great Lakes and help each agency achieve 30x30 conservation goals.
- Objective 3: Provide insights to NOAA and Parks Canada on the systems and tools needed (1) to enhance engagement with local stakeholders (residents, city government officials, business owners, etc.) and (2) to advance the involvement of Indigenous nations in management processes.

## 1.3 - Summary of Methods

We employed three research methods to evaluate NOAA's and Parks Canada's MPA programs in the Great Lakes: (1) a literature review, (2) semi-structured interviews, and (3) geospatial mapping. The literature review served as the foundation for our analysis, and the interviews and geospatial mapping provided commentary, examples, and illustrations to support and extrapolate on information from the literature review.

### 1.3.1 - Literature Review

We defined three objectives for our literature review:

1. Develop comprehensive background information concerning the Great Lakes MPA programs administered by NOAA and Parks Canada, as well as other agencies.
2. Develop a set of MPA evaluation criteria to assess the performance of NOAA's and Parks Canada's existing Great Lakes MPA programs.
3. Synthesize recommendations for enhancing Great Lakes MPA governance from other external program evaluations, academic literature, and gray literature.

Achieving each objective required a different analysis method. As a result, we employed three distinct sets of analysis procedures to achieve our three literature review objectives. We provide a complete description of the literature review methods in Appendix A. Additionally, each of our literature review objectives concerned a different set of documents:

1. Literature Review Objective 1: We read federal statutes relevant to the MPA programs; formal program-wide policies (e.g., NOAA and Parks Canada regulations); informal program-wide guidance documents, covering topics like management plan development, stakeholder consultation, advisory council establishment, and Indigenous partnership development or consultation; and MPA-specific documents, such as management plans and visitor use management plans.

2. Literature Review Objective 2: We reviewed past MPA program evaluations and frameworks for assessing the effectiveness and performance of PAs and PA governance.

3. Literature Review Objective 3: We read academic and gray literature concerning aquatic conservation, community and stakeholder engagement, Great Lakes transnational resource management, and other topics related to MPA governance.

### 1.3.2 - Interviews

We conducted semi-structured interviews with respondents from across the Great Lakes region and across a range of backgrounds and technical expertise for two primary reasons:

1. We aimed to elicit information that could not otherwise be gleaned from the literature, such as attitudes towards past and present aspects of MPA management; perspectives on how agencies actually carry out management plans; and views on the future directions of MPAs in the Great Lakes.

2. We conducted interviews with community members, stakeholders from local industries, and local officials that have been involved with or missing from MPA designation and management processes in the Lake Superior Basin. Given time and budget limitations, we focused our stakeholder interviews around Lake Superior to gather insights about existing and possible proposed sites in both the US and Canada. The Lake Superior Basin offered a variety of MPA structures and was feasible for our team to travel to.

We selected interviewees through a combination of key informant and snowball sampling (i.e., an initial respondent identifies potential participants who meet project criteria). We sought interviewees from the US, Canada, and Indigenous tribes and First Nations with the following five backgrounds: (1) academia, (2) government agency staff, (3) citizens of Indigenous nations, (4) environmental NGO leaders, and (5) local community and business stakeholders from the Lake Superior region. Our interviewees comprised a range of technical expertise including geospatial data science, policy, advocacy, ecology, archaeology, engineering, and business. We selected respondents covering this breadth of locations, backgrounds, and expertise to cover the scope of work of NOAA's and Parks Canada's MPA programs and to encompass the key groups potentially affected by MPAs. We placed emphasis on selecting participants in the west-central Lake Superior basin to limit the geographic scope for in-person interviews. Our faculty advisor and client leads facilitated initial connections with most of our interviewees. In total, we

conducted 33 semi-structured interviews. We report a breakdown of our interviewees based on background and national identity in Table 2.

**Table 2.** Breakdown of interviewees based on background and nation.

| | NGO/Academia | Agency | Stakeholder | Indigenous | **Total** |
|---|---|---|---|---|---|
| Canada | 1 | 6 | 1 | 1 | **9** |
| Indigenous | 1 | 1 | - | - | **2** |
| US | 8 | 9 | 4 | 1 | **22** |
| **Total** | **10** | **16** | **5** | **2** | **33** |

We performed an informal qualitative analysis of the transcripts from our interviews to extract major themes and identify observations that supplemented our literature review. We used Dedoose, a qualitative analysis software, to perform that work. We provide a complete description of our interview methods in Appendices B, C, and D.

### 1.3.3 - Geospatial Mapping

To support our literature review and interview analyses, we developed several maps using ArcGIS Pro. We used layers from the Protected Areas Database of the US (PAD-US), Canadian Protected and Conserved Areas Database (CPCAD), MPA Inventory, Great Lakes Commission, and ESRI to develop our maps. We compiled and interpreted existing layers to illustrate concepts and ideas. At various points throughout the report, we have inserted maps to support the text. Due to time and resource limitations, we did not collect any new geospatial data or perform original GIS analyses.

### 1.3.4 - Bridging Our Methods

Through our three analysis methodologies, we identified which MPA designation and management practices have historically been and are currently effective for achieving 30x30 conservation goals and proposed strategies for NOAA and Park Canada to demonstrate the values of their MPA programs to the public and decision makers. By assessing the federal Great Lakes MPAs from multiple angles, we developed a deeper understanding of the benefits of MPAs as well as a list of opportunities for each agency to improve its designation and management practices. Figure 5 depicts the structure of our program evaluation methodology.

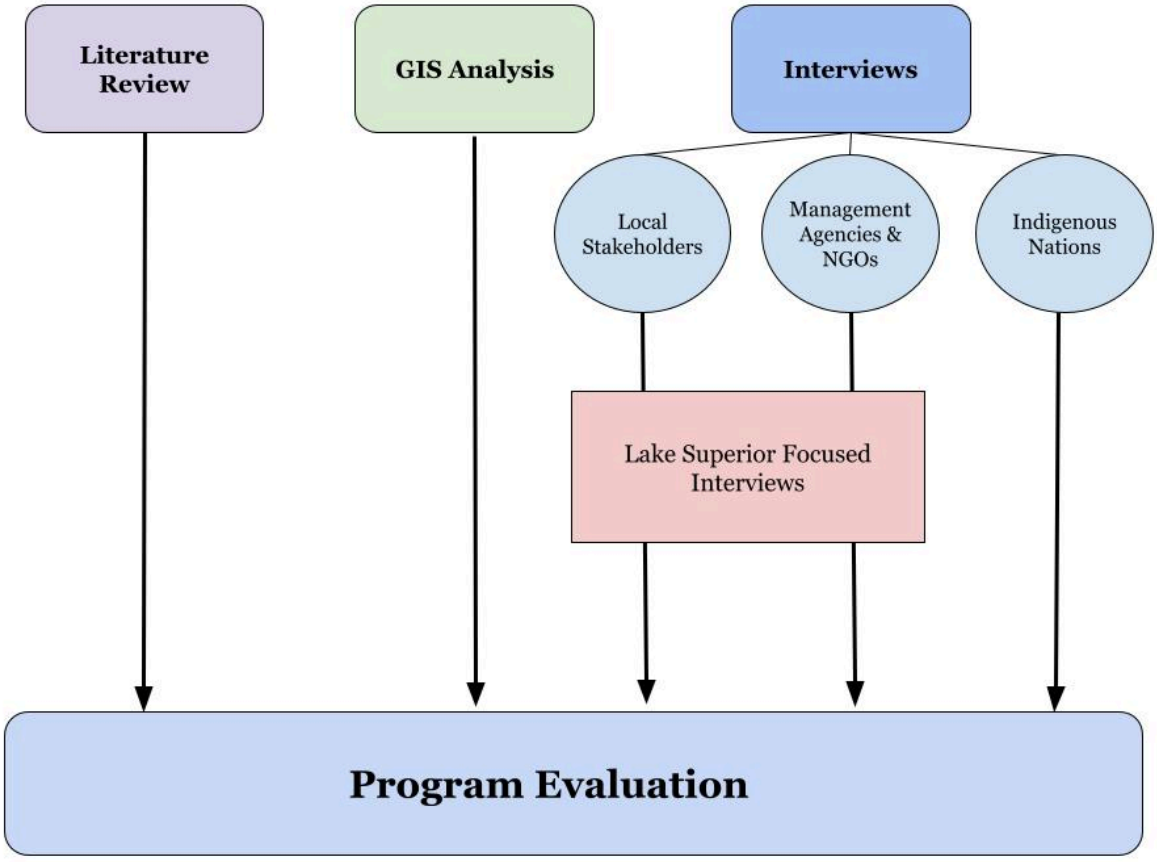



**Figure 5.** Program evaluation methodology structure showing how the literature review, geospatial data analysis, and interviews relate to one another and inform the overall program evaluation.

As shown in Figure 5 and as briefly discussed in Section 1.3.2, we focused on the Lake Superior basin for our interviews with local stakeholders and with some MPA management agency staff. In the early stages of our project, we had intended to analyze Great Lakes MPAs using a case study of Lake Superior because the lake hosts a NMCA, a NP, a NERR, and a potential NMS. That variety of sites offered a promising opportunity to compare different management agencies in the least environmentally impacted Great Lake. However, the body of academic literature specific to Lake Superior was limited, and because NOAA does not have any officially proposed or established NMS sites in Lake Superior, there were no NOAA interviewees with direct management experience concerning Lake Superior. Additionally, focusing entirely on Lake Superior may have caused us to overlook cases for MPAs closer to urban sites and other more degraded portions of the Great Lakes. For these reasons, we decided to adjust our approach and focus on the Great Lakes Basin as a whole, but we have still drawn examples from our interviews with Lake Superior basin interviewees throughout the report.

### 1.3.5 - Limitations

Our primary limitations were time and resources. Given these time and resource constraints, we limited our literature review to the documents most relevant to our project goals, so the literature analysis did not consist of a systematic review that encompassed the entire body of literature

concerning MPAs. As noted in Section 1.3.2, we also limited the geographic scope of our interviews because we only had a few weeks over the Summer 2023 to perform in-person interviews. Additionally, our interviewees did not comprise a representative sample of MPA stakeholders, in terms of both types of interviewees and proportions of interviewees. In particular, members of Indigenous Nations are underrepresented among our interviewees. Due to our small sample size (33 total interviews) and the non-representative distribution of interviewees, we did not perform a rigorous formal quantitative analysis of the interview transcripts. Because NOAA and Parks Canada have not fully designated NMSs or NMCAs in Lake Erie or Lake Ontario, the examples in our evaluation primarily focused on Lake Superior, Lake Huron, and Lake Michigan.

We also acknowledge that we are graduate students. Developing this report has served as an incredible learning experience, but we are not MPA professionals with years of experience in aquatic conservation and policy. While we relied on academic literature, agency documentation, and the expertise of our interviewees to perform our evaluation, this report represents our understanding and interpretations of NOAA's and Parks Canada's MPA programs in the Great Lakes.

## 1.4 - Report Structure

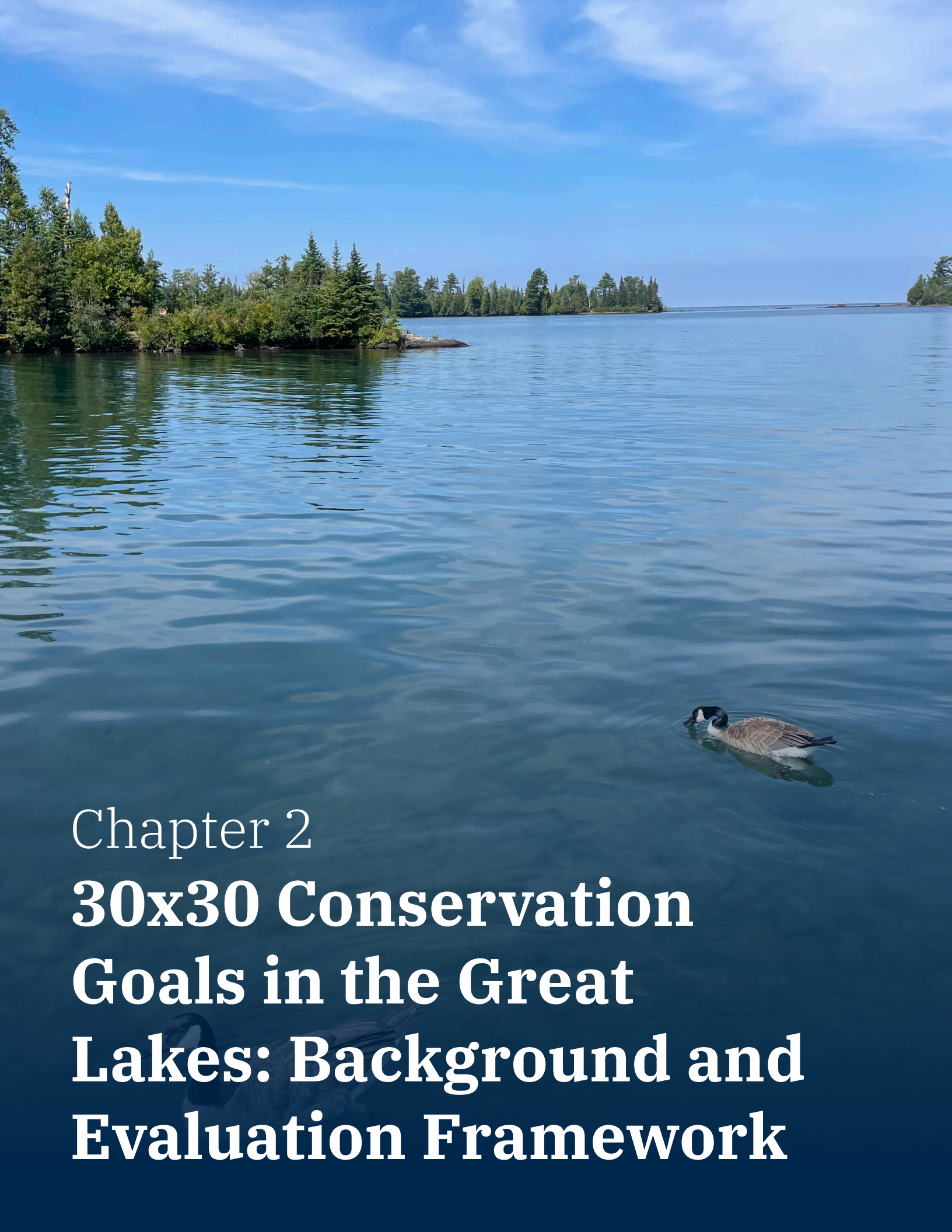
The first three chapters of this report, including the Introduction, establish the foundation for our assessment of Great Lakes MPAs. In Chapter 2, we begin by discussing international and national goals to conserve 30% of lands and waters by 2030 (i.e., 30x30 goals). We also review several frameworks for evaluating progress towards achieving those 30x30 goals and propose a synthesized evaluation framework for the Great Lakes. In Chapter 3, we describe current and emerging threats to Great Lakes ecosystems, resources, and lakeshore communities and discuss how MPAs serve as a tool to address those threats. This discussion of MPAs as a tool to address threats establishes the context for the subsequent chapters.

The synthesized evaluation framework from Chapter 2 serves as the backbone for Chapters 4 through 8, which we briefly summarize below. In each of these chapters, we first discuss the current status of NOAA's and Parks Canada's MPA programs, focusing on a single category from our evaluation framework. We then assess how well the MPA programs align with the criteria in that category. We close each chapter by presenting opportunities for NOAA and Parks Canada to advance their programs towards the 30x30 conservation goals laid out in our evaluation framework.

- Chapter 3 describes the major threats to the Great Lakes and frames how MPAs are positioned to help address these threats.
- Chapter 4 covers the goals and priorities of MPAs currently established in the Great Lakes, how these goals can better align with the 30x30 goals, and opportunities to advance MPA goals.
- Chapter 5 summarizes NOAA's and Parks Canada's current approaches to MPA design and planning in the Great Lakes. This discussion covers the nomination, designation, and establishment processes for NMSs and NMCAs.
- Chapter 6 discusses the current state of Great Lakes MPA governance. This discussion covers NOAA's and Parks Canada's approaches to management plan implementation,

regulations and zoning, federal partnerships, Indigenous partnerships, international collaboration, community participation, and financial/staffing resources.
- Chapter 7 presents the current monitoring and evaluation programs for Great Lakes MPAs and discusses how those programs align with 30x30 goals.
- Chapter 8 uses information from our literature review and interviews to describe how Great Lakes MPAs are currently achieving and demonstrating conservation and social outcomes.

We conclude our report in Chapters 9 and 10 by compiling a set of opportunities for NOAA and Parks Canada to consider to enhance the value their MPA programs provide for the Great Lakes and to advance towards 30x30 conservation goals. These synthesized actions draw from the opportunities we discuss in Chapters 4 through 8, and we organize this section based on near-term and long-term opportunities.



Chapter 2

# 30x30 Conservation Goals in the Great Lakes: Background and Evaluation Framework

To prompt urgent action to reverse biodiversity loss, nations around the world have adopted major global conservation goals (WWF and IUCN WCPA, 2023). This chapter outlines the Kunming-Montreal Global Biodiversity Framework (GBF), which defines the 30x30 conservation goals, and the America the Beautiful initiative, developed by the Biden Administration as the US approach to the GBF. Subsequently, we examine how the National Oceanic and Atmospheric Administration (NOAA) and Parks Canada have implemented their nation's respective 30x30 targets nationally and within the Great Lakes region. Then, we present and review existing marine protected area (MPA) evaluation frameworks, which NOAA and Parks Canada might use to assess their MPA systems' performance and progress towards 30x30 conservation goals. Finally, we describe our analysis of these frameworks and present our synthesized evaluation criteria and framework, which we have used to structure the remainder of this report.

## 2.1 - The Global Biodiversity Framework and America the Beautiful: 30x30 Goals

As a central strategy for protecting biodiversity, nations across the globe have committed to increasing the amount of marine, coastal, terrestrial, and inland waters that are managed for conservation. At the end of 2022, more than 190 countries had signed onto the Kunming-Montreal GBF, and it was adopted by Parties to the UN Convention on Biological Diversity (CBD) (WWF and IUCN WCPA, 2023; UN, 2022a). The GBF sets four long-term goals and includes 23 global targets to address the global biodiversity crisis (UN, 2022a).

Several of these targets are relevant to the Great Lakes, and we share paraphrased selections from some of the relevant targets below.

- **Target 1**: Ensure spatial planning or effective management processes to minimize the loss of high biodiversity areas.
- **Target 2**: Ensure that 30 percent of degraded ecosystems are under effective restoration by 2030.
- **Target 3**: Ensure that by 2030 at least 30 percent of terrestrial, inland water, and of coastal and marine areas are effectively conserved and managed.
- **Target 4**: Ensure surgent management actions to either halt human-caused extinctions or promote the recovery of at-risk species.
- **Target 5**: Ensure that the "use, harvesting, and trade of wild species is sustainable" minimizes other harmful impacts.
- **Target 6**: "Eliminate, minimize, reduce and or mitigate the impacts of invasive alien species on biodiversity and ecosystem services" by at least 50 percent by 2030.
- **Target 7**: Reduce pollution risks to levels that do not harm biodiversity or ecosystem functions by 2030.
- **Target 8**: Minimize the impacts of climate change on biodiversity and improve the resilience of biodiversity.

For this project, we focused on Target 3, which states that signatories will ensure that by 2030 at least 30 percent of terrestrial, inland water, and of coastal and marine areas are effectively conserved and managed (i.e., 30x30). In addition to this quantitative metric, Target 3 also defines several crucial qualitative criteria for PAs: effective conservation and management, ecological representation, connectivity, equitable governance, recognition of and respect for the rights and

lands of Indigenous peoples and local communities, and integration within wider landscapes or water bodies. Nations seeking to achieve Target 3 must comply with each of the qualitative criteria of Target 3. Refer to Box 1 for the complete text of Target 3. Additionally, we further elaborate on the Target 3 criteria in Appendix E. While Target 3 is a significant undertaking, it offers signatory nations a unique opportunity and goal to rapidly extend conservation efforts in an equitable and representative manner (Watson et al., 2023).

**Box 1.** Kunming-Montreal Global Biodiversity Framework Target 3

> Ensure and enable that by 2030 at least 30 percent of terrestrial, inland water, and of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed through ecologically representative, well-connected and equitably governed systems of protected areas and other effective area-based conservation measures, recognizing Indigenous and traditional territories, where applicable, and integrated into wider landscapes, seascapes and the ocean, while ensuring that any sustainable use, where appropriate in such areas, is fully consistent with conservation outcomes, recognizing and respecting the rights of Indigenous peoples and local communities including over their traditional territories (UN, 2022b).

The amount of conserved waters globally is likely to increase in the coming years as nations work towards protecting at least 30% of waters. The success of MPAs in terms of how they are managed and where they are located will likely become the foundation of future conservation efforts for water-based biodiversity (Watson et al., 2023). Therefore, governments tasked with managing MPAs and establishing MPA priorities will need to take into account numerous considerations beyond quantitative targets.

While Canada committed to the GBF and has incorporated GBF Target 3 into its agencies' missions (Environment and Climate Change Canada [ECCC], 2023), the US has not ratified the GBF. The Biden Administration supported the GBF, but conservative members of the US Senate opposed ratifying the treaty (Guillot, 2022). Conservative legislators in the US have refused to ratify treaties produced by the UN CBD since the 1990s, related to concerns about sovereignty, responsibility for payments to countries with fewer economic resources, and corporate intellectual property among others (Blomquist, 2002; Jones, 2021). Consequently, owing to congressional inaction, the Biden administration issued Executive Order 14008, setting the foundation for the America the Beautiful initiative, which aims to conserve 30% of American lands and waters by 2030 (Exec. Order No. 14008, 2021). The Biden Administration issued this executive order in 2021, while nations at the CBD were still negotiating the GBF.

America the Beautiful is a decade-long national initiative, and its goal of 30% conserved lands and waters is the first national goal for nature stewardship in US history (US Department of the Interior, 2021). Along with the area target, America the Beautiful emphasizes the conservation of natural resources, recognizing that land and water have many uses that can be consistent with the long-term health and sustainability of the environment. The first report of America the Beautiful outlines eight core principles (see list below) critical to the success and durability of the initiative (US Department of the Interior, 2021). We elaborate on the principles in Appendix F.

1. Pursue a Collaborative and Inclusive Approach to Conservation
2. Conserve America's Lands and Waters for the Benefit of All People
3. Support Locally Led and Locally Designed Conservation Efforts
4. Honor Tribal Sovereignty and Support the Priorities of Tribal Nations
5. Pursue Conservation and Restoration Approaches that Create Jobs and Support Healthy Communities
6. Honor Private Property Rights and Support the Voluntary Stewardship Efforts of Private Landowners and Fishers
7. Use Science as a Guide
8. Build on Existing Tools and Strategies with an Emphasis on Flexibility and Adaptive Approaches

### 2.1.1 Alignment of GBF Target 3 and the America the Beautiful Initiative

From a high-level perspective, the primary goals of GBF Target 3 and America the Beautiful are the same: to protect or conserve 30% of lands and waters by 2030 (UN, 2022a; Exec. Order No. 14008). However, a more fine-scale review reveals that there are substantive differences between the two policies. The guiding principles of the America the Beautiful initiative are distinct from the qualitative criteria of GBF Target 3. Even so, there is still some alignment between qualitative elements of the two frameworks, especially concerning the emphasis on centering local communities and Indigenous peoples in conservation efforts.

The first key distinction is that GBF Target 3 calls for "protection" of lands and waters, while America the Beautiful refers to "conservation" of lands and waters. This discrepancy has tangible implications, with "conservation" leaving the door open for additional measures including ecosystem restoration and sustainable mixed use to be counted towards the 30% target, while "protection" in GBF Target 3 requires additional conditions for being counted towards 30% as described in Appendix E (US Department of Interior, 2021; UN, 2022a).

Generally speaking, GBF Target 3 concentrates on ecologically-focused goals. Beyond the 30% protection target, the criteria also include incorporating areas of particular importance for biodiversity and ecosystem functions and service, areas that are ecologically representative and well-connected, and areas that allow for sustainable use consistent with conservation objectives. GBF Target 3 also includes the social goal for PAs to be governed equitably with participation from all relevant actors, including recognition of and respect for the "rights of Indigenous peoples and local communities, including over their traditional territories." Overlaying all of these objectives is the principle that PAs "must be managed with the primary objective of achieving positive outcomes for biodiversity" (UN, 2022a).

Compared to GBF Target 3, America the Beautiful places less emphasis on ecological goals and outlines several social foundations for conservation, even though conserving 30% of lands and waters stands as the ultimate goal of the executive order (US Department of Interior, 2021). The social foundations for achieving the 30% goal include following a collaborative and inclusive approach, ensuring that conservation benefits are equitably distributed, supporting bottom-up conservation efforts, pursuing conservation and restoration that create jobs and support communities, and honoring private property rights and supporting voluntary stewardship (Appendix F). That is not to say that America the Beautiful is absent of ecological principles,

though the initiative frames ecological principles as techniques (i.e., using science as a guide and building on existing conservation strategies) rather than criteria, like well-connectedness.

The distinctions between GBF Target 3 and the America the Beautiful initiative necessitate a broader interpretation for determining whether MPAs meet 30x30 goals. For this report, we consider any area conforming to the criteria of either framework as achieving 30x30 goals. This approach to 30x30 goals focuses on the core objectives of each initiative within Canada and the US, while accounting for key differences between the two initiatives when appropriate. In the following subsections, we explore how Canada and the US have applied GBF Target 3 and America the Beautiful, respectively, for MPAs nationally and MPAs in the Great Lakes.

### 2.1.2 - The US Approach to 30x30 - America the Beautiful

#### NOAA's Implementation of America the Beautiful Nationally

NOAA has outlined multiple steps and avenues for the agency to meet 30x30 goals within US waters in its Conserving and Restoring America the Beautiful request for information (RFI) (NOAA, 2021). Informed by the eight core principles outlined in the RFI, NOAA is building on five decades of experience conserving and connecting people to ecosystems, species, and special places in the nation's marine and Great Lakes environments. Through the RFI, NOAA sought public, stakeholder, and rightsholder input (e.g., from state, local, tribal, and territorial officials; agricultural and forest landowners; and fishermen) on how best to apply these authorities to help achieve 30x30 goals (NOAA, 2021). America the Beautiful also advised NOAA to work closely with regional fishery management councils to identify areas or networks of areas where their fisheries management efforts would support long-term conservation goals (US Department of the Interior, 2021).

NOAA's implementation of America the Beautiful primarily involves designating and expanding NMS, NERRs, and other MPAs (US Department of the Interior, 2021). As of 2020, 26% of US waters were in some type of MPA, and 3% of US waters were in the most highly protected category of MPAs that prohibit extractive uses (discussed further in Chapter 6) (Wenzel et al., 2020). Nearly all the highly protected MPAs in the US are located in two MPAs in the remote Pacific Ocean – Papahānaumokuākea Marine National Monument and Pacific Remote Islands Marine National Monument (Wenzel et al., 2020). The current NMS and other NOAA managed MPAs are presented in Figure 6. Each year, more sites enter the nomination and designation processes; in 2023, NOAA continued to work on designations of six new NMS and two NERRs (US Department of the Interior, 2023).


**Figure 6.** The National Marine Sanctuary System, including National Marine Sanctuaries, Marine National Monuments, and proposed National Marine Sanctuaries (NOAA ONMS, n.d.-a).

## NOAA's Implementation of America the Beautiful in the Great Lakes

Similar to the oceans, establishing NMS sites is NOAA's primary mechanism for achieving its 30x30 goals. Although NOAA's America the Beautiful approach applies to both the oceans and Great Lakes, MPAs in the Great Lakes exhibit distinct characteristics compared to their ocean counterparts, functioning within different frameworks concerning their ties to communities, multilevel governmental jurisdiction, ecological challenges, and scale. While the Great Lakes are freshwater systems, NOAA includes the lakes in its marine waters accounting, making up 1.0% of total US marine waters (Wenzel et al., 2020). On the American side of the border, the percent of Great Lakes regional waters that are in MPAs is 11.6%, which will increase once NOAA finalizes designations for the Lake Ontario and Lake Erie proposed NMS sites (Wenzel et al., 2020).

In the Great Lakes region, NOAA has designated two NMS and proposed an additional two. The Thunder Bay NMS (TBNMS) is located in Lake Huron and consists of the waters and the submerged lands surrounding the underwater cultural resources, particularly nationally significant shipwrecks, in Thunder Bay. When NOAA designated the site in 2000, it included 1,160 $km^2$ (448 $mi^2$) of protected waters. However, in 2014, NOAA expanded the NMS to include 11,137 $km^2$ (4,300 $mi^2$) of Lake Huron after years of research, public input, and support from local and regional interests and elected officials (NOAA ONMS, 2023a; NOAA and State of Michigan, 2009). NOAA designated the Wisconsin Shipwreck Coast NMS (WSCNMS) in 2021; it consists of an area of approximately 2492 $km^2$ (962 $mi^2$) of Lake Michigan waters and the submerged lands surrounding the underwater cultural resources in the lake (NOAA, 2023a). Additionally, there are sanctuary designations in progress in Lake Ontario and in Lake Erie, with NOAA aiming to complete the designation for the Lake Ontario proposed NMS in 2024 (NOAA ONMS, 2023b).

TBNMS, WSCNMS, and the two proposed NMS sites are presented on the map in Figure 7. The map indicates the conservation focus and IUCN PA management category for each MPA. As shown, NOAA has designated all of its Great Lakes NMS sites for cultural heritage, and each NMS falls within IUCN category V (Protected Landscape or Seascape), which emphasizes "safeguarding the integrity" of the interaction between people and nature that has emerged over time (Dudley, 2008). This interaction can be based on ecological, biological, cultural, or scenic value. Additionally, in partnership with the University of Wisconsin, NOAA designated the Lake Superior NERR for natural heritage, and the NERR falls within IUCN category IV (Habitat or Species Management Area).

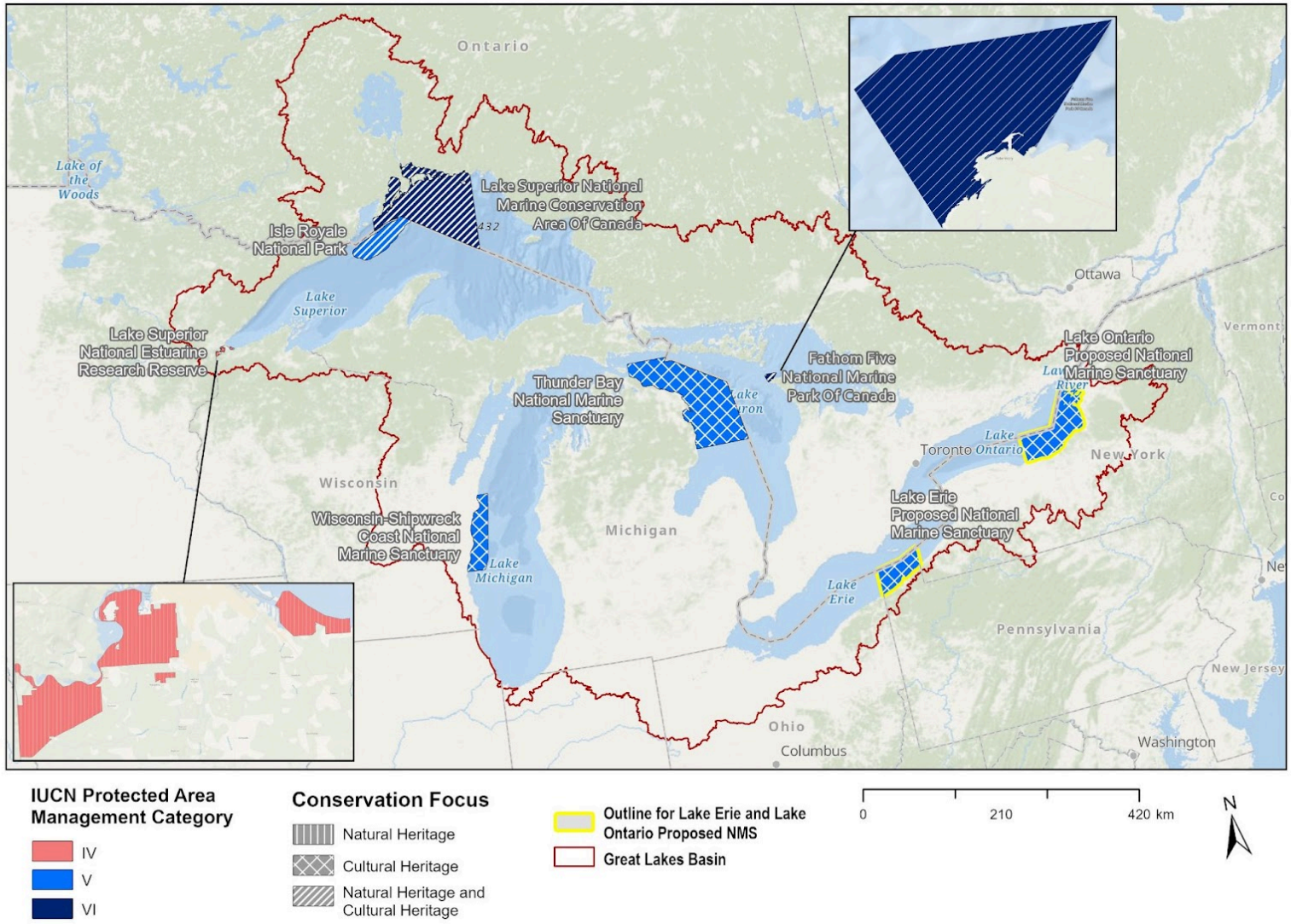



**Figure 7.** Map of Great Lakes MPA Sites with IUCN Category and Conservation Focus (Sources: MPA Inventory, 2024; CPCAD, 2024; NOAA, 2024; Great Lakes Commission, 2022).

### 2.1.3 - The Canadian Approach to Applying the GBF

#### Parks Canada's Implementation of GBF Target 3 Nationally

Canada ratified the CBD in 1993, committing to conserving biodiversity and the sustainable use of its biological resources (ECCC, 2023). The CBD requires Canada to have a National Biodiversity Strategy and Action Plan (NBSAP) that outlines domestic efforts to advance the goals set by the CBD. ECCC is responsible for leading the development of the 2030 Biodiversity Strategy, Canada's latest NBSAP, and reporting on Canada's progress to meeting the GBF targets (ECCC, 2023). Because Canada signed the GBF, ECCC will frame the NBSAP around the GBF goals and targets and intends to cover all relevant aspects of nature conservation, sustainable use, and access and benefit-sharing of genetic resources. The process of developing the NBSAP includes a virtual symposium, focused engagement with key groups, an online platform to allow for broader input, and an opportunity to review a draft strategy and provide feedback before ECC finalizes the plan at the end of 2024. While ECCC will lead the advancement of Canada's GBF initiatives, various federal departments, including Parks Canada, will assume significant responsibilities in leading and co-leading components of the plan according to their mandates and expertise to meet the goals of the GBF (ECCC, 2023).

The proposed indicators for Target 3 include the extent of land and water covered by PAs and OECMs (ECCC, 2023). Canada intends to continue leveraging existing programs to identify, establish, and manage PAs to achieve the objectives of Target 3 by 2030 (Government of Canada, 2024a). Canada strives for a network of well-connected, equitably governed, and ecologically representative protected and conserved areas, covering at least 30% of its terrestrial and marine regions. This stated approach incorporates effective management that involves management planning, monitoring, reporting, and risk-based enforcement, while integrating ecological connectivity and corridors. Canada aims to promote reconciliation by supporting and advancing Indigenous-led conservation and Indigenous co-management of PAs (Government of Canada, 2024a). As of December 2022, 13.6% of Canada's terrestrial land and freshwater, and 14.7% of its marine and coastal areas, had been conserved (Government of Canada, 2024a).

Canada has defined 29 marine regions, each with distinct natural and cultural resources, in the country's oceans and Great Lakes, as shown in Figure 8 (Parks Canada, Department of Canadian Heritage, 1995). In line with national conservation goals, Parks Canada's long-term goal is to establish at least one NMCA in each of these 29 marine regions (Parks Canada, Department of Canadian Heritage, 1995). Parks Canada currently manages five NMCAs, which cover six of the 29 marine regions and protect approximately 123,490 $km^2$ of marine and freshwater environments (Parks Canada Agency, 2024). In 2021, Parks Canada committed to establishing 10 additional marine and four freshwater NMCAs, collaborating with Indigenous communities to develop co-management agreements for these areas (Parks Canada Agency, 2024).

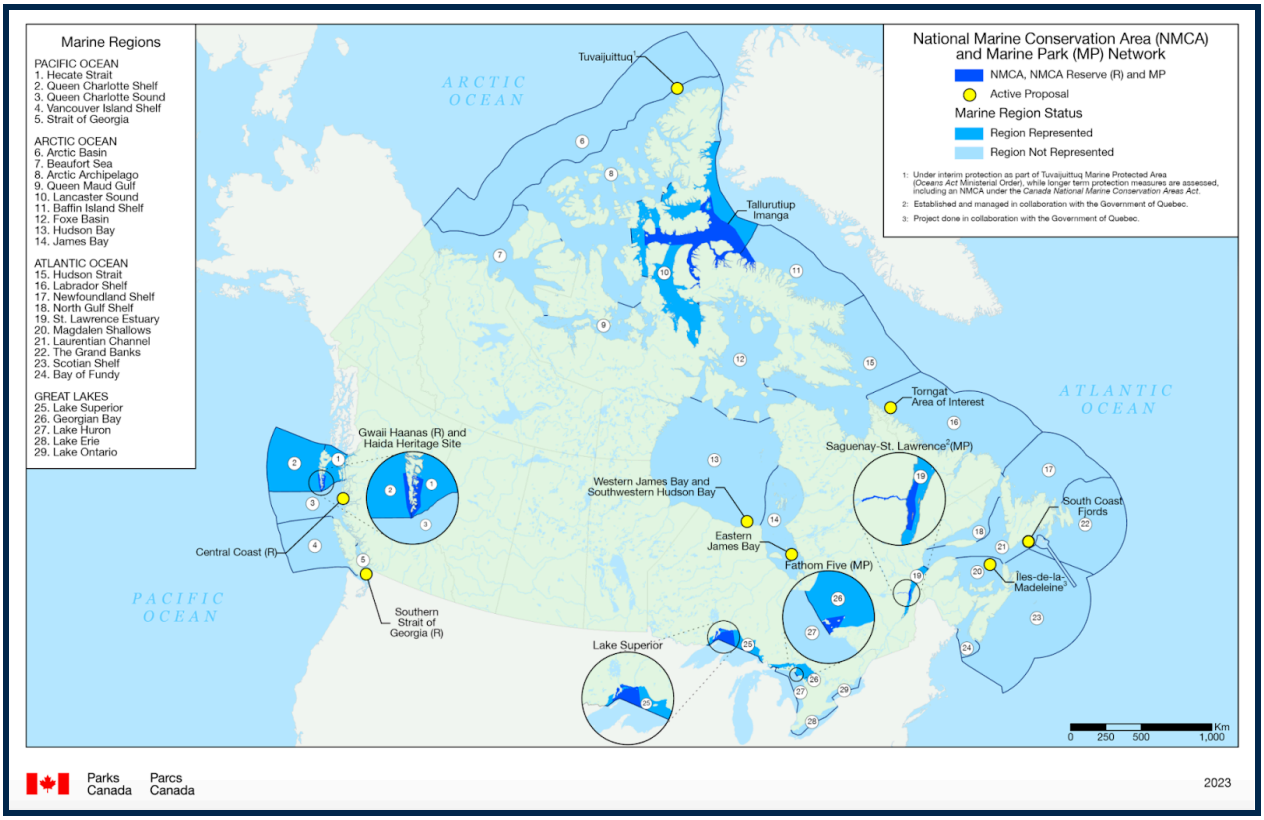



**Figure 8.** The 29 marine regions of Canada. This image also demonstrates whether the region contains a National Marine Conservation Area, National Marine Conservation Area Reserve, National Marine Park, or are underrepresented (Parks Canada Agency, 2023a).

### Parks Canada's Implementation of GBF Target 3 in the Great Lakes

Five of Parks Canada's 29 marine regions are in the Great Lakes (Lake Huron, Lake Superior, Lake Erie, Lake Ontario, and the Georgian Bay) (Parks Canada, Department of Canadian Heritage, 1995). Currently two of these regions, Georgian Bay and Lake Superior, contain MPAs, although Parks Canada has not formally established either MPA (see Chapter 5.2.2. for more details). Fathom Five National Marine Park (FFNMP) is located in Georgian Bay and is approximately 114 km$^2$ (44 mi$^2$) and includes 21 islands and smaller islets. Designated as Canada's first NMCA in 1987, FFNMP has set a precedent for the planning and management of subsequent NMCAs. Lake Superior NMCA (LSNMCA) spans the northern part of Lake Superior, reaching the Canada-United States border in the south. Covering approximately 10,880 km$^2$ (4,200 mi$^2$), LSNMCA covers around one eighth of Lake Superior and one third of the Canadian side of the lake. LSNMCA also includes areas across two peninsulas and a chain of isolated islands of around 60 km$^2$ in size (Parks Canada Agency, 2016).

As shown in Figure 7, Parks Canada has designated FFNMP and LSNMCA to conserve natural heritage and cultural heritage. Both sites fall within IUCN PA management category VI (PAs with Sustainable Use of Natural Resources). This category acknowledges the "low-level non-industrial natural resource use compatible with nature conservation" (Dudley, 2008).

## 2.2 - Review of Protected Area Evaluation Frameworks

Since the US and Canada have both made 30x30 commitments, MPA managers in each country must establish methods for assessing whether the sites they govern help achieve those 30x30 goals. As we described in Section 2.1, the 30x30 Target is not just quantitative. Rather, "the qualitative provisions of [CBD Target 3] are equally relevant, and success depends on ensuring that it is implemented effectively and equitably" (WWF and IUCN WCPA, 2023). In other words, MPA managers need a set of metrics they can use to evaluate how effectively their MPAs achieve the qualitative provisions of the 30x30 goals. This push for evaluation metrics partly stems from the shortcomings of past international area-based conservation targets. For example, assessments of the 2010 Aichi CBD suggest that "while there was significant area expansion of protected and conserved areas during the 2010–2020 period, the specific gains when considering biodiversity coverage were incremental and piecemeal" (Watson, et al., 2023). A set of clear MPA evaluation criteria can help managers and policymakers avoid the pitfalls of just focusing on acreage and serve as a benchmark to assess whether MPA programs are achieving successful conservation outcomes (IUCN and WPCA, 2017).

Various government agencies, academics, environmental NGOs, and international working groups have proposed frameworks to assess the effectiveness of protected areas. These frameworks contain evaluation criteria (e.g., conservation outcomes, level of protection, design processes, management procedures, governance equity, etc.) that experts have determined to be important for assessing the social and ecological elements of protected areas. Figure 9 presents an example of the type of criteria included in a protected area evaluation framework. The authors of these frameworks intend for practitioners to compare their protected area programs and governance processes with the evaluation criteria. These comparisons allow practitioners, like MPA managers, to measure their program's performance and identify specific strategies for improvement. However, a diverse assortment of authors have developed a broad array of protected area evaluation frameworks, some of which apply globally while others are for specific ecosystems or audiences. Practitioners must choose from several frameworks (or develop their own) to identify which best suits their protected area program as there is no one established framework.


**Figure 9.** Example protected area evaluation framework (IUCN and WPCA, 2017).

As part of our analysis, we assessed which protected area evaluation frameworks would be most effective for NOAA and Parks Canada to use for analyzing their Great Lakes MPAs. Addressing this question helped us compile a comprehensive set of criteria for measuring how well the existing Great Lakes MPAs achieve conservation goals and for assessing current MPA governance practices. In other words, identifying a single evaluation framework for the Great Lakes MPAs served both the agencies' goals and our project's goals. We used the framework we ultimately created to identify which elements of MPA governance work well, which elements need improvements, and where there are gaps in governance.

To develop comprehensive criteria for evaluating the effectiveness of the Great Lakes MPAs and MPA governance, we reviewed nine existing frameworks. We decided to compile criteria from multiple frameworks into a new cohesive set. Because the number of frameworks specific to MPAs is limited, we included frameworks that focus on terrestrial areas or that cover both terrestrial PAs and MPAs. Additionally, some evaluation frameworks contain criteria that are specific to individual sites, whereas other frameworks present criteria for entire protected area programs (e.g., NOAA's NMS) or a hybrid covering both programs and individual sites. We have summarized the nine frameworks we considered, identified whether each framework applies to a single area (i.e., site-specific) or across a program (i.e., program-wide), and briefly described each framework in Table 3. We selected these nine sets of evaluation criteria for review because a broad group of conservation professionals developed the criteria or because the criteria focus on MPAs and grouped them into three categories: general conservation frameworks with a global scope, criteria focused on MPAs or MPA networks, and past program evaluations of North American MPAs.

**Table 3.** Summary of conservation frameworks used to develop evaluation criteria for our project. The bolded frameworks are those we ultimately selected for synthesis into our hybrid criteria.

| Evaluation Criteria Title | Author(s) | Site-specific or Program-wide | Description |
|---|---|---|---|
| **Category 1**: General Conservation Frameworks with a Global Scope | | | |
| **IUCN Green List of Protected and Conserved Areas: Standard Version 1.1 (2017)** | **IUCN and WPCA** | **Site-specific** | **The Green List Program seeks to "increase the number of protected and conserved areas that deliver successful conservation outcomes through effective and equitable management." To achieve that goal, the IUCN defines 17 Criteria nested under four Components that are necessary for "successful conservation in protected areas."** |
| Post-2020 Global Biodiversity Framework (2022) | UN Convention on Biological Diversity (CBD) (UN, 2022b) | Site-specific and Program-wide | A framework adopted by the United Nations' CBD that sets a plan to push and enable nations to "halt and reverse biodiversity loss." We focus on Target 3, which we reproduce in Box 1. |
| 30x30: A Guide to Inclusive, Equitable and Effective Implementation of Target 3 of the Kunming-Montreal Global Biodiversity Framework (2023) | WWF and IUCN World Commission on Protected Areas | Program-wide | The guide breaks down Target 3 of the GBF into its components, describes those components in detail, and defines procedures to plan for and implement the target. The guide's Timeline for Implementation for Target 3 breaks the process into 3 major phases: Review (short-term), Planning (medium-term), and Implementation (long-term). |
| **Category 2**: Criteria Focused on MPAs or MPA Networks | | | |
| Blue Park Criteria (2022) | Marine Conservation Institute | Site-specific | Defines criteria for identifying Blue Park Award recipients. Blue Park Awards highlight MPAs that meet science-based standards for effectiveness and serve as an incentive for governments. |
| **The MPA Guide: A framework to achieve global goals for the ocean (2021)** | **Grorud-Colvert, K., et al.** | **Site-specific** | **Areas designated as MPAs vary widely in terms of level of protection and human use management. Establishes a framework to assess levels of protection for MPAs and areas within MPAs.** |
| **Marine Connectivity Conservation 'Rules of Thumb' for MPA and MPA Network Design. Version 1.0 (2021)** | **Lausche, B., Laur, A., and Collins, M.** | **Program-wide** | **Identifies 13 "rules of thumb" concerning ecological connectivity to guide planning and management for individual MPAs and networks of MPAs. "Rules of thumb" are applied when science has gaps, uncertainties, and unexplored domains.** |
| Scientific Guidelines for Designing Resilient Marine Protected Area | Brock, R.J., Kenchington, E., and | Site-specific and Program-wide | Presents four guidelines intended to promote best practices, consistency of approach, and collaboration for MPA site and network design. The guidelines |

| Evaluation Criteria Title | Author(s) | Site-specific or Program-wide | Description |
|---|---|---|---|
| Networks in a Changing Climate (2012) | Martinez-Arroyo, A. | | focus on conferring resilience in the face of climate change. |
| **Category 3**: Past Program Evaluations of North American MPAs | | | |
| Assessing Canada's Marine Protected Areas (2021) | Canadian Parks and Wilderness Society (CPAWS) | Site-specific | Assessed 18 Canadian (oceanic) MPAs and employed The MPA Guide for evaluation. Assessed MPAs using a MPA Index (Index = Sum of Zone Protection Score * Zone Size / Total MPA Size). |
| An External Review of the NMS System (2021) | National Academy of Public Administration | Program-wide | Program evaluation of the NMS system, including ocean areas and the Great Lakes. The evaluation does not include an explicit set of criteria, but we consider the 15 recommendations in the report as metrics to measure NOAA's and Parks Canada's programs against. |

We have compared and contrasted the sets of evaluation criteria within each category in the following paragraphs and have provided a discussion of those comparisons in Appendix G.

Although we present our synthesized MPA evaluation framework in the following section, we should note that the nine sets of criteria we reviewed do not comprise an exhaustive body of frameworks. One key evaluation framework that we initially overlooked was the IUCN's PA Management Effectiveness (PAME) framework (Hockings et al., 2006). The framework includes six key elements: context, planning, inputs, process, outputs and outcomes, and each element consists of several assessment criteria. The PAME framework is significant because the Protected Planet database uses the framework as the basis for the Management Effectiveness Tracking Tool (METT), an online platform that managers can use to evaluate their PAs. The IUCN describes METT as the "most widely used PA assessment system" (Stolton and Dudley, 2021). While the questions posed to managers in METT largely align with the criteria we have compiled in our synthesized framework, the questions in METT may offer a more specific and efficient means for MPA managers to evaluate the performance of their MPAs.

## 2.3 - Synthesized Great Lakes MPA Evaluation Framework

Based on our comparison of the different protected area evaluation frameworks, we decided to combine the following frameworks into a single set of synthesized criteria for assessing the Great Lakes MPAs (Table 3):

- IUCN Green List of Protected and Conserved Areas;
- MPA Guide; and
- Marine Connectivity Conservation 'Rules of Thumb' for MPA and MPA Network Design.

These three frameworks together encompass the key components of effective protected areas that the other documents we reviewed also incorporated. Our hybrid criteria also address important elements of MPAs. The IUCN Green List forms the base for our synthesized framework because the Green List offered the most comprehensive criteria, addressing important elements of GBF Target 3, the External Review of the NMS System, the Scientific Guidelines for Designing Resilient MPA Networks in a Changing Climate, and the Blue Park Criteria. The MPA Guide adds two important criteria (Level of Protection and Stage of Establishment) that are crucial for Great Lakes MPA governance. Great Lakes MPA regulations vary in the level of protection they offer to ecological and cultural resources, and Great Lakes MPAs are also in different stages of establishment. Similarly, the criteria in Marine Connectivity Conservation 'Rules of Thumb' for MPA and MPA Network Design add necessary components to further evaluate the connectivity of MPAs, which is an integral component of our evaluation.

We present the final synthesized Great Lakes MPA evaluation framework in Table 4. Based on the IUCN Green List, we organized the criteria into six overarching categories. Some of the evaluation criteria stand on their own as metrics for measuring MPA performance while others require sub-criteria that further define specific elements of more general criteria. For example, one key feature of access, resource, and visitation management is the level of protection defined in a particular MPA zone. We describe the evaluation criteria categories in the paragraph that follows, and we define the criteria in each category and explain how those criteria apply to Great Lakes MPAs in Appendix H.

Each of the categories in the Great Lakes MPA evaluation framework describes a general concept that is crucial to the efficacy of an MPA. These categories and the criteria within the categories reflect an ideal condition that an MPA governance institution like Parks Canada or NOAA would seek to achieve. Additionally, each category and the criteria within apply to different stages of the lifecycle of an MPA, and we indicate the stages in the descriptions:

- Sound Design and Planning: This category comprises criteria concerning the conservation goals, priorities, and objectives of an MPA and the ways that MPA design reflects those priorities and objectives. The criteria in this category primarily apply to the MPA nomination, designation, and establishment stages.
- Good Governance: This category comprises criteria that address how equitable, effective, transparent, accountable, and adaptive the institution governing an MPA is. The criteria in this category apply to all stages of an MPA's lifecycle.
- Good Strategy Implementation: This category comprises criteria concerning how an MPA management agency establishes and implements management practices to achieve the goals and objectives for an MPA. The criteria in this category apply to the ongoing management of an MPA (i.e., after an agency establishes an MPA).
- Key Enabling Conditions: As the name suggests, enabling conditions are circumstances that allow for effective MPA planning and management. These conditions do not directly involve conservation planning or management activities for an MPA, but the conditions are necessary to achieve conservation outcomes. This category comprises criteria concerning resources available to MPA managers, collaboration with partners in other jurisdictions, and external factors important for an MPA yet outside the direct control of an MPA manager. The criteria in this category apply to all stages of an MPA's lifecycle.
- Monitoring, Evaluation, and Learning: This category comprises a single criterion that focuses on the systems MPA managers have put in place to observe, measure, and report on how well the MPA achieves its goals and objectives. While an agency should plan for the systems used to monitor and evaluate the success of an MPA before fully establishing the site, the Measure Success criterion applies to the ongoing management of an MPA.
- Conservation and Social Well-being Outcomes Achieved: This category comprises criteria expressly assessing whether an MPA meets or exceeds both its internal goals and objectives and 30x30 conservation goals. The criteria cover conservation of natural values (e.g., species and ecosystems), ecosystem services, and cultural values (e.g., sacred sites and shipwrecks). The criteria in this category apply to the ongoing management of an MPA (i.e., after an agency establishes an MPA).

**Table 4.** Proposed Great Lakes MPA evaluation framework.

| Evaluation Criteria Category | Evaluation Criteria | Evaluation Sub-Criteria (if applicable) |
|---|---|---|
| Sound Design and Planning | Identify and Understand Major Site Values | |
| | Design for Long-Term Conservation of Major Site Values | Consider ecological connectivity using best available science |
| | | Account for role of connectivity in face of current and anticipated climate change in management strategies and plans |
| | | Account for aquatic and land-based processes in design and management, especially related to climate change resilience |
| | | Identify role of MPAs in supporting connectivity and barriers to connectivity |
| | | Scale management units based on realistic connectivity patterns for specific species |
| | | Include multiple ecosystems in MPA and network design |
| | | Employ a multi-management approach across realms (e.g., land-sea) for species that use different habitats during lifecycle |
| | | Use habitat suitability modeling when spatial distribution data is limited |
| | | Base network size and spacing recommendations on representative species when data limited for many species |
| | Understand Threats and Challenges to Major Site Values | |
| | Understand Social and Economic Context | |
| Good Governance | Guarantee Legitimacy and Voice | |
| | Achieve Transparency and Accountability | Conflict Resolution Mechanisms |
| | Enable Governance Viability and Capacity to Respond Adaptively | Stage of Establishment |
| Good Strategy Implementation | Develop and Implement a Long-Term Management Strategy | |
| | Manage Ecological Condition | |

| Evaluation Criteria Category | Evaluation Criteria | Evaluation Sub-Criteria (if applicable) |
|---|---|---|
| | Manage within Social and Economic Context of the Area | |
| | Manage Threats | |
| | Effectively and Fairly Enforce Laws and Regs | |
| | Manage Access, Resource Use, and Visitation | Level of Protection |
| Key Enabling Conditions | Enabling Conditions | Sustainable Financing |
| | | Coordination with Related Governance Institutions |
| | | Collaboration Across Jurisdictions |
| | | Sufficient and Properly Organized Staffing and Funding |
| | | Education and Outreach Initiatives |
| | | Effective Management of Broader Seascape and External Pressures |
| Monitoring, Evaluation, and Learning | Measure Success | |
| Conservation and Social Well-being Outcomes Achieved | Demonstrate Conservation of Major Natural Values | |
| | Demonstrate Conservation of Major Associated Ecosystem Services | |
| | Demonstrate Conservation of Cultural Values | |

As noted in Section 1.4, we use our proposed Great Lakes MPA evaluation framework to structure Chapters 4 through 9 of this report. In each of those chapters, we focus on a single evaluation category in our discussion of NOAA's and Parks Canada's Great Lakes MPA programs, and we use the criteria within that category to frame the current conditions of the MPA programs and opportunities to advance the programs towards 30x30 conservation goals. The categories of Good Strategy Implementation and Key Enabling Conditions do not have their own chapters because they are discussed accordingly within each individual chapter as they relate to many areas of MPA processes.

Beyond the purposes of this report, using the evaluation framework categories to structure our assessment will allow NOAA and Parks Canada to build on this report when tracking and documenting 30x30 progress. We based our evaluation framework categories on the IUCN Green List, which is one of the standards the United Nations Environment Program and IUCN use to track international conservation progress in the Protect Planet database. This database is the most

widely accepted and complete source for reporting on protected and conserved areas and management effectiveness for those areas. Because we use categories and criteria based on the IUCN Green List, we intend for the rest of this report to function as a foundation for NOAA and Parks Canada to report on their conservation progress in the Protected Planet database.

Chapter 3

# Current and Emerging Threats to the Great Lakes

The Great Lakes have faced myriad threats, many of which were the result of degradation occurring from industrial and agricultural pollution predating environmental laws adequate to limit and prevent harms. The region has made great strides to address these threats since Canada and the US passed such laws, with binational mechanisms like the Great Lakes Water Quality Agreement (GLWQA) and the binational governance bodies of the Great Lakes Fishery Commission (GLFC), Great Lakes Commission (GLC), and International Joint Commission (IJC) helping to bring the Great Lakes to their current improved state. However, despite significant progress towards preventing, mitigating, and remediating environmental harms, familiar risks and emerging contemporary pressures continue to threaten the Great Lakes (Jenny et al., 2020). Threats recognized in the GBF 30x30 and America the Beautiful like climate change, inequity, disappearance of nature (habitat loss and biodiversity decline), aquatic invasive species, pollution, and energy development pose ongoing risks to the Great Lakes, necessitating flexible and adaptable protection. Marine protected areas (MPAs) represent one mechanism for Canada and the US to address these threats and achieve national conservation goals. In this chapter, we outline some of the current and emerging threats to the Great Lakes basin and discuss how MPAs are situated to address them. Note that we do not review all current and emerging threats to the Great Lakes because the body of literature on such threats is substantial. Rather, we focus on threats that our interviewees most frequently discussed.

## 3.1 - Current and Emerging Threats to Great Lakes Resources

### 3.1.1 - Climate Change

The tangible effects from climate change have begun to manifest across the globe, gaining public visibility through recent extreme events, such as the record-breaking Canadian wildfires and global coral bleaching events in the summer of 2023 (NOAA NCEI, 2024). Events like these have helped to elevate climate change issues to the forefront of landscape conservation policy. For instance, America the Beautiful highlights climate change (along with the disappearance of nature and inequitable access to the outdoors) as one of three primary problems threatening land, water, and wildlife and cites downstream effects of climate change like ocean acidification, deoxygenation, and exacerbation of other threats (US Department of Interior, 2021).

The Great Lakes are no exception to this global phenomenon, despite the region potentially being a future climate change refuge. The local effects of climate change on the Great Lakes are already visible, from drastic fluctuations in lake levels to low annual lake ice coverage since 1998. For example, researchers have observed that Lake Superior is one of the fastest warming lakes in the world, recording open water temperature increases (2.5°C) nearly twice that of air temperature increases over the same time period (1979-2006) (Austin and Colman, 2007). Additionally, Lake Superior's cool climate and relatively simple food web make it particularly vulnerable to climate change, particularly in deep-water zones (ECCC and US EPA, 2022; Lake Superior Binational Program, 2015).

With 2023 registering as the warmest year on record, researchers anticipate that the effects from climate change will accelerate in the Great Lakes region, though large uncertainties remain in terms of exactly how climate change will continue to manifest at the lake-level (Zhang et al., 2020). As such, Canada and the US codified climate change in Annex 9 of GLWQA, calling for coordination of "efforts to identify, quantify, understand, and predict the climate change impacts on the quality of the Waters of the Great Lakes, and sharing information that Great Lakes resource

managers need to proactively address these impacts" (GLWQA, 2012). Many interviewees spanning different backgrounds from both Canada and the US highlighted climate change as one of the most crucial and pressing threats facing the Great Lakes region.

### 3.1.2 - Inequity

Target 3 of the GBF expands the conversation about protected areas beyond purely ecological protections to encompass inclusion and equity. These principles involve governance approaches that fairly distribute the costs and benefits of protection, incorporate Indigenous and local community knowledge and practices, recognize human rights and land and water-based rights, promote inclusivity in decision-making processes, and promote the well-being of affected communities (WWF and IUCN WCPA, 2023). Many of these aspects of inequity discussed in Target 3 have been present historically and contemporarily within the Great Lakes region.

The costs and benefits of past protection efforts have not always been equitably distributed in the Great Lakes. Indeed, protected areas in North America have a history of preserving "wilderness" or the "untouched" in remote places that are often prohibitively difficult to reach (Winter et al., 2019). This approach to siting, combined with historically discriminatory housing and transportation practices and environmental injustice, has created a landscape whereby frontline communities of color and low income have had disproportionately less access to nature, natural resources, and the associated benefits (US Department of the Interior, 2021). Federal MPAs in the Great Lakes are primarily in locations (e.g., Alpena and Nipigon) distant from large population centers. While MPAs in locations like these facilitate access to the lakes for these communities that themselves have been underserved, the physical distance from major population centers limits who can reasonably access MPAs, reducing the potential social impact of MPAs. Still, the recognition that protected areas and MPAs can reach frontline communities and provide social advantages is increasing within the region. As one NGO leader put it, "*What's most exciting about ecosystem protection in the Great Lakes now is how it's been expanded to include human communities, particularly in vulnerable communities… And that's absolutely critical. It brings new people into the conversation, it brings more communities into being invested in the Great Lakes, it broadens the definition of the Great Lakes to include communities as well as human communities as well as benthic communities*."

In regard to Indigenous Nations of the Great Lakes, access to land and waters, recognition and respect for historical treaty rights, and free prior and informed consent (FPIC), are essential parts of the conversation concerning protected areas. Numerous Indigenous Nations in the Great Lakes region possess water and fishing rights, established through treaties with the US and Canada (originally via the British government prior to Canadian independence) (GLIFWC, n.d). Indigenous peoples' tie to the Great Lakes is not only their right to fishing, but also their deep cultural ties to the Lake itself. Gichigami, or Lake Superior for the Ojibwe people, is how many tribes sustained themselves and their culture for generations (Gagnon, 2016). Without equitable access, Indigenous Nations are denied not only their innate rights, but also their traditional practices and relationships that have sustained their livelihoods for generations.

Additionally, many of the treaties of the region were signed by Indigenous peoples under threat or other coercive means. This history underlies the need for FPIC regarding present-day decisions involving Indigenous nations and MPAs. Historically, decisions around the designation and governance protected areas have come from top-down federal mechanisms, leaving Indigenous

peoples and stakeholders out of decision-making processes and the conversations concerning MPAs. For the past two decades, NOAA and Parks Canada have developed guidelines for meaningful consultation with Indigenous Nations, advanced collaboration and co-management, incorporated Traditional Ecological Knowledge (TEK), and taken other actions to improve relationships with Indigenous Nations, which we describe further in Chapter 6. However, those actions have not eliminated issues that members of Indigenous nations face, with one interviewee saying, "*simply stated, having an understanding of the value of water and what it supports to [Great Lakes Tribes and First Nations]... that's not represented currently in MPAs*." As evidenced by recent controversies like those surrounding Line 5 and the Great Lakes Fishing Decree, respect for Indigenous Tribes and First Nations is still a threat in the Great Lakes region (Halleck and Searcey, 2023; House, 2024). Ensuring that all voices are heard, recognized, and respected in the Great Lakes is critical to ensuring that NOAA and Parks Canada's Great Lakes MPAs are administered in an equitable fashion.

### 3.1.3 - Disappearance of Nature (Habitat Loss and Biodiversity Decline)

The disappearance of nature has been a primary motivation behind the need for the GBF and America the Beautiful (US Department of the Interior, 2021; WWF and IUCN WCPA, 2023). As the result of other threats (climate change, pollution, invasive species, development, etc.), the disappearance of nature encompasses the current loss of biodiversity itself and habitats.

Freshwater systems have been hit disproportionately hard by the disappearance of nature due to their positions as catchment points for pollutants and to the concentrations of human settlements along freshwater bodies (WWF, 2022). The WWF's Living Planet Index, based on over 6,000 populations of freshwater mammals, birds, amphibians, reptiles, and fish, measured that freshwater populations declined by an average of 83% between 1970 and 2018 (WWF, 2022). Additionally, native populations of organisms at low trophic levels, like mussels, have declined significantly in recent decades, contributing to a decline in ecosystem structure and function (Nobles and Zhang, 2011).

Historically, the Great Lakes have faced immense pressure from overexploitation of native fisheries, leading to the formation of the Great Lakes Fisheries Commission (GLFC) in 1955. The GLFC's efforts and Joint Strategic Plans have drastically improved the state of Great Lakes fisheries, with one environmental NGO leader noting that while the "*greatest threats in the Great Lakes historically have been overfishing and invasive species… overfishing is not really a threat, as it once was*." Despite this improvement, stressors like climate change and invasive species continue to pose a threat to Great Lakes fish populations, with some iconic and culturally important fishes like Lake Huron Coregonids (i.e., lake whitefish) and Lake Superior coaster brook trout still in jeopardy (Gobin et al., 2015; Peterson, 2018).

> *"I'm going to probably see extirpation, decimation of that species [lake whitefish] in my lifetime. And we're almost there. We're kidding ourselves if we think we're going to stop that… There is no indication that we are going to create the food webs structures that are critical for chinook web and the makeup of lake whitefish."*
>
> *- Indigenous Citizen*

Habitat fragmentation and loss amplifies these declines in biodiversity. The Great Lakes basin alone has lost approximately half of its coastal wetlands since European settlement (Brazner et al., 2000). Nowhere is this more evident than on Lake Erie where large-scale wetland loss has contributed to the yearly harmful algal blooms that plague the lake. Habitat loss has occurred within the lakes, too, as evidenced by the threat to Buffalo Reef in Lake Superior from legacy stamp sands originating from 19th century mining operations (see Figure 10 for an example of stamp sands). 60% of Buffalo Reef is at risk of being unviable for lake trout and lake whitefish spawning by 2025 (Michigan Department of Natural Resources, n.d.). As one tribal leader told us, "*I know from the Buffalo Reef issue, a lot of the fish are moving out of the area because of the washing up of these mining tailings which they call stamp sands. At one time, there was a vibrant fishery there that actually supported the community. And now that fishery is dissipating at an alarming rate, and it's been replaced by the stamp sand.*"

**Figure 10.** Legacy stamp sands creating an unstable, artificial beach near the Keweenaw Bay Indian Community in Baraga, MI.

## 3.2 - How MPAs Are Situated to Address Current and Emerging Threats

### 3.2.1 - Climate Change

MPAs have been recognized as a key climate change adaptation strategy in marine settings, and although research is beginning to recognize the value of MPAs for addressing climate change in freshwater ecosystems, far less data exists on their freshwater effectiveness (Acreman et al., 2020; Bryndum-Buchholz et al., 2022). Further research is needed to understand and support the role of MPAs in conferring climate resilience and to guide the establishment and management of climate-ready MPAs. This research needs to identify the crucial species and habitats most vulnerable to climate change and determine whether MPAs can mitigate the effects of climate change on those species and habitats, or how they can be designed so that they they can mitigate

those effects (Commission for Environmental Cooperation [CEC], 2012; Sullivan-Stack, et al., 2022; NOAA ONMS, 2022a).

Lakes, as sentinels of change, serve as optimum sites to study, evaluate, and monitor the effects of climate change while demonstrating these studies to the public. As said by one agency employee, "*we also have to act as a catalyst for certain types of initiatives, often field testing them in the sanctuaries. And a couple of issues that we've been working on over the last few years and have really helped be champions for have been integrating climate into the management of Marine Protected Areas.*" This sentiment is reflected in the ONMS Climate Resiliency Plan, which notes the role of MPAs in being "canaries in the coalmine" as well as areas to advance climate literacy (NOAA ONMS, 2023c). Similarly, Parks Canada has recognized the importance of MPAs for the conserving and enhancing of marine carbon stocks and conferring climate resiliency for ecosystems, human health, safety, and security in adjacent lands (Parks Canada Agency, 2022a).

### 3.2.2 - Inequity

Great Lakes MPAs have an opportunity to address the threat of inequity in long-lasting ways that align with the principles of equity discussed in Target 3 of the GBF. Regarding the distribution of costs and benefits, MPAs may offer a means of connecting vulnerable communities to the Great Lakes and expanding educational opportunities to such communities, which we elaborate on in Section 8.2.1. Additionally, the physical infrastructure and longevity of MPAs within their respective communities might allow MPA managers to collect valuable insights about community well-being and other social metrics, which we discuss in Section 7.2.2. Looking forward, Great Lakes MPAs have the potential to be a key mechanism for connecting vulnerable communities to nature and the benefits derived from nature.

Moreover, MPA management in the Great Lakes can advance designation and governance decision-making processes that are inclusive of Indigenous Nations in ways that honor rights, knowledge, and practices, such that the harms of the past are not repeated. NOAA's Sanctuary Advisory Councils and Parks Canada's Management Advisory Committees provide mechanisms for the agencies to continue integrating these voices into Great Lakes MPAs. We discuss additional mechanisms NOAA and Parks Canada have developed to more meaningfully engage with Indigenous Nations in Chapter 6.

### 3.2.3 - Disappearance of Nature (Habitat Loss and Biodiversity Decline)

Protected areas have been used as a tool to protect and preserve intact lands from habitat loss and exploitation for over a century in North America, while modern MPAs can trace their beginnings back to the 1960s (Humphreys and Clark, 2020). Freshwater protected areas have lagged far behind in this timeline, leaving aquatic nature vulnerable to anthropogenic pressures like overexploitation in the interim. However, Great Lakes MPAs have an opportunity to be a tool to stymie and reverse the disappearance of nature.

MPAs are well situated to continue to, as one interviewee phrased it, "*preserve the good*" and the pristine in the Great Lakes. There is significant desire for MPAs to "future proof" these pristine areas against destruction of habitat and potential damaging future uses (Canadian Parks and Wilderness Society, 2021), as described by one Great Lakes NGO employee: *"I think having the initial designation in place potentially gives you that ability in the future to be able to put in place*

*other protective measures for that area.*" Designating MPAs in "pristine" areas can protect species, habitats, and ecosystems with crucial ecological roles or those of special conservation concern, including source populations whose emigrants can recolonize or bolster populations in exploited areas (CEC, 2012; Brock et al., 2012; Hedges et al., 2010; Edsall et al., 1995). MPAs can also serve as sites to facilitate the establishment of self-sustaining populations of key species by providing relatively undisturbed habitat (Edsall et al., 1995).

Alternatively, there has been some recognition of the need for MPAs to go beyond preserving the "pristine" to also protect degraded and restored sites throughout the region as well. The ONMS has noted a goal in its 20-year visioning document to "identify areas that would simultaneously bolster protection in ecosystems that currently lack sanctuaries" to cover ecoregions, cultural areas, or representative habitats not already protected (NOAA ONMS, 2022b). Some, primarily in the NGO community, felt this was a potential mechanism to enhance these more degraded areas while connecting more people to the Great Lakes, with one stating, "*I think there's an even greater opportunity to think about how MPA designations could be used to draw attention to more degraded areas that have in some way outstanding ecological value. And I'm thinking of a place like western Lake Erie… candidly it's polluted. It doesn't meet water quality standards for large parts of the year. So you might think 'Why should a place that's degraded be considered a MPA?' Well, it has the highest fish community density in the Great Lakes region. It supports the most lucrative sport fishing industry in the Great Lakes and a commercial fishing industry in Canada. It has a massive tourism economy. So the idea of how we could use an MPA designation as a way of… actually challenging those areas to behave differently because of this MPA designation."* An MPA in a site such as this would have the opportunity to link to restoration activities within that site, including those under GLRI.

MPAs can also oppose biodiversity loss. Many of the benefits of oceanic MPAs have been extensively demonstrated; however, these benefits are still somewhat unclear in freshwater MPAs (Acreman et al., 2020, Chu et al., 2017, Zuccarino-Crowe et al., 2016). There is significant potential for Great Lakes MPA managers to establish the monitoring necessary to demonstrate the same effects seen in oceanic settings (see Section 7.2.1). Dealing directly with high-visibility fish species will be difficult due to long-standing fisheries management from the GLFC, although there may be opportunity for Great Lakes MPAs to address the threat of biodiversity loss in coordination with GLFC to optimize the location of no-take or other restrictive zones, while simultaneously helping GLFC to achieve their fisheries goals in communities where GLFC may have stronger relationships with local communities than Federal agencies (Council on Environmental Quality, 2023). Refer to Section 6.2.4 for additional discussion of MPA and fishery partnerships. There are additional opportunities for collaboration regarding outstanding questions like the potential role of shipwrecks for fish populations or other biota that could help to demonstrate MPAs effectiveness for stemming the disappearance of nature.

*"If they're [MPAs] really thought out, you would look at if part of the objective of a particular MPA is to protect or help the jurisdictions achieve their fishery objectives which might be, you know, natural reproduction of a certain species at certain levels in these protected areas. If they're thought out and science-based and brought forward in a collaborative way to the processes that exist to establish those objectives then I think they can make a very good case that if you do this here, let's just pick Isle Royale as an example, where if you establish a zone*

*on the lake trout spawning reef off of Isle Royale and have that be absolutely closed for this part of the year for these reasons. And you could tie it to how it helps them achieve their objectives. I think that's an amazing level of collaboration between the federal government… and the state governments and provincial and tribal which have to come to some understanding of what harvest levels are needed to sustain that fishery."*

*- Academic*

### 3.2.4 - Other Current and Emerging Threats

Myriad other threats face the Great Lakes, including aquatic invasive species, pollution, and energy and mineral development. The role of MPAs in addressing these threats varies drastically by threat, from relatively minor roles for pollution to substantial roles in protecting against mineral development.

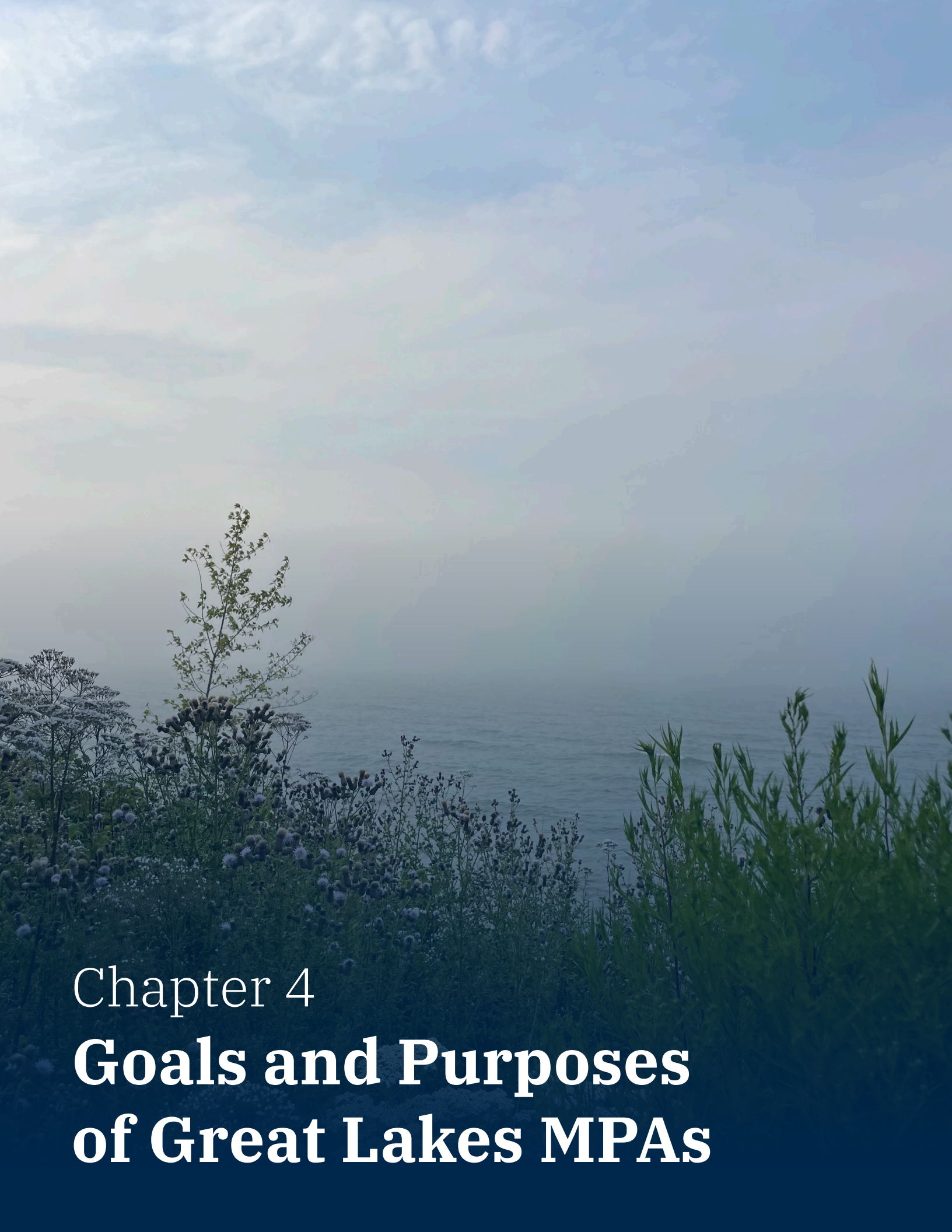
Aquatic invasive species have had major implications on aquatic ecosystems worldwide, though their effects on the Great Lakes are well documented, with more than 180 non-native (64 invasive) species established in the lakes (Hedges et al., 2010; IJC, 2023). Annex 6 of the GLWQA focuses on the prevention of non-native species, noting that the recent preventative efforts have begun to slow the rate of establishment of new invasive species (4 fully established over the past decade) (IJC, 2023). However, established invasive species continue to cause significant damage to the lake ecosystems, as evident by the food web disruptions resulting from the spread of dreissenid mussels and round goby (Karatayev and Burlakova, 2022). Additionally, invasive freshwater mussels have detrimental effects on submerged cultural and historical artifacts like shipwrecks (Zatko, 2023). Despite the risks that invasive species pose for natural, cultural, and historical resources within the Great Lakes MPAs, gaps still exist that future Great Lakes MPA networks may help address. One agency employee noted this potential, stating, "*right now, for example, zebra mussels are taking off on the north shore of Canada and that, obviously, is going to impact us and that MPA north of us. So, we don't have any formal working group that is addressing that at the moment. They're working on it on their end, we're just sort of keeping informed by it, it's not something that we're collaboratively addressing.*"

Another common threat facing the Great Lakes, pollution can take many forms, but is divided between nutrient pollution and toxic or chemical pollutants (as recognized by Annex 4 and 3 of the GLWQA, respectively). Struggles with nutrient pollution are well-documented in certain areas of the Great Lakes like the western and central basins of Lake Erie, Saginaw Bay, Green Bay, and more recently Duluth-Superior Harbor where high nutrients have fueled algal blooms (McKindles et al., 2020; Sterner et al., 2020). Toxic chemicals have a long history in the Great Lakes from industrialization throughout the early 20th century. These toxic pollutants have been heavily researched, though new emerging contaminants of concern like PFAS are still little understood (IJC, 2023). Nearly all of the major forms of pollutants that afflict Great Lakes waters are derived from terrestrial sources largely outside the scope of MPAs and thus will not be discussed at length in this report. However, there are some ways MPAs may combat pollutants by setting clear and comprehensive definitions of "dumping" and disposal for future MPAs (Canadian Parks and Wilderness Society, 2021).

Regulatory prohibition against future energy and mineral development is a key role of MPAs, as codified by the Canada National Marine Conservation Areas Act (CNMCAA) and the US National Marine Sanctuary Act (NMSA) (see Chapter 4 for more on the CNMCAA and NMSA). The role of Great Lakes MPAs in regulating other forms of non-extractive energy (e.g., offshore wind) is less clear, however, with the two countries simultaneously pursuing federal mandates for the expansion of conserved and protected lands and waters, and the expansion of renewable energy sources. This issue has been given some consideration in Europe but has been less tested in the North American Great Lakes due to the much smaller presence of offshore wind energy in the Great Lakes (Stephenson, 2023). This too, will not be discussed at length here, but it is worth mentioning while looking towards the future of Great Lakes MPAs.

"*There's value in saying, "Okay, we're going to designate this area as an MPA or whatever it is, with certain specific goals." So an advocate in Duluth or in Thunder Bay or in Marquette can say when a new use is proposed… It's something to refer to when you're kind of filtering out potential future uses of that place. And I think that can be really healthy and welcome for an aquatic space that has a relatively good quality*."

*- NGO Employee*



Chapter 4

# Goals and Purposes of Great Lakes MPAs

There is not a single authority or framework that sets priorities and regional goals for the Great Lakes. Canada and the US have different national level goals for marine protected areas (MPAs) and site-specific objectives for each MPA which are outlined in National Marine Sanctuary (NMS) and National Marine Conservation Area (NMCA), respectively. Great Lakes MPAs are well suited to align with future-looking regional goals, including 30x30 targets. This chapter provides an overview of the goals and purposes of existing federal Great Lakes MPAs within the context of broader regional goals and priorities for the Great Lakes. These goals are then compared with the GBF Target 3 and America the Beautiful to ultimately determine foundational steps that the National Oceanic and Atmospheric Administration (NOAA) and Parks Canada could take to assure that the goals and purposes of a Great Lakes MPA network are in line with these national conservation goals.

## 4.1 - Current Goals and Purposes of Great Lakes MPAs

### 4.1.1 - Great Lakes Regional Priorities and Goals

Priorities and goals within the Great Lakes are not set by any one body nor constrained to any one framework. Several binational commissions exist to coordinate goals, objectives, and activities at the regional level within the Great Lakes: the Great Lakes Commission (GLC), International Joint Commission (IJC), and the Great Lakes Fisheries Commission (GLFC). The Great Lakes Water Quality Agreement (GLWQA), which has established general objectives in response to the threats recognized in the agreement, is perhaps the closest thing to a set of Great Lakes-specific goals. This is a framework under which the aforementioned commissions can set goals and implement targets, though the functions of the commissions are not limited to their duties under GLWQA. While these commissions have typically operated in relative isolation, a recent memorandum of understanding has set out to "detail the specifics of the working relationship between the IJC-GLRO (Great Lakes Regional Office), GLFC, and GLC on Great Lakes issues of mutual interest. These currently include, but may not be limited to, the decadal science plan project, science vessel coordination…" (IJC et al., 2024).

> *"There are different entities that have different authorities, overlapping authorities. And those authorities vary as you go from place to place in the Great Lakes… It's really complex. There are structures in place in the Great Lakes Water Quality Agreement to collaboratively manage the Great Lakes. They are cumbersome, I mean, they're necessary, but they're also cumbersome and slow. And it's difficult to establish agreed upon quantitative goals for those"*
>
> *- NGO Employee*

The IJC produces frequent documentation regarding progress towards some of the common goals for the Great Lakes region. For example, the IJC's Third Triennial Assessment of Great Lakes Water Quality places significant emphasis on the role of climate change, specifically in terms of improving binational collaboration to address gaps (IJC, 2023). Included in this report is the recommendation to "develop common, basin-wide and scalable climate resiliency goals with transparent and accountable performance metrics and assessment processes, to be included in each of the Annex 2 Lakewide Action and Management Plans as they are developed." (IJC,

2023). Similarly, the IJC's Science Strategy Report for the Next Decade calls for prioritization of "basic process research," which involves "a more complete understanding of the physics, biogeochemistry, food webs, climate forcing and dynamics of the interactions between the lakes and their watersheds" and requires "predicting future states of the Great Lakes that could jeopardize the economic productivity of the region and social well-being." (IJC, 2022). These goals are reflected at the individual lake level through the goals and actions embedded in Lakewide Action Management Plans (LAMPs). For instance, the most recent Lake Superior LAMP identified 49 actions for United States (US), Canadian, and Tribal partner agencies to take to meet the goals of the GLWQA (ECCC and US EPA, 2022). However, it has not been entirely clear as to how MPAs fit into this agenda, as evidenced by recent LAMPs providing little, if any, consideration of MPAs (US EPA, 2023).

The GLC similarly has established clear binational goals through their strategic plan for the Great Lakes as well as through the 1955 Great Lakes Compact. For example, their goal that healthy aquatic ecosystems "are protected from the negative impacts of aquatic invasive species and other stressors, and provide cultural and economic benefits to local communities" includes key priority areas and specific actions to achieve those goals like those to "support Canadian federal programs directed at Great Lakes restoration and protection" and "support opportunities, initiatives, and investments that identify and prioritize coastal conservation and habitat restoration needs, share knowledge, and contribute to decision-making" (GLC, 2023). However, like LAMPs, MPAs have not been explicitly called out as mechanisms towards achieving these goals.

The GLFC has clear objectives to develop a binational research program to sustain Great Lakes fish stocks, and to "formulate and implement a comprehensive program for the purposes of eradicating or minimizing the sea lamprey populations" (GLFC, 1954).

Additionally, although there has been significant research and discussion of the goals and priorities for ecological and physical science in the Great Lakes, social goals have only recently begun to gain attention in the Great Lakes (Jurjonas et al., 2023). For instance, while the Great Lakes Restoration Initiative (GLRI) (under the GLWQA) has clearly outlined objectives like Objective 4.1 to "Protect and restore communities of native aquatic and terrestrial species important to the Great Lakes" with corresponding measures for those goals such as "Acres of coastal wetland, nearshore, and other habitats restored, protected, or enhanced," social outcomes from achievement of these goals have not been included or prioritized to the same extent (US EPA, 2019; Jurjonas et al., 2023; Williams et al., 2023). However, goals around the protection and restoration in the Great Lakes have begun to reflect the need for corresponding social goals (Jurjonas et al., 2023), with one interviewee reflecting this change saying, "*the data needs to be bigger than the fish… It needs to be bigger than the ecological indicators that are often considered. What are the human well-being indicators that might be impacted by this? It's not just how many jobs will be created, it's also about identity and quality of life. And some of those indicators are actually generated by the people who live there - asking them what's missing? Those are social science research questions that are often left out of a lot of ecological planning*. However, despite these regional goals and priorities MPAs still remain largely absent from discussions surrounding future aspirations for the region.

### 4.1.2 - Legislative and Management Goals of Federal Great Lakes MPAs

NOAA manages MPAs, specifically NMSs, in the Great Lakes according to several regulations, policies, and other governing documents. The primary framework for NOAA's management of NMSs is the National Marine Sanctuaries Act (NMSA), which authorizes NOAA to designate and manage NMSs and outlines the overarching goals of NMSs (National Marine Sanctuaries Act, 2000). The establishment and management of NMCA's in Canada is guided by the Canada National Marine Conservation Areas Act (CNMCAA), which provides the legal authority to establish and manage NMCAs (Canada National Marine Conservation Areas Act, 2002). The following sections outline the legislative and management goals of NOAA and Parks Canada-managed MPAs in the Great Lakes, including their alignment with 30x30 goals.

#### The US Great Lakes NMSs

NMSs in the US are managed by NOAA through the NMSA. The NMSA aims to protect against the destruction, loss or injury of any sanctuary resource managed under the laws and regulations for that specific sanctuary. What constitutes as a "sanctuary resource managed under the laws or regulations of that sanctuary" can differ drastically from sanctuary to sanctuary based on "conservation, recreational, ecological, historical, scientific, cultural, archaeological, educational, or esthetic qualities," all of which are cited as potential rationales for site designation (National Marine Sanctuaries Act, 2000). In US waters of the Great Lakes, MPAs have been designated only for cultural, historical, archaeological, and educational purposes, with ecological benefit and research occurring as a secondary benefit.

> *"The sanctuaries that are either designated or in designation status are not focused on the ecology of the Great Lakes, they're focused on the cultural and historical resources. So the direct answer is that we do not have regulations that support Great Lakes protection from a natural resources perspective."*
>
> *-Agency Employee*

#### Thunder Bay National Marine Sanctuary

The primary management goal of the Thunder Bay National Marine Sanctuary (TBNMS) is "to protect the underwater cultural resources of the Thunder Bay region, in partnership with the State of Michigan, to ensure the long-term use and integrity of those resources for present and future generations," placing cultural resources at the forefront of management activities (NOAA, 2000). Additionally, TBNMS has goals set around a research agenda to support overall cultural resource management, including through education programs "that focus on underwater cultural resources and the maritime heritage of the region. The goal of the Sanctuary's education program is to improve public awareness, understanding and appreciation of these resources," and "to facilitate, to the extent compatible with the primary objective of resource protection, public and private uses of Sanctuary resources which are not prohibited" (NOAA, 2000).

### Wisconsin Shipwreck Coast National Marine Sanctuary

Similar to TBNMS, Wisconsin Shipwreck Coast National Marine Sanctuary's (WSCNMS) primary resources of concern are cultural resources, defined as "all prehistoric, historic, archaeological, and cultural sites and artifacts within the sanctuary boundary" (NOAA ONMS, 2020b). The final management plan notes that "while the effects of natural processes such as ice or invasive mussel damage on shipwrecks will be studied using strategies found in the Research Protection Action Plan, that plan is designed to assess and reduce human impacts on sanctuary resources" (NOAA ONMS, 2020b). Also similar to TBNMS, WSCNMS has additional secondary goals for providing "innovative, technology-driven, and placed-based educational opportunities," and to "protect the sanctuary resources by inventorying, locating, documenting, assessing, managing, and interpreting the sanctuary's archaeological, historical, and environmental resources" (NOAA ONMS, 2020b).

### Alignment of NMS Goals with 30x30 Goals

At the national level, the US's NMSA contains goals that align with many of the goals set in GBF Target 3 (Table 5) and America the Beautiful (Table 6). However, much of this overlap is applicable only when the primary resources being directly protected (as determined by individual site management plans) are ecological resources. For instance, "maintaining the natural biological communities" is not applicable in areas where the purpose for resource protection is cultural or historical like the two existing and two proposed sanctuaries in the Great Lakes (NOAA ONMS, 2019; 2015). Because America the Beautiful does not have a strict definition of "conserved" in its 30% goal, these sanctuaries align with the goals of America the Beautiful. However, the existing Great Lakes MPA goals do not align with many of the ecologically-focused goals of GBF Target 3. For example, Target 3 stipulates that "protected areas must be managed with the primary objective of achieving positive outcomes for biodiversity" while the TBNMS Final Rule states that the "the highest priority management goal is to protect the underwater cultural resources of the Thunder Bay region." While some have suggested that there may be ecological benefits derived from these protected areas regardless, at the level of primary goal-setting, Great Lakes NMSs do not currently fit the criteria of Target 3.

However, many of the secondary goals of Great Lakes NMSs do align with principles of America the Beautiful and GBF Target 3. The existing US NMSs contain strong goals for scientific research and monitoring, directly aligning with the Target 3 goal for effective conservation and management through "adequate and appropriate resourcing and consistent monitoring," as well as with the America the Beautiful goal to use science as a guide for conservation.

**Table 5.** NMSA purposes and goals cross-referenced with GBF Target 3 criteria.

| GBF Target 3 Criteria | Criteria Description (Secretariat of the CBD, n.d.) | NMSA Goals and Purpose (National Marine Sanctuaries Act, 2000) |
|---|---|---|
| **At least 30 percent of terrestrial and inland water areas, and of marine and coastal areas** | "This quantitative element of the target specifies that, globally, at least 30 percent of terrestrial and inland water areas, and at least 30 percent of marine and coastal areas should be conserved or protected by 2030." | "Cooperate with global programs encouraging conservation of marine resources" |
| **Areas of particular importance for biodiversity and ecosystem functions and services** | "Areas particularly important for biodiversity include areas high in species richness or threatened species, threatened biomes and habitats, areas with particularly important habitats and areas that are important for the continued provision of ecosystem functions and services. The protection of such areas should be prioritized in reaching this target." | "Identify and designate as national marine sanctuaries areas of the marine environment which are of special national significance" |
| **Effectively conserved and managed** | "Protected areas and OECMs must be managed with the primary objective of achieving positive outcomes for biodiversity. Effective management and sustained positive outcomes for biodiversity conservation requires the adoption of appropriate management objectives and processes, governance systems, adequate and appropriate resourcing and consistent monitoring." | "Maintain the natural biological communities in the national marine sanctuaries, and to protect, and, where appropriate, restore and enhance natural habitats, populations, and ecological processes" |
| **Ecologically representative** | "Protected areas and OECMs should contain adequate samples of the full range of existing ecosystems, ecological processes and regions." | |
| **Well-connected** | "In order for protected areas and OECMs to be effective, they should be connected through corridors as well as integrated into wider landscapes, seascapes and the ocean. This is an essential element of creating effective systems or networks of protected and conserved areas that can meet sustained in situ conservation outcomes and cope with stresses and disturbances, including from the impacts of climate change." | |
| **Equitably governed** | "A key element of the equitable governance of protected areas and OECMs is ensuring that relevant actors are involved and able to fully participate in their establishment, management and governance and that the costs and benefits of establishing and managing such areas are shared fairly. It also includes effective participation in decision-making, transparent procedures, access to justice in conflicting situations, and the recognition of the rights and diversity of the people that will be affected by the establishment and management of protected areas and OECMs." | |

| | | |
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| **Sustainable use consistent with conservation objectives** | "Some types of protected areas and OECMs allow for limited types of non-industrial, traditional, cultural activities to occur within their boundaries. Examples could include hunting, fishing, gathering and tourism. Where these activities are permitted within protected areas and OECMs, they should be sustainable and consistent with conservation objectives." | "Provide authority for comprehensive and coordinated conservation and management of these marine areas, and activities affecting them, in a manner which complements existing regulatory authorities"<br><br>"Facilitate to the extent compatible with the primary objective of resource protection, all public and private uses of the resources of these marine areas not prohibited pursuant to other authorities"<br><br>"Enhance public awareness, understanding, appreciation, and wise and sustainable use of the marine environment, and the natural, historical, cultural, and archeological resources" |
| **The rights of Indigenous peoples and local communities** | "All activities carried out under this target must be done so recognizing and respecting the rights of Indigenous peoples and local communities, including over their traditional territories. This includes, as specified in Section C of the Kunming-Montreal Global Biodiversity Framework that rights, knowledge, including traditional knowledge associated with biodiversity, innovations, worldviews, values and practices of Indigenous peoples and local communities are respected, and documented and preserved with their free, prior and informed consent, including through their full and effective participation in decision-making, in accordance with relevant national legislation, international instruments, including the United Nations Declaration on the Rights of Indigenous Peoples." | "Develop and implement coordinated plans for the protection and management of these areas with appropriate Federal agencies, State and local governments, Native American tribes and organizations, international organizations, and other public and private interests concerned with the continuing health and resilience of these marine areas" |

**Table 6.** NMSA purposes and goals cross-referenced with America the Beautiful principles.

| America the Beautiful Principles | America the Beautiful Principle Description (US Department of Interior, 2021) | NMSA Goals and Purpose (National Marine Sanctuaries Act, 2000) |
|---|---|---|
| **Pursue a Collaborative and Inclusive Approach to Conservation** | The spirit of collaboration and shared purpose should animate all aspects of America's nature conservation and restoration efforts over the next decade. The US should seek to build upon the myriad examples where collaboration and consensus-building have led to significant conservation outcomes. | "Develop and implement coordinated plans for the protection and management of these areas with appropriate Federal agencies, State and local governments, Native American tribes and organizations, international organizations, and other public and private interests concerned with the continuing health and resilience of these marine areas" |
| **Conserve America's Lands and Waters for the Benefit of All People** | The conservation and restoration of natural places in America should yield meaningful benefits in the lives of all Americans, and these benefits should be equitably distributed. The conservation value of a particular place should not be measured solely in biological terms, but also by its ability to help America prepare for and respond to the impacts of climate change, or to unlock access for outdoor recreation, hunting, angling, and beyond. | "Facilitate to the extent compatible with the primary objective of resource protection, all public and private uses of the resources of these marine areas not prohibited pursuant to other authorities" |
| **Support Locally Led and Locally Designed Conservation Efforts** | Every community in the United States has its own relationship with nearby lands and waters, and every community is working in some way to conserve the places that matter the most to it. The Federal Government should do all it can to help local communities achieve their own conservation priorities and vision. Locally and regionally designed approaches can play a key role in conserving resources and be tailored to meet the priorities and needs of local communities and the nation. Conservation and restoration efforts should also be regionally balanced. Marine conservation efforts should reflect regional priorities and seek to achieve balanced stewardship across US ocean areas. | "Develop and implement coordinated plans for the protection and management of these areas with appropriate Federal agencies, State and local governments, Native American tribes and organizations, international organizations, and other public and private interests concerned with the continuing health and resilience of these marine areas" |
| **Honor Tribal Sovereignty and Support the Priorities of Tribal Nations** | Tribal Nations have sovereign authority over their lands and waters, possess long-standing treaty hunting and fishing rights on and off reservations, and have many cultural, natural, and sacred sites on national public lands and the ocean. Efforts to conserve and restore America's lands and waters must involve regular, meaningful, and robust consultation with Tribal Nations. These efforts must respect and honor Tribal sovereignty, treaty and subsistence rights, and freedom of religious practices. Federal agencies should seek to support and help advance the priorities of Indigenous Peoples, including those related to sustainable land management and the conservation of natural, cultural, and historical resources. | "Develop and implement coordinated plans for the protection and management of these areas with appropriate Federal agencies, State and local governments, Native American tribes and organizations, international organizations, and other public and private interests concerned with the continuing health and resilience of these marine areas" |
| **Pursue Conservation** | Conserving and restoring the nation's lands and waters can yield immense economic benefits. | |

| | | |
|---|---|---|
| **and Restoration Approaches that Create Jobs and Support Healthy Communities** | A healthy ocean, for example, supports productive fisheries and vibrant working waterfronts. Locally driven, nationally scaled conservation campaigns over the next decade can help lift America's economy, address environmental justice, and improve quality of life. | |
| **Honor Private Property Rights and Support the Voluntary Stewardship Efforts of Private Landowners and Fishers** | There is a strong stewardship ethic among America's fishers, farmers, ranchers, forest owners, and other private landowners. US working lands and waters give our nation food and fiber and keep rural and coastal communities healthy and prosperous. They are also integral to conserving functioning habitats and connecting lands and waters across the country. Efforts to conserve and restore America's lands and waters must respect the rights of private property owners. Such efforts must also build trust among all communities and stakeholders, including by recognizing and rewarding the voluntary conservation efforts of private landowners and the science-based approaches of fishery managers. | "Facilitate to the extent compatible with the primary objective of resource protection, all public and private uses of the resources of these marine areas not prohibited pursuant to other authorities" |
| **Use Science as a Guide** | Scientists have made remarkable gains in understanding the complicated natural systems that support human communities, particularly in the face of climate change. Studies of the carbon sequestration potential of lands and the ocean; of biodiversity loss, ecosystem services, and the movement and migration of wildlife; and of air and water pollution are part of a large and growing body of scientific information that can help guide decisions about how the nation should manage, connect, and conserve its lands and waters. Conservation efforts are more successful and effective when rooted in the best available science and informed by the recommendations of top scientists and subject matter experts. Transparent and accessible information will increase shared understanding and help build trust among stakeholders and the public. The use of Indigenous and Traditional Ecological Knowledge can complement and integrate these efforts | "Support, promote, and coordinate scientific research on, and long-term monitoring of, the resources of these marine area" |
| **Build on Existing Tools and Strategies with an Emphasis on Flexibility and Adaptive Approaches** | The US has long been a global innovator in natural resource conservation and stewardship, from inventing the idea of national parks to forging market-based strategies for slowing the loss of the nation's essential wetlands. Though President Biden's national conservation goal is ambitious, it can be achieved using the wide array of existing tools and strategies that Tribal Nations, territories, State and local governments, private landowners, non-profit organizations, fishing communities, Congress, and Federal agencies have already developed and deployed effectively. These tools range from grant programs for local parks and coastal restoration projects, to conservation programs on working lands, to the designation of locally crafted recreation and conservation areas on public lands and waters, to using the stakeholder-driven processes for marine fisheries management and sanctuary designations, among other examples. Agencies should support the flexible application of tools, innovation in designing new approaches, and, where appropriate, the use of adaptive management to help adjust to a changing climate, shifting pressures, and new science. | "Create models of, and incentives for, ways to conserve and manage these areas, including the application of innovative management techniques" |

### The Canadian Great Lakes NMCAs

Parks Canada administers Canadian NMCAs under the CNMCAA. The CNMCAA maintains overall objectives of "protecting and conserving representative marine areas for the benefit, education and enjoyment of the people of Canada and the world," "in a sustainable manner that meets the needs of present and future generations without compromising the structure and function of the ecosystems, including the submerged lands and water column, with which they are associated," including "at least one zone that fully protects special features or sensitive elements of ecosystems" (CNMCAA, 2002).

### Fathom Five National Marine Park

Fathom Five National Marine Park's (FFNMP) origins predate Canada's passing of the CNMCAA in 2002. A federal-provincial agreement signed in 1987 transferred 11,175 hectares (27,614 acres) to Parks Canada, establishing the FFNMP in the Georgian Bay Marine Region (Parks Canada Agency, 1998). Despite predating the CNMCAA, the park continues to be managed "in the spirit of the CNMCAA," with the park's 2010 State of the Park Report noting that "although the Act (and policy) [CNMCAA] does not herald terms such as 'ecological integrity' or 'ecological health,' or explicitly define the management concepts of ecosystem management, precautionary principle or ecologically sustainable use, the priority for MPAs is to protect ecosystem structure, function, and biodiversity and ensure that use is ecologically sustainable" (Parks Canada Agency, 2010). One interviewee told us, "*Fathom Five was not created for ecological boundaries, and that's a pretty big limiting factor for it and its contribution to those larger Marine Conservation Area goals. We do the best we can with what Fathom Five is, and we're really proud of that.*" This management spirit has led to respective goals to maintain ecosystem structure and function and to enrich the human experience in a sustainable manner based around the precautionary principle (Parks Canada Agency, 1998). As such, the maintenance of structure and function of marine ecosystems is the first priority when considering zoning and management of visitor use and resource harvesting (Parks Canada Agency, 1998).

Beyond ecological health, FFNMP has primary goals to protect and manage the conservation area's significant cultural resources; offer visitor groups and other regional audiences opportunities to understand, appreciate, and enjoy the natural and cultural values of the park; and integrate these educational and recreational programs with other federal, provincial, and First Nations in the region (Parks Canada Agency, 1998).

### Lake Superior National Marine Conservation Area

Lake Superior National Marine Conservation Area (LSNMCA) - established in 2015 - covers 10,880 $km^2$ (4,200 $mi^2$) of northern Lake Superior (Figure 4; Parks Canada Agency, 2016). While the lands to LSNMCA have not been officially transferred to the federal government from Ontario, (see Chapter 5), the park still has crafted management strategies to help achieve the goals and overall vision of the CNMCAA (Parks Canada Agency, 2016). The overarching goal of the LSNMCA is to "continue to foster ecologically sustainable use and meaningful visitor experiences, the protection of natural and cultural resources, enhanced ecosystem health, and the increased appreciation of the Lake Superior NMCA" (Parks Canada Agency, 2016). The strategies under this primary NMCA goal include offering visitors "the opportunity to experience the natural beauty, majesty and serenity of Lake Superior," "honouring both the natural and

human history of the area by involving and celebrating the communities of the present," promoting shared stewardship, and reaching out from local communities to the world through the foundations of coastal communities and First Nations.

### Alignment of NMCA Goals with 30x30 Goals

The CNMCAA of 2002 contains numerous goals that align with most aspects of GBF Target 3 (Table 7; Appendix E) (Canada National Marine Conservation Areas Act, 2002). As stated in the original 2002 legislation, NMCAs are to be "managed and used in a sustainable manner that meets the needs of present and future generations without compromising the structure and function of the ecosystems, including the submerged lands and water column" and that NMCAs are to contain zones to both "encourage sustainable use of marine resources and to protect special features or sensitive elements of ecosystems." Here, protection extends to ecosystems, cultural, historical, and archaeological resources, but with ecosystems and precautionary principle being the primary consideration in management. Additionally, provisions of the CNMCAA to consider bottom-up proposals and to enter agreements with "other federal departments, provinces and territories, and Indigenous governing bodies…" algins with 30x30 social objectives for equitable governance and respecting the rights of Indigenous peoples and local communities.

> *"I think the most obvious overlap is that both the 30x30 and NMCA management plans generally have the same underlying goal to conserve biodiversity and protect the marine environment"*
>
> *- Agency Employee*

Goals at the site level within the Canadian Great Lakes are worded slightly different from these nationally-set goals, given that FFNMP has not been formally established and that LSNMCA has not officially had lands transferred to it. However, generally speaking, the management goals are similar. For instance, FFNMP's 1998 Management Plan states that "maintaining the structure and function of marine ecosystems must be the first priority" when weighing regulations and uses. While worded slightly differently, this aligns with the primary considerations for management being principles of ecosystem management and the precautionary principle (CNMCAA, 2002). Due to its small size, FFNMP deviates from some of the goals enshrined in 30x30, including the need for well-connected MPAs and MPAs that achieve positive outcomes for biodiversity, considering evidence supporting the conservation benefits of large MPAs (Acreman, et al., 2020; Hedges, et al., 2010; Ohayon et al., 2021). While the most recent FFNMP Management Plan does not set specific objectives regarding the rights of Indigenous peoples, Parks Canada has adopted and implemented the goals of the United Nations Declaration on the Rights of Indigenous (UNDRIP) with the passing of the UNDRIP Act in 2021 (United Nations Declaration on the Rights of Indigenous Peoples Act, 2021; Parks Canada Agency, 1998; 2010). Through the UNDRIP legislation and other nationally-set objectives outlined in NMCA policy, Parks Canada has more closely aligned management goals at FFNMP with 30x30 criteria. FFNMP's continued efforts and collaborations with SON are discussed further in Section 6.1.4.

In part due to its more recent release in 2016, the goals outlined in LSNMCA's Interim Management Plan more closely mirrors that of the CNMCAA, albeit without the regulatory

power held in other NMCAs due to the lack of official land transfer from Ontario. As such, the goals of its Interim Management Plan closely reflect 30x30 goals in terms of encouraging sustainable use, protecting areas of particular importance, seeking equitable governance, and respecting the rights of Indigenous peoples and local communities (Parks Canada Agency, 2016).

Despite areas of alignment between Great Lakes MPAs and 30x30 goals, the need remains for a binational MPA network to create a more cohesive set of network goals in order to communicate to the broader Great Lakes community exactly what their goals are, as well as how these goals fit within the context of regional Great Lakes goals.

**Table 7.** Alignment of CNMCAA Goals and Purposes with GBF Target 3.

| GBF Target 3 Criteria | GBF Target 3 Criteria Description (Secretariat of the CBD, n.d.) | CNMCAA Goals and Purposes (Canada National Marine Conservation Areas Act, 2002) |
|---|---|---|
| **At least 30 percent of terrestrial and inland water areas, and of marine and coastal areas** | "This quantitative element of the target specifies that, globally, at least 30 percent of terrestrial and inland water areas, and at least 30 percent of marine and coastal areas should be conserved or protected by 2030." | |
| **Areas of particular importance for biodiversity and ecosystem functions and services** | "Areas particularly important for biodiversity include areas high in species richness or threatened species, threatened biomes and habitats, areas with particularly important habitats and areas that are important for the continued provision of ecosystem functions and services. The protection of such areas should be prioritized in reaching this target." | "Each marine conservation area… must include… at least one zone that fully protects special features or sensitive elements of ecosystems, and may include other types of zones" |
| **Effectively conserved and managed** | "Protected areas and OECMs must be managed with the primary objective of achieving positive outcomes for biodiversity. Effective management and sustained positive outcomes for biodiversity conservation requires the adoption of appropriate management objectives and processes, governance systems, adequate and appropriate resourcing and consistent monitoring." | "...the primary considerations in the development and modification of management plans and interim management plans shall be principles of ecosystem management and the precautionary principle." |
| **Ecologically representative** | "Protected areas and OECMs should contain adequate samples of the full range of existing ecosystems, ecological processes and regions." | "...the primary considerations in the development and modification of management plans and interim management plans shall be principles of ecosystem management and the precautionary principle." |
| **Well-connected** | "In order for protected areas and OECMs to be effective, they should be connected through corridors as well as integrated into wider landscapes, seascapes and the ocean. This is an essential element of creating effective systems or networks of protected and conserved areas that can meet sustained in situ conservation outcomes and cope with stresses and disturbances, including from the impacts of climate change." | "Establish a system of marine conservation areas that are… of sufficient extent and such configuration as to maintain healthy marine ecosystems." |
| **Equitably governed** | "A key element of the equitable governance of protected areas and OECMs is ensuring that relevant actors are involved and able to fully participate in their establishment, management and governance and that the costs and benefits of establishing and managing such areas are shared fairly. It also includes effective participation in decision-making, transparent procedures, | "Involve federal and provincial ministers and agencies, affected coastal communities, aboriginal organizations, aboriginal governments, bodies established under land claims agreements and other appropriate persons and bodies in the effort to establish and maintain the representative system of marine conservation |

| | | |
|---|---|---|
| | access to justice in conflicting situations, and the recognition of the rights and diversity of the people that will be affected by the establishment and management of protected areas and OECMs." | areas." |
| **Sustainable use consistent with conservation objectives** | "Some types of protected areas and OECMs allow for limited types of non-industrial, traditional, cultural activities to occur within their boundaries. Examples could include hunting, fishing, gathering and tourism. Where these activities are permitted within protected areas and OECMs, they should be sustainable and consistent with conservation objectives." | "...provide opportunities, through the zoning of marine conservation areas, for the ecologically sustainable use of marine resources for the lasting benefit of coastal communities" |
| **The rights of Indigenous peoples and local communities** | "All activities carried out under this target must be done so recognizing and respecting the rights of Indigenous peoples and local communities, including over their traditional territories. This includes, as specified in Section C of the Kunming-Montreal Global Biodiversity Framework that rights, knowledge, including traditional knowledge associated with biodiversity, innovations, worldviews, values and practices of Indigenous peoples and local communities are respected, and documented and preserved with their free, prior and informed consent, including through their full and effective participation in decision-making, in accordance with relevant national legislation, international instruments, including the United Nations Declaration on the Rights of Indigenous Peoples." | "Involve… aboriginal organizations, aboriginal governments, bodies established under land claims agreements and other appropriate persons and bodies in the effort to establish and maintain the representative system of marine conservation areas" |

## 4.2 - Opportunities to Enhance and Further Great Lakes MPA Goals

### 4.2.1 - Opportunities to Coordinate MPA Goals and Purposes of Great Lakes Protection

The current goals of Great Lakes MPAs both overlap and diverge with 30x30, basin-wide, and individual lake goals. However, there is opportunity for NOAA and Parks Canada to advance the position of MPAs in the Great Lakes through aligning the goals of individual MPAs and a regional MPA network with broader 30x30 and basin-wide goals. Foundational to a Great Lakes MPA network is the need to create common goals, purposes, and definitions that mesh with broader, well-established Great Lakes regional goals. "To determine success in ecosystem restoration [and conservation], there must be a clearly defined goal, several success criteria or objectives, and a way in which to measure the criteria compared with some baseline" (Jurjonas, et al., 2023).

Described in section 4.1.1, the Great Lakes region has a number of well established commissions and tools for coordination of activities both at the basin level and at the individual lake level. These forums have established forward looking priorities and goals for the Great Lakes. While these priorities and goals align well with the goals of NOAA and Parks Canada's MPA programs, this alignment is currently not well realized by the broader Great Lakes community. For instance, Annex 7 (Habitat and Species) of GLWQA includes priorities to "strengthen binational collaborative actions to conserve, protect, maintain, restore and enhance native species and habitat by identifying protected areas, conservation easements and other conservation mechanisms to recover populations of species at risk and to achieve the target of net habitat gain." However, respective LAMPs like the Lake Superior LAMP have not given extensive consideration to MPAs. One reason that this consideration has not been given was described by an interviewee as such:

> *"If they know their purpose, their goals and objectives, and the actions to meet those objectives and everyone agrees that that's the right approach, maybe there's a hierarchical type or phased approach that they could take. So once they get their stories, the way they want them to, then they take it to each lake partnership. So under the Great Lakes Water Quality Agreement… there's the habitat and species annex… I think there's platforms at a very rudimentary level that [NOAA and Parks Canada] can start to insert themselves into and test the waters. So see what lake managers and the agencies that sit on those partnerships say. And if it's a positive response, and they build on that, or it's a negative response, we learn from it."*
>
> *- NGO Employee*

Central to getting the story of MPAs out to the broader Great Lakes community is reaching a set of common definitions about what "positive outcomes" of MPAs are, given that defining these foundational definitions in turn informs protection, monitoring, and reporting. As one interviewee put it, "*until we can agree on the terms of what a positive conservation outcome is, we can't achieve it, we can't get towards it… I think it almost always comes back to that same point*." Clearly defining and communicating regional MPA goals can help managers frame issues, establish effective management plans, and develop strategies for addressing issues. Defining regional MPA outcomes can help managers implement Strategic Adaptive Management (SAM)

by setting desired ecological conditions, which managers might extend beyond the MPA boundaries (Canadian Parks and Wilderness Society, 2021; Kingsford et al., 2011; Gleason, et al., 2010).

Clearly defining conservation and socioeconomic goals as a foundation for a network is crucial to building a high degree of legitimacy to move MPAs forward (Parker et al., 2015). Some interviewees noted this need for alignment of a Great Lakes MPA network's goals, with one stating the need to "*first and foremost, get on the table agreement as to what a [Great Lakes MPA network is] trying to achieve?"* As this interviewee would go on to say, the goals of the network will have substantial bearing on the design of the network, "*If we're focusing exclusively on water quality, the network may look like this. If we're focused on fisheries health the network may look like this, if we're focused on the conservation of maritime heritage and cultural resources, the system may look like this."* Without building this consensus about the network's goals across governing bodies across the Great Lakes, integrating MPAs into existing binational platforms will be difficult. One interviewee noted the need to align with regional platforms due to the prominent role of state and provinces in Great Lakes governance, stating that, "*given all of the authority that is vested in states and provinces, perhaps the best and most effective way of achieving and improving the health of the Great Lakes is to improve the policies and management priorities of those state and provincial governments that have those authorities, so that they have the same goals and objectives that you or Parks Canada or NOAA would have for the Great Lakes."*

Building consensus regarding goals will be particularly important given that some interviewees voiced opposition to quantitative protection targets for land and water (i.e., 30x30) in the Great Lakes, even though national and international goals have clearly settled upon the 30% protection benchmark. For instance, one academic told us, "*the ultimate goal is restoring the health of the Great Lakes. If you do that, then you're not talking about 30%. You're talking about 100%. And so that's always been the goal."* On the flip side, others have considered that 30% may not be an appropriate goal unless management can be demonstrated to effectively manage potentially harmful uses. Thus, we identify that coming to a common agreement on the goals of a Great Lakes MPA network before attempting to more fully integrate MPAs within the region will be crucial to allaying these concerns.

Clearly defining, aligning, and communicating goals and objectives for the regional component of a MPA network, consistent with legislative goals, make it possible to effectively frame the issues to be resolved (Gleason et al., 2010). Additionally, legal mandates are a key factor in the success of large scale MPA network planning processes (Gleason et al., 2010). In light of a lack of an official mandate requiring binational collaboration for NMCAs and NMSs, using a platform that moves beyond site-specific and agency-specific teams like GLPAN as a means to build the "story" of a Great Lakes MPA network's goals could represent a crucial first step in building support for MPAs within the wider Great Lakes community.

*"A [Great Lakes MPA network] would be an international program that Canada, the US, all of the sovereign nations commit to. It has clear goals… clear benefits… clear outcomes."*

*- NGO Employee*

### 4.2.2 - Opportunities to Situate Great Lakes MPA Priorities within Broader Regional Goals

#### Restoration

Great Lakes MPAs are well suited to fit with future-looking regional goals for protection and restoration. As the Great Lakes region continues to move forward from its historically degraded state, regional priorities are beginning to shift to incorporate ecosystem protection alongside and in conjunction with ecosystem restoration activities. These priorities are reflected in the most recent GLRI Action Plans commitments to "Identify habitats that support important Great Lakes species and take actions to restore, protect, enhance, and/or provide connectivity for these [important native species] habitats" with metrics for "acres of coastal wetland, nearshore, and other habitats restored, *protected*, or enhanced." (emphasis added) (US EPA, 2019). Some interviewees noted that as restoration activities like those of GLRI are completed, there is additional need to complement restoration efforts with protection efforts with one interviewee saying, "*the GLRI plans, it gives you a sense of where the most important initiatives are, for government issues for Great Lakes restoration and protection. And so the four elements in the prescription paper [Prescription for Great Lakes Ecosystem Protection and Restoration]… one was restoration - really restore the nearshore communities. Second was prevent… new stressors. The third was preserve what's already good, which I think is what the MPA piece is.*" This is reflected in recent LAMPs like the Lake Superior LAMP that states, "to maintain Lake Superior's overall "good" condition, restoration efforts are necessary in many degraded areas, but more importantly, protection and conservation actions are essential."

Despite this, MPAs occupy only small portions of the Lake Superior and Lake Huron LAMPs, while receiving no mention in the most recent Lake Erie and Lake Ontario LAMPs (US EPA, 2023). Parks Canada's management policy goal to maintain or improve ecological sustainability and the US NMSA's purpose to "Maintain… and, where appropriate, restore and enhance natural habitats, populations, and ecological processes" both represent key goals that NOAA and Parks Canada can use to situate MPAs within Great Lake priorities for continued restoration and new protections. Additionally, NOAA's vision to invest in restoration and conservation inside NMSs, focusing on key habitats that support wildlife populations, key parameters, or key cultural or heritage assets further helps to align NMS goals with those of the Great Lakes region. (ONMS, 2022a; 2022b). "The ultimate goal of MPAs is to improve ecosystem health and productivity" (Stortini, et al., 2015); a Great Lakes MPA network needs to demonstrate to the Great Lakes community that the Goals of MPAs do, in fact, align with their regional priorities for restoration.

> *"I think [restoration is] an area where the state and the feds can come together around a common goal and work together on some of these topics. And that may be something that could be part of a broader vision of a protected area network that also supports and sits within broader restoration goals."*
>
> *- Agency Employee*

### Climate Change

Great Lakes MPAs are also well suited to fit with future-looking regional goals regarding climate change resiliency and research. As noted in Chapter 3, climate change is one of the highest priority issues for the Great Lakes. Both NOAA and Parks Canada have set goals for their MPAs to address climate change through a Climate Resiliency Plan and Establishment and Management Policies, respectively (Table 8; NOAA ONMS, 2023c; Parks Canada Agency, 2022a).

**Table 8.** Climate change goals for NMSs and NMCAs.

| ONMS Climate Resiliency Plan (NOAA ONMS, 2023c) | Policy on the Establishment and Management of NMCAs (Parks Canada 2022a) |
|---|---|
| Assess current and predicted climate impacts to sanctuary resources | NMCAs are established and managed in a manner that enhances ecosystem resilience to climate change and other stressors and supports the provision of ecosystem services, including carbon uptake and storage in marine habitats, and other socio-economic benefits |
| Identify and implement climate adaptation and mitigation strategies for sanctuaries | Parks Canada undertakes adaptation efforts to enhance climate resilience of NMCAs and their ecosystems |
| Advance ocean and climate literacy through sanctuaries | |

Research on the effects of climate change on Great Lakes resources is still in its relative infancy, and we discuss that research in Chapter 8. As some interviewees noted, MPAs themselves are likely not an exclusive cure to climate change: "*MPAs aren't going to solve climate change. You know, let's be honest, they're not set up that way*." However, NOAA has noted that MPAs can serve as sites "where monitoring and research take place to enhance our understanding of natural and historical resources and how they are changing. They also provide an early warning capability to detect changes to ecosystem processes and conditions" (NOAA ONMS, 2024). For instance, some of our interviewees pointed to the responsiveness of water bodies like Lake Superior making them prime locations as "canary in the coal mine" sites, with one academic interviewee observing, "*What's nice about the Great Lakes is that they're an excellent beacon of the effects of climate change. We're already seeing that in Lake Superior, especially. And so it gives us a really great way of showing in a very small system what's happening as the climate changes.*"

Additionally, while MPAs in the oceans can protect potential carbon sinks, the connection between protected areas and carbon sinks in the Great Lakes is less well-established (Brock et al., 2012; Alin and Johnson, 2007). The Department of Fisheries and Oceans Canada has suggested that the Blue Economy Strategy employed by Canada can support marine science to investigate climate change mitigation by evaluating aspects of climate mitigation like protection of carbon sinks (Fisheries and Oceans Canada, 2021). This may provide one climate change mitigation strategy that Great Lakes MPAs help contribute to, though more research is needed to establish this connection and to determine areas of the Great Lakes that may be disproportionately important carbon sinks.

Thus, the goals for climate change mitigation and research situate well with regional goals that emphasize the role of researching and addressing climate change. Therefore, we identify that a Great Lakes MPA network could additionally help to pursue this in a binational manner through

coordination of goals for evaluating the effects of climate change on Great Lakes resources in line with the IJC recommendation to "develop common, basin-wide and scalable climate resiliency goals with transparent and accountable performance metrics and assessment processes, to be included in each of the Annex 2 Lakewide Action and Management Plans" (IJC, 2023). However, without first having internal clarity within a MPA network about these climate research and resilience goals for Great Lakes MPAs, MPAs may struggle to convince the broader Great Lakes community that MPAs are properly equipped to address the broader Great Lakes' regional goals, despite their significant areas of overlap.

### Social Goals

There has been increasing recognition that people are the foundation of effective conservation. Reciprocally, the freshwater environment is crucial to the well-being of the people and communities that are situated on their shores (Parks Canada Agency, 2022a). Existing programs for improving the Great Lakes have recognized the latter but have largely left social outcomes as an afterthought. As one agency employee told us, "*Traditionally, Parks Canada has focused more on the strict biodiversity and not considered the human dimension as much, but I think it's building that awareness of how important humans are in the marine conservation equation. MPAs are inherently a social construct, and it's making sure that we consider the human dimension as much as we consider the ecological dimension.*" However, even in programs like GLRI that have previously placed less emphasis on formally setting social goals for restoration activities, there has been a growing perception from those involved in Great Lakes restoration projects that restoration and protection efforts lead to socio-economic benefits (Jurjonas et al., 2023). Recognition of this gap has led the IJC to recommend human capital and workforce development, research infrastructure and Centers of Excellence, and inclusion of broad socioeconomic and cultural perspectives as priorities for future study (IJC, 2023). One NGO employee noted that, "*The movement to protect and restore the Great Lakes is becoming more inclusive, to be looking not just at ecological metrics, but also integrating social metrics. It's one of the things I feel that the GLRI really lacks, and we're trying to integrate more. But issues around jobs and community benefits have been lacking and even climate resiliency, and we're… really trying to come up with some outcomes and indicators and measures of progress that we can start to track.*" Present failures to document these socio-economic benefits may be holding back these projects from receiving long-term budgetary security, but these are difficult to capture without staff familiar with social research methods on staff (Jurjonas et al., 2023).

Thus, we highlight that collecting and reporting community well-being research data is a key regional focus that MPA programs in the Great Lakes seem to be well-situated to address relative to other Great Lakes protection programs. The place-based visitor and research centers of MPAs like that of TBNMS and FFNMP align with IJC goals for human capital development and research infrastructure, with one interviewee noting that MPAs are positioned to, "*[take] advantage of those partnerships with local communities and Indigenous groups, hiring local communities and Indigenous peoples to work with us to gather that data… take advantage of the amazing work that's already been done and local knowledge*." Thus, we find that Great Lakes MPA programs have the opportunity to help fill this void in current research and help create resilient and thriving Great Lakes communities. As one agency employee told us, "*in the Great Lakes where there is this sense of identity and a very distinct environment that people care about, I think there's some great opportunities… It's a great advantage [of MPAs] to see the natural and*

*cultural resources and worlds linked rather than separate. If we can think about how the human stories of interaction with the landscape, and the natural resources are connected and managed together, I think that offers a huge opportunity.*"

We also find that NOAA and Parks Canada could further strengthen and align these socio-economic goals through the development of regional (i.e., Great Lakes MPA network-level) and site-level coastal community well-being programs like that described by Ban (2023). At the network level, a coastal community well-being program could include, as a first step, seeking feedback into a co-creation framework, and further develop program principles, goals, etc, as already started through internal working groups like GLPAN. Working through these programs would also help to address both countries' goals to engage and further involve Indigenous Nations into the working being done with MPAs. Following this co-creation framework would help to encourage sharing of power and responsibilities. We identify that at the site level, MPA managers might hold workshops with site staff and existing partners (e.g., advisory board) to start developing conceptual diagrams about how the MPA has and might affect well-being. Such workshops and the resulting diagrams can be a great starting point for getting staff and partners to think about goals for well-being at the site level, as well as for communicating how MPAs help to meet regional social priorities.

*"We could get a lot more data on the community well-being and social perspective. Right now we largely focus on dollars and cents. So the economics of the area, the tourism of the area, but we could be informed by the historical source of conflict, community values, community sense of place… places for access, and what the right environment means to community members would be ideal."*

*-Agency Employee*

### Fisheries Goals

Unlike MPAs in the federal waters of Canada and the US where fisheries are managed by Fisheries and Ocean Canada and NOAA Fisheries, respectively, fisheries in the Great Lakes have long been the domain of states and provinces through the GLFC. This has created a situation whereby the worlds of fisheries and area-based protection are bifurcated to avoid conflicts.

People involved in both fisheries and MPAs in the Great Lakes have recognized that the two worlds can be complimentary of one another but believe that this begins with an understanding of how MPA goals help advance fisheries objectives that they might otherwise be unable to achieve and vice versa.

The Joint Strategic Plan for the management of Great Lakes fisheries has been recognized as a means by which these shared objectives are formed, but there is still a need for NOAA and Parks Canada to describe how MPAs can help to achieve these goals. For example, one academic involved in fisheries management said, "*NOAA would want… a regular way in which the fishery managers can talk, share science, and talk with [NOAA] about what the objectives are, and how that might fit into the broad objectives for the fishery. I think you have to have a respect for jurisdictional roles and to talk about what our shared objectives are, as opposed to we're going to*

*do this, regardless of what you say, because it meets our objectives. That's not how it works in freshwater… you have to make it a structure so that the people who are involved… have a great discussion about how the next proposed marine sanctuary helps in the achievement of the fishery objectives*." NOAA and Parks Canada employees have similarly recognized the need for clarity about the how the objectives of MPAs advance GLFC goals, saying things like, "*if it's [fisheries work] something that's going to be happening consistently, then it's 'oh okay, maybe, you know, where do you need support in this? Or how can we add to what you're doing?' Because a lot of what we do is add to what others are already doing on the landscape because they're not stopping their work, their fisheries assessments or habitat or whatever they're doing. That stuff still continues. We add to it or fill gaps if we can*" and "*there's a bit of a language like how do we get the fishing community approaches and tools to dovetail nicely into a protected area context so that it doesn't seem foreign to them?*"

For example, coming to a common agreement about how the goals for an MPA that might encompass Buffalo Reef in Lake Superior might further GLFC goals could be an opportunity for a mutually-beneficial MPA for fisheries. As one US agency employee told us, "*One thing I can envision for NOAA being involved in fisheries is looking at habitat. And if there was a threat to habitat that supported fisheries, then that's something that we could address,*" while another academic said, "*our vision to protect something with a sanctuary is to… get rid of the impacts of stamp sands, particularly in Buffalo Reef where the native fishes can go back to spawning in the way that they have for 1000s of years.*" Therefore, we highlight that the relationship that MPAs have with academic institutions (i.e., Michigan Technological University) could help to further align how an MPA would help to promote fisheries goals, with one academic saying "W*e have a large covered agreement with the USGS to help with their fishery surveys and other efforts in the Great Lakes… we have the tools and the expertise to accomplish the scientific goals that could come along with a marine protected area.*" However, the first step in this process would necessitate agreement about shared objectives:

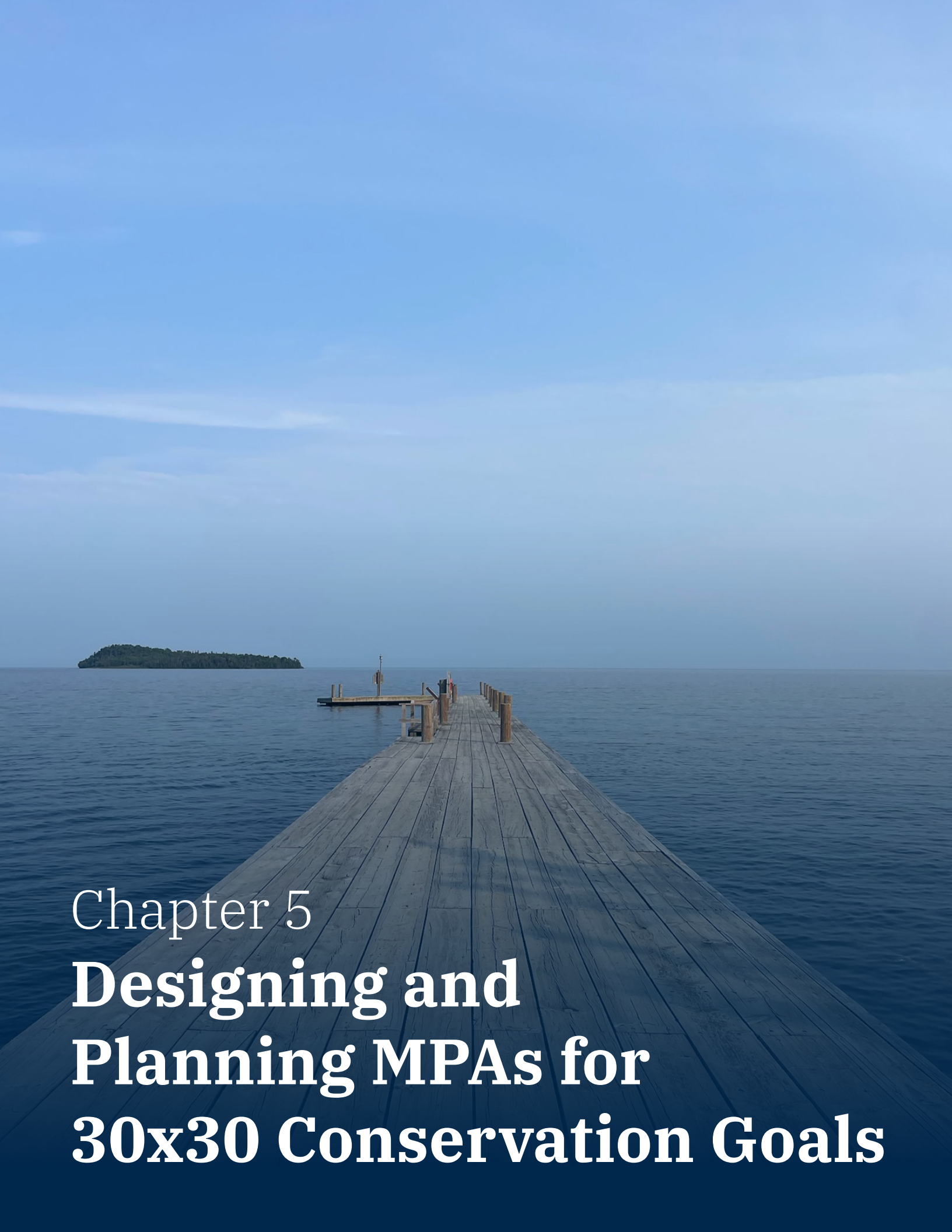
> *"I think we need to get to the point where we have a design where our fisheries management aligns with the MPA goals."*
>
> *- Agency Employee*

### 4.2.3 - Opportunity to Leverage National Objectives to Create a Great Lakes Network that More Closely Aligns with 30x30

In addition to situating MPAs within the current context of Great Lakes regional goals, NOAA and Parks Canada also have the opportunity to leverage recent national recommendations to more closely align Great Lakes MPAs with the goals of 30x30. Canada's recent Policy on the Establishment and Management of NMCAs promotes a series of goals that match 30x30 goals quite well, but one significant gap is in the 30x30 goal for well-connected protected areas (Parks Canada Agency, 2022a). One agency employee referenced this disconnect, saying, "*connectivity is a key element of the 30x30. So making sure that we start to build networks, so we allow these core protected areas that are connected by corridors, and species can move between them so that they're not just isolated. So connectivity is part of the current agenda and aligns with 30x30*."

While individual sites like FFNMP are highly integrated with the surrounding landscape (i.e., Bruce Peninsula National Park), areal extent and aquatic continuity between protected areas in the Great Lakes is still lacking, which is problematic given that an MPA network should protect the full range of biodiversity present in the target biogeographic area, be of sufficient size and configuration, and can conserve large mobile species (CEC, 2012; Brock et al. 2012; Acreman et al., 2020; Hedges et al., 2010; Sullivan-Stack et al., 2022). Meanwhile, the IJC has called for increased binational coordination for achieving Great Lakes protection and research, creating a situation where Great Lakes MPAs can help achieve both 30x30 goals and regional-specific goals (IJC, 2023).

Current US Great Lakes MPAs may not have the ability to change their goals mandated through their Final Rules and Management Plan, but we highlight that recent national recommendations can help guide future designations that more closely align with Canada and 30x30. For example, NOAA has envisioned investing in restoration and conservation inside NMS, focusing on key habitats that support wildlife populations, key parameters, and/or key cultural or heritage assets, as well as to identify areas that would bolster protection in ecosystems that currently lack sanctuaries (NOAA ONMS, 2022a). Therefore, we identify that an area like that of Lake Superior adjacent to LSNMCA could help create a Great Lakes MPA network that has improved connectivity reaching other 30x30 objectives by engaging in activities like restoration and conservation efforts for key habitats like lake trout spawning sites on rock reefs, rocky shorelines, etc., that are necessary for lake trout recovery (Hansen, 1996).



Chapter 5

# Designing and Planning MPAs for 30x30 Conservation Goals

Both the National Oceanic and Atmospheric Administration (NOAA) and Parks Canada have, and continue to, designate and establish Marine Protected Areas (MPA) in the Great Lakes Region to protect natural and cultural resources. This chapter provides an overview of the current designation processes employed by both NOAA and Parks Canada. It encompasses the agencies' nomination, designation, and establishment operations, all in accordance with their respective authorizing policies and guidance documents. Our insights are furthered by qualitative data gathered through our interviews, including what we heard from around the region on the agencies' current planning processes. Expanding on this framework, we present ideas from the literature review and interviews about how to enhance MPA nomination, designation, and establishment for achieving long-term conservation outcomes and 30x30.

## 5.1 - Current Approaches to MPA Design and Planning in the Great Lakes

### 5.1.1 Effective MPA Designation Design and Planning Process

Area-based conservation efforts are the primary approach used globally to address biodiversity decline (Gurney et al., 2023). Following the Kunming-Montreal Global Biodiversity Framework and international conservation endeavors targeting the 30x30 objectives, there is a growing acknowledgment of the necessity for additional area-specific conservation efforts (Woodley et al., 2021). Thus, the number and size of MPA's are expected to rapidly expand in the coming years to protect 30% of waters by 2030 (McIntyre, 2024). Yet, as the outcomes of MPAs are highly variable, there's lasting concerns about the ambitious target, with many concerned about the rise of "paper parks" – protected areas created mainly to fulfill area-based quotas, without ensuring their effectiveness, equitable distribution, or proper management (McIntyre, 2024; Gleason et al., 2010). These worries are compounded by the possibility that these parks might not be strategically located in priority biodiversity conservation areas, raising doubts about the success of the 30x30 initiative. These themes were heard in interviews where agency staff expressed feelings of pressure to meet 30x30 goals and deadlines:

> *"I think that it's good to have big goals like that, but shoving them through to get to a specific percentage by a specific timeline can be difficult. And I think that it's kind of like, at what cost? So I think that with those goals, we definitely run the risk of kind of creating paper parks and not focusing on quality, more so on quantity. I think that when we're looking at these 30x30 goals, it's important to come back to what we want to get out of these protected areas, if it's a number on a page, great. But if we want them to actually reach conservation and human well-being objectives, that should guide our work. Whether that's taking more time to build those relationships and build trust, then we should do it."*
>
> *- Agency Employee*

In response to concerns such as this, extensive research has been conducted on the essential elements of MPA designation to ensure that both current and future MPAs are strategically planned to effectively (McIntyre, 2024; Woodley et al., 2021; Sullivan-Stack et al., 2022; Gurney et al., 2023; Dudley, 2023; Gleason et al., 2010). In the effort to advance area-based conservation, many highlight "quality" as an essential part of 30x30 targets and designating the type of MPAs

necessary to achieve 30x30 goals (Woodley et al., 2021; Sullivan-Stack et al., 2022). Quality can include many elements, including a focus on establishing protected areas in areas important for biodiversity, how they are designed and ecologically connected, and ensuring management effectiveness and governance equity (Woodley et al., 2021). The focus on quality is especially important as not all MPAs provide the same ecological and social benefits, but all must be underpinned by enabling conditions such as appropriate ecological and social design principles to produce the benefits necessary to meet 30x30 (Sullivan-Stack et al., 2022). This was heard in interviews with some interviewee stating, *"How uses are managed is more important than the number of MPAs."* Both quantity and quality are key for realizing the benefits MPAs can deliver for US ecosystems, communities, and economies now and in the future (Sullivan-Stack et al., 2022). Therefore, the literature supports establishing more fully protected areas to achieve optimal conservation results, along with creating new MPAs in regions lacking area-based protection but are significant for biodiversity conservation (McIntyre, 2024; Sullivan-Stack et al., 2022). Based on lessons learned from past implementations of MPA design policy in California, collaborative planning experiences, a successful planning process, and other global examples Gleason et al. (2010) identified six key principles for successful regional MPA network planning:

- Clearly defining roles and responsibilities for all involved in MPA planning and implementation
- Facilitating cross-interest stakeholder participation and public participation in the MPA planning process
- Clearly defining and communicating goals and objectives for the regional component of the MPA network, consistent with legislative goals
- Providing clear science guidelines and effective decision support to ensure access to the best readily available scientific information, local knowledge, and spatial data by stakeholders, scientists, and decision-makers in a joint fact-finding approach
- Building toward broad-based support in the design of alternative MPA proposals that fulfill legislative goals and meet scientific and feasibility guidelines, while minimizing potential socioeconomic impacts
- Ensuring a robust and transparent decision-making process for evaluating proposals and selecting a preferred alternative

### 5.1.2 NOAA's NMS Designation Process

NOAA's National Marine Sanctuary's (NMS) designation process has changed and progressed since the program's enactment in 1972. The first formal process of identifying and evaluating sites as possible NMSs started in the late 1970s with NOAA creating a List of Recommendation Areas based on nominations from states and other agencies (NOAA ONMS, 2013a). In 1983, NOAA replaced this process and implemented the Site Evaluation List, which was a list of sites selected by the agency as qualifying for possible designation. In 1995, Site Evaluation List was deactivated to focus on management of the already existing sanctuaries and until 2013 only Thunder Bay National Marine Sanctuary (TBNMS) was added to the US NMS system. During this pause in designating new sites, public interest in the designation of new NMSs was prominent. As such, a diverse array of stakeholders requested that NOAA, the Department of Commerce, and the President consider designating additional sanctuaries again. Thus, the nomination process for designating new NMSs was updated in 2014 (NOAA ONMS, 2013a).

This new process, titled "Re-establishing the Sanctuary Nomination Process" shifted the nomination process to be more community driven. It allowed local communities to provide NOAA with criteria-driven proposals for areas that they believe should be the site of a new NMS, rather than the agency proposing areas itself. Describing this change, one agency employee captured its focus, stating, "*Sanctuary system community engagement really starts with even the idea of a sanctuary, it comes right from the community, not from NOAA*." The shift in the nomination process structure created the means by which the public can engage in the designation system and see new NMSs that reflect their local priorities. This includes the public having the ability to identify areas with significant ecological, historical, cultural, and economic importance that they would like to see preserved (NOAA ONMS, 2013a). During interviews, agency staff expressed a favorable view of the new designation process, perceiving it as effective in aligning community priorities with the placement of MPA sites. They noted that this process empowers communities to nominate areas they deem significant and promotes a bottom-up approach to designation.

While the nomination process for NMSs is now a more community driven approach, NOAA still has the authority to propose sites for designation. Additionally, the Antiquities Act of 1906 exists as another avenue for the federal government through the executive branch to designate areas that they deem to be significantly important (Congressional Research Service, 2024). While the authority has mostly been used for terrestrial resources, it has been used to a limited extent in marine environments. For example, Papahānaumokuākea Marine National Monument was designated in 2006 through this action (Proclamation No. 8031, 2006). However, the Antiquities Act cannot be used in the Great Lakes due to state jurisdiction of the Great Lakes waters. Still, these designation strategies, while top down in structure, do offer benefits for conserving areas of ecological significance, as heard from many interviewees. As one interviewee put it, the top-down approach has the ability to create sites with "*very strong regulatory prohibitions on nationally significant areas of our nation, terrestrial and marine*" and do it "*very quickly*." While NOAA's past nomination and designation processes have always involved local public processes and engagement, agency staff often recognize that the potential ecological benefits of a top-down approach are still paired with concerns of federal agencies not including the voices of local and Indigenous communities in the designation process.

Once submitted by a community, NOAA undertakes an evaluation of the nomination to see if it aligns with the national significance criteria (NOAA ONMS, 2023b). These criteria encompass the assessment of the nominated area's natural and ecological resources, including factors such as biological productivity, diversity, ecosystem structure, and function. Additionally, the evaluation considers the presence of maritime heritage resources with historical, cultural, or archaeological significance. NOAA also gives special consideration to resources that hold sacred meaning for Indigenous communities within the evaluation process as well. Economic aspects of the nominated area are also evaluated, including its potential to support economic activities such as tourism, commercial and recreational fishing, subsistence, and traditional uses (NOAA ONMS, 2023b). Beyond the significance criteria, NOAA also weighs a set of management considerations to assess the nominated area. These include the potential for research, opportunities for education, the threat of adverse impacts from activities, unique conservation opportunities, and existing management authorities. Community involvement and support are integral to the process, including from diverse Tribal entities, and stakeholders such as individuals, local groups, government agencies, and government officials. After the evaluation, the director may select a

nominated area for future consideration as a national marine sanctuary. This selection begins the formal sanctuary designation process (NOAA ONMS, 2023b).

### 5.1.3 Parks Canada's NMCA Establishment Process

Parks Canada's long-term goal is to establish at least one National Marine Conservation Area (NMCA) in each of the 29 marine regions that divide Canada's oceans and Great Lakes (Parks Canada, Department of Canadian Heritage, 1995). Legislative requirements for NMCA establishment and enlargement are outlined in the Canada National Marine Conservation Areas Act (CNMCAA). In the context of NMCA establishment, The Policy on the Establishment and Management of National Marine Conservation Areas details the specific steps undertaken by Parks Canada to establish new NMCA sites (Parks Canada Agency, 2022a). Proposals for NMCA establishment can be brought forward by Parks Canada itself, along with Indigenous peoples, provincial and territorial governments, stakeholders, and the public (Parks Canada Agency, 2022a). Similar to the US, the Canadian nomination process has also increased community engagement in recent years, where in the past engagement was described by an agency employee in an interview as *"pretty one-sided, just telling people what we're doing and why"* whereas engagement now is *"much more collaborative, much more invested in relationships and shared power,"* particularly with local and Indigenous communities.

Candidate NMCA's are selected by Parks Canada through assessing the sites that best represent the region, have minimal conflicts, would enhance connectivity, and avoid possible threats to the area's long-term sustainability (Parks Canada Agency, 2022a). The proposal process for candidate sites requires collaboration with stakeholders to assess feasibility and desirability of the NMCA. Within each region, Parks Canada works to support Indigenous leadership in conservation through the selection of NMCA locations of mutual interest. When support is present, Parks Canada negotiates agreements with relevant governments and/or Indigenous organizations for the new NMCA. These agreements set out the terms and conditions under which the NMCA will be established and managed. The formal establishment of NMCAs are then advanced through the appropriate legislative or regulatory process. The NMCA is officially established by adding the name and legal description of the boundary of the site to the CNMCAA and making the needed amendments to the Act (Parks Canada Agency, 2022a; n.d).

As of the release of this report, both Canadian Great Lakes MPA's, Fathom Five National Marine Park (FFNMP), and Lake Superior National Marine Conservation Area (LSNMCA), lack formal establishment under the CNMCAA. This in part is due to the complex and lengthy process of the full establishment of a site which includes activities like land transfers from the provinces to the federal government of Canada and other coordination between various governmental agencies. Even with the lack of formal establishment under the CNMCAA, both sites operate as if they were established through aligning their management objectives with the Act. This was heard in an interview where an agency employee explained, *"We have two National Marine Conservation Areas in the Great Lakes. Neither of them are established or scheduled under the their Act. The province [Ontario] hasn't transferred the lakebed or water column. So it's managed in the spirit of the National Marine Conservation Areas Act."* The establishment process itself is unique to each NMCA and lacks a specific timeframe to move these processes along. Often NMCAs, like both FFNMP and LSNMCA, will stay in the negotiation phase of establishment for some time as they work with other agencies and provinces to formalize things like land transfers (Parks Canada Agency, 2022a). For LSNMCA, the establishment process has included multiple agreements

between different governing bodies, committees, and the creation of a Federal–Provincial Harmonization Committee. While there have been significant steps toward LSNMCA establishment, ongoing dialogue with First Nations and discussions with the province and federal agencies remain critical for shaping future management directions and official establishment of the NMCA (Parks Canada Agency, 2016).

Through our interviews, we gleaned insights that indicate that the absence of formal establishment by Parks Canada has presented both advantages (permitting management flexibility) and challenges (increasing workload for agency staff, raising the risk of community dissatisfaction when transitioning from interim to established management, and restricting what can be managed within the sites) to effective site management. The lack of establishment provides Parks Canada with opportunities to work with the community to achieve management goals and partner with other federal and provincial agencies to be able to effectively manage the site in ways that they would be unable to under formal establishment. Yet, the lack of establishment also means that the Great Lakes NMCA's do not have a clear plan for moving forwards in terms of managing activities. As one interviewee stated "*that's part of the challenge that we face, we don't have that regulatory, clear legislative framework, and so we're improvising. And then that creates space for people using their discretion.*"

### 5.1.4 OECMs and Connectivity

Global 30x30 targets may be achieved by a mix of MPAs and Other Effective Area-Based Conservation Measures (OECMs) (Sullivan-Stack et al., 2022). OECMs may have a variety of objectives, including fisheries, human uses, and sustaining cultural practices, but by definition must also achieve desired conservation outcomes. Through this, OECMs have the potential to meaningfully contribute towards conservation goals, depending on the area's ability to demonstrate conservation effectiveness (Sullivan-Stack et al., 2022).

OECMs have primarily been considered in the realm of terrestrial and marine protection; their application to fresh waters has been limited and unclear in the Great Lakes. This in part is due to the body of research on OECMs being limited and inconclusive concerning OECMs and their impacts (Cook, 2023; Lemieux, et al., 2022). Studies that evaluated OECM conservation outcomes are rare and suggested effectiveness must be judged on a case-by-case basis (Sullivan-Stack et al., 2022). Canada has recently established OECM criteria concerning longevity of measure, accounting standards, discrete biodiversity conservation benefits, long-term governance and management; however, no OECMs have been recognized along the Great Lakes Coast (Lemieux et al., 2023; Fisheries and Oceans Canada, 2022). Comparatively, in the US, OECMs have received relatively little consideration, particularly with respect to the Great Lakes, leaving confusion regarding the purposes and definitions of OECMs. One agency employee highlighted this difference, saying, "*In the US, we have not formally identified any OECMs yet. And that is one difference between the US and Canada. Canada is pretty out in front in terms of identifying OECM 's and thinking about how they fit. I believe they've only done them in oceanic areas, not in the Great Lakes, but I'm not 100% sure.*"

Researchers have recommended standardization of terms and recognition criteria for OECM, such that credit is only given to organizations achieving demonstrated conservation outcomes (Cook, 2023; Lemieux el al., 2023). The complexity of applying OECMs and verifying their benefits has made the need for new tools to evaluate the effectiveness of OECMs and new measures to hold

countries accountable to protected and conserved area targets in the CBD (Cook, 2023; Lemieux, et al., 2022). When OECMs are well designed and managed, they can support MPAs in improving connectivity and representation across regions and improve equity and meet local needs simultaneously. They also can incentivize cooperation between sectors and incorporate a wide array of diverse voices into conservation decision making (Sullivan-Stack et al., 2022).

Moreover, OECMs hold promise in amplifying connectivity of MPAs within the Great Lakes, thereby furthering ecological and aquatic preservation efforts. There exist limited instances of regional-scale planning for ecologically connected MPA networks managed as a system (Woodley et al., 2021). Nonetheless, there is an increasing recognition among scientists and policymakers of the advantages of transitioning from singular MPAs to carefully designed networks of ecologically-connected MPAs at larger scales. Such networks can help play a crucial role in sustaining and rehabilitating marine populations (Woodley et al., 2021). In oceans, OECMs offer a way of connecting established transboundary MPAs, while underscoring further areas of focus (Sullivan-Stack et al., 2022).

In response to diverse challenges, OECMs can and have been used to facilitate rehabilitation of imperiled populations and degraded habitats (Hedges et al., 2010). For example, in Six Fathom Bank Lake Trout Sanctuary in Lake Huron (Figure 11), the state of Michigan prevented trout harvest and habitat disturbances to promote lake trout recovery (Johnson et al., 2015). This refuge was part of Michigan's lake trout recovery strategy following population collapses and is an example of what could be considered an OECM in the Great Lakes. However, there are not any federally recognized OECMs in the Great Lakes, as discussed further in Section 5.2.1 of this chapter. Based on existing literature on MPAs, strategically located and well-designed MPAs have the potential to provide large conservation benefits for many species, although migratory or highly mobile species may require extremely large sites or MPA networks to achieve conservation goals (Hedges et al., 2010). Hence, effectively designated and established MPAs within the Great Lakes, encompassing well-planned NMSs, NMCAs, and potential OECMs, can support regional connectivity.

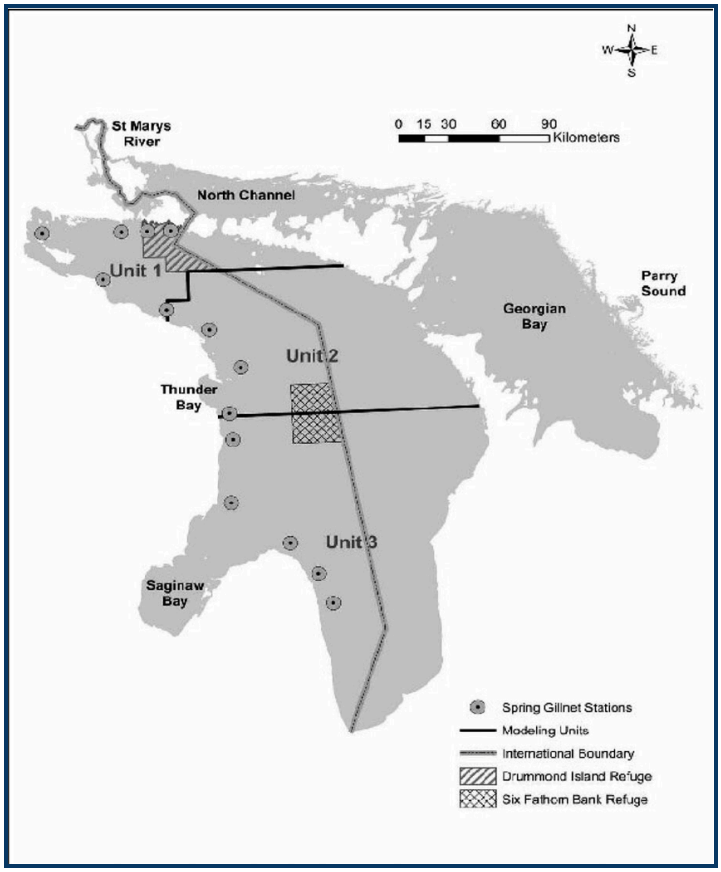



**Figure 11.** Six Fathom Bank Lake Trout Sanctuary (Johnson, et al., 2015).

### 5.1.5 Ensuring Equitable and Representative Future Designation Processes

Target 3 specifically calls for "equitably governed systems," "recognizing Indigenous and traditional territories," and "ensuring that any sustainable use…is fully consistent with conservation outcomes, recognizing and respecting the rights of Indigenous peoples and local communities including over their traditional territories" (UN, 2022b). As part of the qualitative aspect of 30x30 there is the need to ensure equitably governed systems that include the rights of Indigenous peoples and local communities (Sullivan-Stack et al., 2022). This focus on equitable governed systems encompasses the designation and establishment processes of MPAs in the Great Lakes, particularly with Indigenous peoples, communities, and Nations. Through our interviews, we heard the importance of ensuring equitable and representative designation processes for achieving 30x30 targets, including an NGO employee stating, "*I know that the states and the tribes on the US side or especially in Canada, or in the province, are following 30x30 very closely and generally are supportive of those objectives… So as long as the Marine Protected Areas don't take that arrogant, top down, 'we're from the federal government and we have the right approach,' and instead are more collaborative, then I think that the objectives and the ways to reach them will be very much in alignment.*"

A collaborative approach to designation and establishment processes is necessary to move effective conservation forwards. MPA managers have a responsibility and have the opportunity to collaborate and partner with Indigenous peoples, and where suitable, implement co-management

arrangements (Sullivan-Stack et al., 2022). NOAAs Office of National Marine Sanctuaries has explicitly stated in its latest five-year strategy a desire to encourage and expand engagement and partnerships with Indigenous communities and to "Build and strengthen relationships with Indigenous communities to provide more opportunities for Indigenous-led and collaborative conservation" (NOAA ONMS, 2022a). The significance of collaborating with Indigenous communities and aligning MPA nomination and designation goals resonated in the Keweenaw Peninsula of Michigan, where a local stakeholder emphasized the pivotal role of partnering with the Keweenaw Bay Indian Community (KBIC):

> *"I definitely think the tribe needs to be really, really, really rooted in all of the decisions. And all of the management that goes forward. I think that's clearly being explored at the moment… working with tribal councils and getting a sense of how people feel about this. Is this something that KBIC would nominate and put forward as a nomination document? And then what does that management look like?... I feel like front and center, the tribe should definitely be involved and then thinking even further ahead."*
>
> *- NGO Employee*

Parks Canada's establishment process of NMCAs supports the country's commitment to reconciliation with Indigenous people (Parks Canada Agency, 2022a). As a result, Parks Canada engages with Indigenous peoples within NMCA establishment, considers Indigenous community advances proposals, and "explores opportunities to enable and advance marine Indigenous Protected and Conserved Areas (Parks Canada Agency, 2022a).

Indigenous groups, including the Chumash in California and the Aleut communities of the Pribilof Islands in Alaska, have expressed interest in establishing new MPAs through nominations for National Marine Sanctuary status to protect their traditional waters and address their conservation and sustainable use priorities. Considering an NMS in Lake Superior, a stakeholder stated that it would allow for the protection of the sovereignty of place, saying, *"Everyone, and every being, every relative, and we think that gets back to thinking about water, thinking about our community, friends, and our partners with the Keweenaw Bay Indian Community, thinking of water as alive and something that should have the same rights and that has sovereignty… So recognizing sovereignty for all beings, and that protection is another layer to really think about that."* Recognition and inclusion of Indigenous knowledge, leadership, and stewardship is crucial for directing and informing MPA decision-making, including design (Sullivan-Stack et al., 2022).

### 5.1.6 Alignment with Local and Indigenous Communities Values and Resource Use

Establishing MPAs is one strategy that can contribute to ecosystem protection and restoration of marine resources, especially if MPAs are well-designed and have a high degree of stakeholder acceptance (Gleason et al., 2010). Thus, the alignment of community priorities and use of resources within MPA designations can be a path towards meeting 30x30 with the support of the public. The importance of alignment of community values within the designation processes is something that is stated in both the literature and throughout our interviews with agency staff and stakeholders (Woodley et al., 2021; Jamieson and Levings, 2001; US Department of Commerce, NOAA, n.d.). As an agency employee stated, *"Well, I think upfront engagement with your rights*

*holders and stakeholders in understanding what the breadth of resources are that matter to them. So conservation and networks don't work unless the constituency and the stakeholders will adhere to whatever legal is imposed on them. If I've learned anything, it's that you have to have the community behind whatever it is you're trying to do. Not during, way before."* An effective MPA and its designation depends on input, support, and engagement from surrounding communities (Sullivan-Stack et al., 2022). The designation process of MPA's offers the opportunity to learn and incorporate community values into conservation efforts and protect areas of priorities for the public (Sullivan-Stack et al., 2022). Through interviews we heard that community values are strongly connected to the use of the Great Lakes natural resources, including recreational, traditional, and historical use. Consequently, the alignment of community values and new MPA level of protection and resource restrictions is crucial, as seen below:

> *"Understanding what coastal communities value in the area, what their sense of place is, how they connect to a place, where areas of cultural and spiritual significance are, the perspective of communities on marine conservation in general. All [of that] is key."*
>
> *- Agency Employee*

> *"It'd be a real challenge if an agency came in and put just a new restriction overnight in place. I think understanding who's currently operating somewhere would be really important beforehand, and figuring out ways to be able to incorporate them going forward without really imposing some sort of crazy restrictions or changes. But it would be real concerning if there was a new area designated in a certain way, and it's like this is no longer allowed, fishing or whatever. So being able to understand historical uses of the resource and then allowing for those activities to continue."*
>
> *- Lake Superior Stakeholder*

The extent of habitat protection within a MPA is influenced by its establishing documents and statues and the level of protection can be determined through consultation with local communities and other stakeholders (Jamieson and Levings, 2001). A significant determinant of the level of protection within an MPA and its alignment with local priorities, particularly in the Great Lakes region, is the consideration of fisheries management. Significant debate arises when there is a threat of increased regulations or complete prohibition on fishing, which diminishes political enthusiasm for establishing no-take zones in freshwater environments (Hedges et al., 2010; Woodley et al., 2021). The literature emphasizes that in the past there has been organized opposition to the implementation of protected areas by commercial and recreational fishing organizations (Woodley et al., 2021). This was heard within our interviews where both local stakeholders and agency staff identified fisheries and the rights to fish in Great Lakes, both for local communities and Indigenous Peoples, as one major concern over the designation of new MPAs in the region. One interviewee told us, *"if someone's used to being able to fish somewhere*

*and you create a new marine protected area in there, and then there's zones where they can't fish like, of course, there's people that will be resistant to that."* Along with the acknowledgement of the importance of fishing rights in the Great Lakes, there is also the recognition from some stakeholders that MPA's will not "*change any state rights overfishing or any tribal rights over fishing."* The relationship between fisheries management and MPA management in the Great Lakes is explored further in Chapter 6, including how this impacts conservation in the region.

## 5.2 - Opportunities to Enhance Great Lakes MPA Design and Planning

### 5.2.1 Opportunities to Incorporate Great Lakes OECMs into an MPA Network

Freshwater ecosystems have often been overlooked in schemes that account for protected areas, despite the fact that several current strategies for freshwater conservation could meet the criteria outlined in general definitions of protected areas (Abell et al, 2007). When well-designed and managed, OECMs and MPAs can both play complementary roles in conservation of the Great Lakes, including improving connectivity and representation across regional networks, while also improving equity and the ability to meet local needs (Lemieux, et al., 2022). Successfully reaching 30x30 through well-planned and implemented areas may represent one of the most effective ways to reduce the risks to biodiversity. It can also support ecosystems in fulfilling human requirements sustainably and equitably, all while protecting providing a network for species to migrate, inhabit, and reproduce (Lemieux, et al., 2022). Yet, notably, no OECMs have been recognized along the Great Lakes coasts (Lemieux, et al., 2022).

As a result of this, we identify the unique opportunity for the Great Lakes MPA system to expand by incorporating OECMs within recognized protected areas, thereby enhancing conservation objectives. For NOAA and Parks Canada, this involves establishing evaluation criteria for these areas, advocating for the inclusion of effective OECMs into national and regional conservation initiatives, supporting the identification of specific OECMs in the Great Lakes, and implementing tracking for OECMs to ensure accurate national PA accounting. This opportunity would include both agencies needing to take proactive measures to define OECMs and identify sites that could be considered within the Great Lakes context. Parks Canada could emulate its approach to identifying OECMs in the oceans and apply a similar methodology in the Great Lakes region. Similarly, NOAA could explore adopting a comparable methodology to Canada's in defining OECMs. Ideally, this identification process should align to establish standardized terms and ensure consistent application across the border. It is important to note that incorporating OECMs into the protected area network is contingent upon ensuring that OECMs effectively achieve desired conservation outcomes (Sullivan-Stack et al., 2022). Therefore, we recognize that this opportunity hinges on and requires conducting additional research and monitoring of these areas to assess the outcomes and impacts of MPAs in the region.

Still, through better understanding the benefits of OECMs and recognizing effective areas as MPAs would allow both agencies to acknowledge and support local conservation endeavors already underway in the region. Furthermore, it would foster enhanced connectivity among MPAs by creating corridors and additional protected areas, presenting the opportunity to deepen the understanding of the significance of connectivity within the Great Lakes ecosystem and the role of protected spaces in facilitating this connectivity. By adhering to this approach, the inclusion of Great Lakes OECMs presents the opportunity to expand the network of Great Lakes MPAs, fostering connectivity and while assisting both agencies in achieving their conservation and social

goals. This opportunity was formed and supported through interviews, where we heard an agency employee say:

> *"I think they [OECMs] have a role in helping in that they're a bit more holistic. I think that they can play an important role in conserving waters and reaching those 30x30 goals. They recognize important conservation work that's already happening. So counting them towards 30x30 is almost a low hanging fruit because it doesn't necessarily give federal agencies more work. It just kind of enables those conservation projects to kind of carry on what they were doing, which is conserving biodiversity, either indirectly or directly. I think that recognizing OECMs in 30x30 kind of helps facilitate and keep environmentally friendly practices in place and credits folks that are doing that work on the ground… I think they validate and recognize conservation efforts at smaller scales. And they support management that's aligned - not just with those biological objectives - because not all OECMs have that kind of priority of biodiversity conservation - but kind of those social, cultural, economic focuses as well."*
>
> *- Agency Employee*

### 5.2.2 Opportunities to Advance Formal Establishment of Great Lakes NMCAs

The literature underscores that effective management of MPAs requires specific enabling conditions, including clear legal designations and financial support for enforcement, as well as assigning a lead agency or organization for oversight and implementation (Gleason et al, 2010). An article from Jamieson and Levings also emphasizes the importance of environmental managers having the authority to restrict human activities that impact natural resources, highlighting the need for formal establishment to allow agency staff within Parks Canada to implement policy consistent with establishment (Jamieson and Levings, 2001). Additionally, having specific areas clearly defined as protected areas where identified actions cannot occur eliminates the pressure for managers to enhance protection efforts through other means (Jamieson and Levings, 2001). Many of these objectives can be achieved through the formal establishment of the area.

The Parks Canada managed Great Lakes MPAs, LSNMCA and FFNMP, both lack formal establishment under the CNMCAA. This emerged prominently during interviews, particularly concerning LSNMCA, whose path to establishment has been characterized by lengthy collaborative effort between the Canadian and Ontario governments, which is still ongoing as of the release of this report. Therefore, we identify the opportunity to further the regional network of MPAs toward 30x30 goals through advancing the formal establishment of both of NMCAs under the CNMCAA. As referenced in 4.1.2 the lack of formal establishment, while providing some benefits, also creates barriers for effective management. As such, we believe that formal establishment could empower Parks Canada to continue effectively managing the site, ensuring robust conservation efforts can continue unabated into the future. This would shift the management of the site "in the spirit" of the CNMCAA to managing it directly under its schedule and to be aligned with its objectives. Therefore, we recognize that there are benefits associated with the opportunity to formally establishment of LSNMCA and FFNMP under the CNMCCAA. While the potential for formally establishing both NMCAs in the Great Lakes exists, the

advantages of formally establishing such areas were highlighted mostly in interviews specifically addressing the LSNMCA, which we utilized to inform this opportunity.

The establishment processes for MPAs differ among countries, ecosystems, and MPA types (Hedges et al., 2010). Moreover, the timelines for political processes and public consultations, as well as the associated financial costs, can introduce additional layers of complexity to reaching full designation or establishment (Hedges et al., 2010). This was heard in interviews where communities and other levels of government around LSNMCA have other priorities that have made the process of establishment extended, as seen below:

> *"We think about Lake Superior NMCA all day long, that's kind of what we do. But communities are dealing with every other issue on the landscape and within their communities as well. And the province, I always say that too, like they're dealing with so much more than just us… When it's Parks Canada's priority, it might not be somebody else's. So things just take a really long time."*
>
> *- Agency Employee*

While much of the designation process is out of the control of Parks Canada due to the process's complexities, we identified some opportunities for the agency, including advancing the timeline of establishment and transparent communication with communities. In the short term, targeted outreach and engagement efforts can build awareness of the NMCA among local communities and stakeholders, which could garner significant support for the political process. Looking to the future, leveraging partnerships with relevant government agencies, Indigenous groups, and non-governmental organizations can help share the financial burden and expertise needed for effective planning and implementation. Partnerships and communication between the different agencies also could better align the diverse priorities and timelines of the many stakeholders involved in the formal establishment process. This collaborative approach has the potential to mitigate future challenges stemming from the involvement of numerous stakeholders in the designation process, like the one at LSNMCA where an interviewee described it as *"I think the most significant challenges have been regarding Indigenous consultation… There's been a lot of conversations around ongoing management and how to manage with the province because there's a lot of collaboration that needs to happen and a lot of layers for management. So those conversations have been ongoing for a long time. It's just a really complicated process."* By strategically capitalizing on these strategies, the establishment of LSNMCA could be advanced while navigating the complexities and political timeline inherent in the establishment process.

Along with opportunities associated with advancing timelines, transparency within the designation process and communication with local stakeholders was highlighted as a strategy that could influence the advancement of designation efforts. While transparency is a key component of NMCA establishment, as outlined in the Policy on the Establishment and Management of National Marine Conservation Areas which states, "Inclusive and transparent processes are the cornerstones of sustained collaboration and engagement," we highlight a few strategies to further transparent communication within the establishment process (Parks Canada Agency, 2022a). While more transparency does not always coordinate with faster processes, the necessity for

concise and transparent documentation concerning the potential impacts of an MPA on the community and its economic viability, without exaggerating potential benefits, is a strategy we have gleaned from interviewees. Community meetings represent another valuable opportunity to educate community members about the realities of MPA establishment, assuring them of their concerns. Addressing concerns such as potential impacts on recreational or resource use in an accessible and informative manner is another opportunity for fostering trust and understanding within the community. As expressed by multiple interviewees, facilitating conversations with communities to clarify misconceptions about designation can be instrumental in garnering support. This entails gaining a comprehensive understanding of the current uses within a community and openly communicating what aspects will or will not change with MPA designation. By embracing transparency and engaging in effective communication practices, Parks Canada can continue to cultivate trust, dispel misunderstandings, and foster collaboration, which has the potential to advance the designation process. Although the formal establishment of LSNMCA appears imminent, it is crucial to employ these strategies and emphasize their efficacy for future designations to propel further advancements in NMCA establishment.

### 5.2.3 Opportunities to Use Experienced MPAs as a Guide to Designation

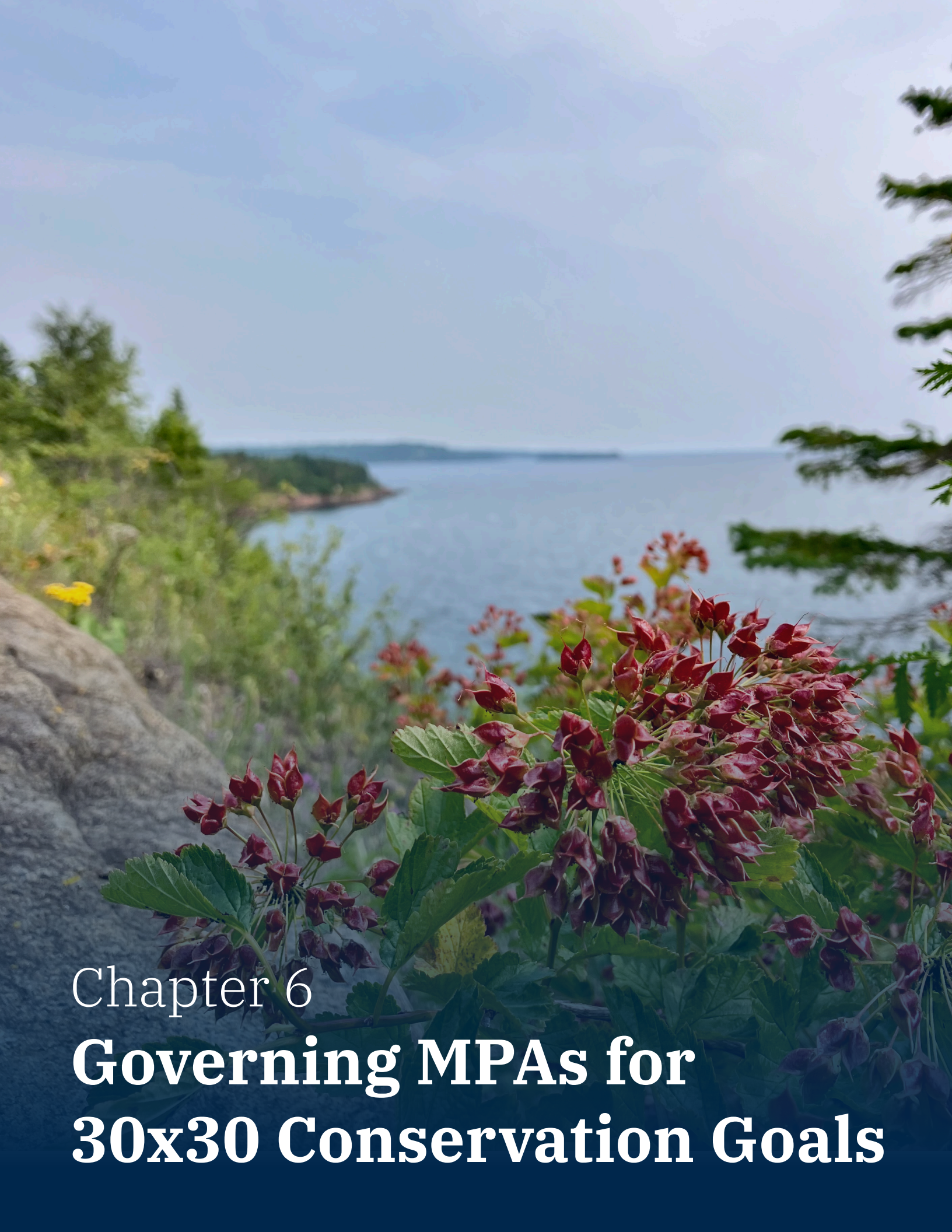
Another opportunity exists to utilize the lessons learned and effective practices of experienced, or "veteran," MPAs. These sites, with past designation or establishment effort histories, can help guide the designation process of current and future nominations. These veteran MPA's exist in both the US and Canada, including two sites within the Great Lakes, TBNMS and FFNMP. Along with these areas, our interviews and literature review also recognized Gwaii Haanas National Marine Conservation Area Reserve as an NMCA to learn from as well (Canadian Parks and Wilderness Society, 2021).

In the US, Thunder Bay National Marine Sanctuary was described in an interview as *"the sort of crown jewel of the Great Lakes and frankly, the entire [NMS] program you could argue."* However, this perspective took time to establish, as throughout its designation process concerns arose regarding the perceived top-down approach and potential federal government intrusion, leading to considerable opposition to the NMS (Wiesen et al., 2017). Nevertheless, a major shift in public perception occurred after its designation and subsequent community-supported expansion of the site demonstrates the significant benefits TBNMS brings to the local community (NOAA ONMS, 2023a). Local community members and other stakeholders had the opportunity to witness the developments within the NMS and observe the positive benefits that the designation of THNMS brought to the region. Therefore, the history and extensive experiences of the TBNMS designation can offer valuable lessons for future NMSs, serving as an example of a sanctuary that continues to be viewed positively within the community. It also can provide insights into the process of expanding an MPA and what that process entails.

The opportunity for lessons learned and effective practices to be gained from past experiences of long operating sites was also heard in interviews about the Canadian site FFNMP as well. In an interview with an agency employee it was stated, *"Us being a site that can demonstrate what can be done, or is being done, or that the changes aren't necessarily huge. That may help other areas, it may smooth the way for the development of more Marine Protected Areas in the Great Lakes."* Similarly, staff from Parks Canada characterized FFNMP as positioned to offer leadership to other NMCA stating, *"the fact that this was the first protected area to fall under the stewardship of Parks Canada's National Marine Conservation Area program, I think that throughout the years*

*we have certainly been leaders for any new NMCA that might be designated or established… I think we have a lot of lessons learned in terms of some things like the management goals here over the years. So I think we have a lot of value for Marine Protected Areas, in the regard that we have several years under our belt and we can certainly share some of our successes and lessons learned along the way."* These similar sentiments can be applied to TBNMS as well, highlighting both sites as MPAs that can provide valuable guidance to other MPAs within the national systems.

Both our interviews and literature informed this opportunity for MPAs currently undergoing the designation or establishment process to gain insights from veteran MPAs within the Great Lakes. By examining the practices that have proven effective, as well as those that have not, these experienced sites offer valuable lessons and insights for guiding the designation, establishment, and ongoing management of present and future MPAs. This knowledge extends its reach to communities seeking to nominate an MPA and to management staff involved in designing and planning designations as well. These sites serve as a roadmap, showcasing past achievements and illustrating how these experiences can be leveraged into the planning of MPAs with possible greater efficiency. Both sites also have the potential to demonstrate effective freshwater conservation through the establishment of protected areas, which can be utilized for the rest of the Great Lakes, but also nationally and internationally as well. Moreover, this opportunity affords NOAA and Parks Canada the chance to showcase the value and benefits of TBNMS and FFNMP on a national scale, positioning them as leaders in marine conservation efforts. Capitalizing these sites' successes and knowledge presents the opportunity to perhaps effectively expand the future systems of NMSs and NMCAs through utilizing best practices.



Chapter 6

# Governing MPAs for 30x30 Conservation Goals

Knowledge gained from both United States (US) and international experience illustrates that effectively managing marine resources demands a challenging mix of scientific understanding, policy implementation, and active involvement of stakeholders, all of which heavily depend on specific site circumstances (Gleason et al., 2010). Both the National Oceanic and Atmospheric Administration (NOAA) and Parks Canada employ distinct, comprehensive systems for Marine Protected Areas (MPA) governance. While both systems share common elements, they differ in their management systems, legislative frameworks, formal program-wide policies, and regulations. Through our literature review and interviews, in this chapter we discuss the current state of Great Lakes MPA governance, covering NOAA's and Parks Canada's approaches to management plan implementation, regulations and zoning. This also includes discussion on current federal, state, and provincial agency partnerships, Indigenous partnerships, international coordination, community participation and advisory groups, and governance resources. We conclude by proposing opportunities for how the agencies might improve upon the current landscape of governance to reach their future potential and 30x30 goals.

## 6.1 - Current State of Great Lakes MPA Governance

### 6.1.1 MPA Management Plans

In the US, National Marine Sanctuaries (NMS) are managed according to site specific management plans that summarize existing programs and regulations, guide preparation of annual operating plans, articulate goals, objectives and priorities, guide management decision-making and future project planning, and ensure public involvement in management processes (NOAA ONMS, n.d.-b). Per National Marine Sanctuaries Act (NMSA) requirements, sanctuaries must review their management plans starting five years after the date of designation and occurring on a five-year interval afterwards (National Marine Sanctuaries Act, 2000). The review of management plans includes the evaluation of progress towards implementation of the management plan, the goals of the sanctuary, and evaluation of the effectiveness of site-specific management techniques. NOAA must also revise the management plan and regulations as necessary to fulfill the policies and purpose of the NMSA (National Marine Sanctuaries Act, 2000). As a result, NOAA employs an adaptive management approach, regularly reviewing and updating its management.

National Marine Conservation Areas (NMCA) are to be managed and used in a sustainable manner that meets the needs of present and future generations (Canada National Marine Conservation Areas Act, 2002). Central to NMCA management is the development of comprehensive management plans for each NMCA (Parks Canada Agency, 2023b). With this, the Canada National Marine Conservation Areas Act (CNMCAA) includes provisions concerning consultation and content requirements for each of the management plans. Within five years of an NMCA's establishment, a management plan must be prepared in collaboration with relevant federal and provincial authorities, coastal communities, aboriginal organizations and governments, bodies established under land claims agreements, and other relevant stakeholders (Canada National Marine Conservation Areas Act, 2002). Management plans are a strategic long-term guide that extends 15 or more years into the future and is the primary public accountability document (Parks Canada Agency, 2023b). Plans are required to encompass long-term ecological goals for the NMCA, along with provisions for ecosystem protection, human use, zoning, public awareness, and performance evaluation (Canada National Marine

Conservation Areas Act, 2002). In developing and modifying management plans and interim management plans, the primary considerations are for ecosystem management and the precautionary principle in order to protect marine ecosystems and preserve biodiversity (Canada National Marine Conservation Areas Act, 2002). This includes aligning with goals of 30x30, however, it was stated in an interview that NMCA management plans are more specific than 30x30 goals, highlighting their importance in promoting additional goals.

> *"NMCA management plans are focused on more local scales. So they are more context-dependent, and the goals within the management plan are more specific to place. I think NMCA management plans are a little more holistic. So while they do have the primary goal of protect and conserve, they also take into account other aspects that factor into the NMCA. So community well-being, local support, Indigenous leadership, sustainable use and access, which I'm sure the 30x30 touch on, but I think NMCA management plans are just a little more specific about the different factors that influence NMCA Success."*
>
> *- Agency Employee*

### 6.1.2 Zoning and Special Management Areas

NOAA policy regarding different areas of use restriction is dependent on an area's ecological significance, biodiversity, and cultural heritage. As a result, different specialty management areas may be put into place where certain activities can be restricted depending on their impact (NOAA, 2023a). A marine reserve or "no take" MPA is a highly protected type of MPA where removing or destroying natural or cultural resources is prohibited (National Marine Protected Areas Center, 2014). Other types of MPAs include multiple use MPAs and MPAs that allow different uses based on designated zones within their borders (National Marine Protected Areas Center, 2014). Although an agency employee stated that these special management areas *"can be a very effective, very targeted tool,"* both NMSs in the Great Lakes do not have specific areas with clear boundaries as there has not been a recognized need for them to date. While effective, these special management areas can be controversial, as seen in Thunder Bay National Marine Sanctuary (TBNMS) where people were concerned during designation about being excluded from use. This was in part due to knowledge about more restrictive zoning in other NMS located across the nation. This concern over more restrictive zoning was noted in an interview where an agency employee stated, *"In fact, when we were designating Thunder Bay, we had a lot of the people who would winter in Florida. And because of some of the zoning in Florida, they thought that areas will be excluded in Thunder Bay, and that's people's biggest concern, that they're not able to use an area."* Section 6.2.2 further discusses the perceptions and utilization of more restrictive zoning in the Great Lakes.

All activities (including fishing, boating, diving, and research) may be conducted in MPAs unless prohibited or otherwise regulated by site specific regulations, outlined in an NMS management plan (NOAA, 2023a). Permits can be issued for activities such as research, education, and other management activities, including for activities that would otherwise be prohibited. All activities are subject to emergency regulations, which are in place to prevent or minimize the loss of a Sanctuary resource or quality when necessary. Yet, this emergency regulation does not apply to

NMSs with site-specific regulations that establish procedures for issuing emergency regulations. This includes Thunder Bay National Marine Sanctuary and Wisconsin Shipwreck Coast National Marine Sanctuary (WSCNS), which both need the approval of the respective state Governors before the emergency regulation takes effect. (NOAA, 2023a).

Parks Canada adheres to a comprehensive regulatory framework outlined in CNMCAA for zoning and use within each NMCA. According to the Act, as part of the management planning process, each NMCA is divided into zones (Canada National Marine Conservation Areas Act, 2002). These zones must include at least one providing full protection to special features or sensitive elements of ecosystems (Zones 1 or 2) and another promoting ecologically sustainable use of marine resources (Zone 3 or 4) (Parks Canada Agency 2022a; Parks Canada Agency, 2022b).

> *"There are four zones. And they go up in the level of protection, so Zone 1 has the highest level of protection. I don't know exactly what the subtle differences are between Zone 1 and 2, but basically, in those ones there are no extractive uses allowed. So no recreational or commercial fishing. I think Zone 1 you can't do anything. Zone 2, you might be able to go and get a permit for science and some research… and they're supposed to be protecting significant cultural or ecological features, areas of high biodiversity, and sensitivity… And then Zones 3 and 4 are supposed to be more multi-use, more activities are able to happen there and you can have extractive uses as well."*
>
> *- Agency Employee*

Further description of the purpose and objective of these different zones can be found in Table 9. Parks Canada is working towards the goal of placing the majority of each NMCA in fully protected zones, Zones 1 or 2 (Parks Canada Agency, 2022a). This was also heard in interviews where agency employee shared that, *"Parks Canada has an overall goal in our policy for achieving over half of the NMCAs in Zone 1 or 2, which is really, really huge."* Both Lake Superior National Marine Conservation Area (LSNMCA) and Fathom Five National Marine Park (FFNMP) have pending zoning contingent on the formal establishment of both parks (Parks Canada Agency, 2016; 2010). While FFNMP has zoning outlined in its management plan from 1998, the State of the Park report released in 2010 stated "There are no protection zones within the aquatic ecosystems of Fathom Five" (Parks Canada Agency, 2010; 1998).

Utilizing the CNMCAA, Parks Canada has more detailed outlined restrictions for zoning than NOAA in the Great Lakes. This includes detailed zoning with specific activities that are permitted in certain zones within Canadian NMCA waters. As a Parks Canada agency employee stated, "*Marine conservation areas are designed to support multiple different uses. So it's not excluding people entirely. The intent is to have some zones that will be non-extractive. That's good in terms of ensuring that species continue and uses are sustainable, and some certain areas, more sensitive areas are protected."* The CNMCAA also outlines use regulations, explicitly prohibiting activities such as the disposal of public lands, use or occupation of public lands, exploration, and exploitation of hydrocarbons, minerals, aggregates, or any other inorganic matter within an NMCA unless authorized (Canada National Marine Conservation Areas Act, 2002). The Marine

Protected Area Protection Standard of 2023 provided greater consistency and clarity on prohibited activities in federal MPAs as well (Fisheries and Oceans Canada, 2023). This includes prohibiting oil and gas exploration and exploitation, mining, dumping and bottom trawling in all new MPAs established by federal agencies after April 25, 2019 (Fisheries and Oceans Canada, 2023). Table 10 details in more depth what is or is not permitted within each zone.

**Table 9.** NMCA zoning purpose and objective. Retrieved from (Parks Canada Agency, 2022b).

| Zone | Purpose | Objective |
|---|---|---|
| Zone 1: Strict Protection | Strictly protects special features and sensitive ecosystem elements that are susceptible to disturbance. Access and extractive use are prohibited. | • To protect special features and/or sensitive ecosystem elements in as undisturbed a state as possible.<br>• To restore or recover depleted or degraded special features and/or sensitive ecosystem elements.<br>• To provide reference areas for research.<br>• To contribute to maintaining biodiversity |
| Zone 2: General Protection | Protects special features, sensitive ecosystem elements and representative characteristics of the marine region while providing for compatible access and non-extractive uses. Extractive use is prohibited. | • To protect representative characteristics of the marine region and contribute to maintaining biodiversity.<br>• To protect special features and/or sensitive ecosystem elements.<br>• To restore or recover depleted species or degraded habitats.<br>• To provide research opportunities.<br>• To provide opportunities for education and non-extractive recreation.<br>• To foster awareness, understanding and enjoyment of NMCAs. |
| Zone 3: Habitat Protection | Protects specific habitats while providing for compatible access and extractive uses. Some uses are prohibited to support specific habitat conservation objectives. | • To protect, conserve or restore a specific habitat.<br>• To support a range of uses that do not conflict with the specific conservation objective(s) of the zone.<br>• To provide opportunities for research, education and appreciation of the habitat protected by the zone. |
| Zone 4: Multiple Use | Sustains the greatest range of uses that do not compromise ecological sustainability, cultural resources or heritage values. | • To foster a range of uses that do not compromise ecological sustainability, cultural resources or heritage values.<br>• To provide research opportunities in areas with multiple uses.<br>• To provide opportunities for education and recreation.<br>• To foster awareness, understanding and enjoyment of NMCAs |

**Table 10.** NMCA zone allowable uses and activities. Zones 1 and 2 represent full protection zones. Zones 3 and 4 represent ecologically sustainable use zones. Retrieved from (Parks Canada Agency, 2022b).

| Activities/Uses | Zone 1 | Zone 2 | Zone 3 | Zone 4 | Limits/Permits/Exceptions |
|---|---|---|---|---|---|
| Indigenous Traditional Use | Yes | Yes | Yes | Yes | Traditional use of an NMCA by Indigenous peoples will not be subject to zone restrictions except for conservation, public health or public safety reasons, determined in consultation with Indigenous rights holders. |
| Research, Monitoring and Restoration | Conditional | Yes | Yes | Yes | A research and collection permit from Parks Canada, and other applicable permits, are required. |
| Recreational Activities (Non-extractive) | No | Yes | Yes | Yes | Permits may be required. |
| Commercial Tourism (Non-extractive) | No | Yes | Conditional | Yes | A business license is required. |
| Coastal and In-water Infrastructure | No | Conditional | Conditional | Yes | Authorization from Parks Canada is required. |
| Commercial Shipping | No | Yes | Conditional | Yes | Conducted in accordance with Transport Canada's legislative and regulatory framework and consistent with international maritime law. Anchoring may be restricted to ensure bottom protection. |

### 6.1.3 Federal, State, and Provincial Agency Partnerships

As mentioned in the introduction, the Great Lakes are shared by Canada, US, Indigenous Nations, eight US states, and two Canadian provinces. Thus, governance of the Great Lakes watershed is complex due to many jurisdictional authorities, each with their own roles and responsibilities in managing the water resource. For NOAA and Parks Canada this means while the agencies specifically manage both NMSs and NMCAs in the Great Lakes, they also must engage in collaborations and partnerships with other entities for management activities. MPA management is dependent on agency management decisions and site-specific considerations, yet both NOAA and Parks Canada partake in some degree of shared management responsibility with fisheries managers and other state/provincial and federal agencies within the Great Lakes as well.

#### Fishery Management

In the oceans, fishery management falls under the jurisdiction of federal governments (NOAA Fisheries and Fisheries and Oceans Canada), yet in the Great Lakes region the authority for fishery management remains decentralized (GLFC, 2024b). As a result, fisheries of the Great Lakes are managed by state, provincial, and tribal agencies, with support from the US and Canadian federal governments (GLFC, 2024b). This approach results in separate bodies and governments handling fishery-related matters, leading to the need for coordination between state

and federal agencies in fishery and MPA related manners. Despite the potential barriers posed by this separation, there are mechanisms in place to facilitate coordination for fishery management in the region. Most prominently, the Great Lakes Fishery Commission (GLFC) facilitates cross-border cooperation between the US and Canada to advance and sustain the fisheries of the Great Lakes (Minns, 2014; GLFC, 2024c). GLFC recognizes that fishery resources do not adhere to political boundaries and thus fosters collaboration binationally for the benefit of millions of citizens who rely on these resources for food, subsistence, recreation, and income (GLFC, 2024b). As noted by one academic, the Commission's duty, plainly put, is, *"to help the states and the provinces and the tribes work together."*

While GLFC serves as a focal point for cooperative Great Lakes fishery management, it is designed specifically not to supersede the existing management authority of states or provinces. This approach ensures that state and provincial agencies retain control over their respective fisheries while working collaboratively with federal entities and neighboring jurisdictions through the commission's coordination efforts (GLFC, 2024b). One interviewee noted the unique role that federal agencies play in this jurisdictional tapestry, saying, *"...anything that includes federal involvement, like say, Marine Protected Areas, marine sanctuaries, Endangered Species Act, whatever, requires something just a little bit different in terms of governance*." Still, communication, coordination, and data sharing between governmental entities, including NOAA and Parks Canada, on fishery research and activities could be improved. As we heard from a Lake Superior stakeholder within the fishing industry, *"In Lake Superior, we have Michigan, Wisconsin, Minnesota, Ontario, and everyone manages the fish that I'm familiar with - trout, salmon - they all manage those fish differently, they all study them differently, and it's questionable what data is exchanged between agencies. I think there's some fair collaboration between them, but I'm always surprised to find that one agency is researching this thing, and the other ones are researching the same thing without sharing data."*

There is a general consensus that MPAs alone cannot provide adequate protection for an entire fishery, although they support other traditional fishery management strategies (Hedges et al., 2010). Yet, given the positive impact of well-managed MPAs on fisheries and ecosystems, it's crucial to acknowledge the interconnectedness between MPA management and the management of commercial fisheries beyond MPAs (Lausche et al., 2021). This recognition is necessary in addressing challenges such as overfishing, climate change impacts, and habitat destruction (Lausche et al., 2021). Also, of major importance in the Great Lakes in the realm of fisheries and MPA management are Indigenous fishing treaties and rights. Many Indigenous nations and tribes, including the Anishinabek Nation, have treaty rights with respect to Great Lakes land, water, and fishing resources (Anishinabek, 2015). In recent years, Indigenous Nations and groups, such as the Bay Mills Indian Community, have opposed NOAA's NMS nominations due to concerns about infringements on their treaty rights (Gravelle, 2021). Further discussion of Indigenous partnerships in relation to MPA management is discussed further in the next section of this chapter.

### State and Provincial Governments

Both NOAA and Parks Canada are dependent on their respective federal, state, and provincial agencies to enable some management aspects of sites. For NOAA, both NMS in the Great Lakes are managed with the state of the waters they reside in. Therefore, TBNMS is managed by a state/federal Joint Management Committee which has the decision-making authority within the

Sanctuary (NOAA 2023a; NOAA and State of Michigan, 2009). The Joint Management Committee is composed of one Federal employee named by the NOAA Administrator and one state employee named by the Governor of Michigan. The Joint Committee approves revisions to the management plan, annual work plans, allocated state and federal funds and other sources of revenue for the NMS, and overall makes management decisions for the site (NOAA, 2023a; NOAA and State of Michigan, 2009). At WSCNMS, NOAA has primary responsibility for the management of the Sanctuary but co-manages the Sanctuary in collaboration with the State of Wisconsin. A Memorandum of Agreement is in place for this collaboration, encompassing various aspects such as mutual concerns related to Sanctuary resource protection, programs, permitting, activities, and development (NOAA, 2023a). Along with partnerships within the sanctuary, additional partnerships extend further as well, as we heard in an interview where an agency employee noted, "*there's been cases where there's been a shipwreck found somewhere or a need for some type of on-water platform outside of the sanctuary where I can deploy my people and resources to help [the state of Michigan] with it. [The state administrator] runs a very, very large museum and museum system and has archivists in that. I tap into her resources where they come help us do projects. She's helped foster additional law enforcement through DNR [Michigan Department of Natural Resources] - our enforcement is through NOAA, Coast Guard, [and] DNR. So it's helped bring those resources in motion.*"

Similar to NOAA, Parks Canada has partnerships to accomplish management goals in the Great Lakes. This includes at FFNMP where the regulation and management of fisheries and marine transportation fall under the jurisdiction of the federal ministers of departments of Fisheries and Oceans, and Transport, respectively (Yurick, 2010). As a result, any provisions to management plans that pertain to fisheries or navigation, and any proposed regulatory amendments respecting those activities, require the agreement of both the Minister of Fisheries and Oceans or the Minister of Transport (Yurick, 2010). This was heard in interviews where an agency employee said, *"NMCAs require a lot of collaboration and cooperation among federal agencies in Canada because each federal department kind of has some level of responsibility for activities within NMCAs. So it's not just Parks Canada, we share responsibility for certain things. For example, Parks Canada works really closely with the Department of Fisheries and Oceans on matters relating to commercial fisheries in NMCAs and closely with Transport Canada on matters related to shipping. So we definitely share responsibility with that. So we need to be on the same page. And we also work closely with provinces, territories and Indigenous partners on things such as recreational fisheries and other specific marine uses… definitely close collaboration."* As LSNMCA is in the process of being formally established, it does not have any official partnerships. The interim management plan does not address marine navigation and safety, and therefore does not affect the jurisdiction of the Ontario Minister of Natural Resources, the Minister of Fisheries and Oceans, or the Minister of Transport (Parks Canada Agency, 2016).

While these federal partnerships between NOAA and Parks Canada and other entities exist through formal legislation and policies, there are other less formal state-federal relationships that have persisted without strict memorandum of understandings. These less formal relationships allow flexibility as heard from an agency employee, "*What we learned was, you don't need this big clunky framework; you just need a couple of people that are willing to kind of work together. So that's what we've done [for WSCNMS]. It's pretty straightforward. It's the Wisconsin Historical Society and the sanctuary working together. It's technically the head of the [Wisconsin] Historical Society and the superintendent, but usually that's delegated down… [There is a] pretty*

*streamlined number of people involved in the co-management. So, we don't have a joint management committee.*" Yet, it was also noted in an interview that conducting operations without a documented partnership agreement may present limitations. The presence of formal documentation delineating the terms of a partnership facilitates effective collaboration and provides a strategic framework to ensure continuity of projects in the future. This was noted at WSCNMS with one interviewee stating, "*A Programmatic Agreement is something we're working on now. We have an MOA that says, 'we'll work together.' And it's the overarching document that solidifies this co-management. But, how does that actually work in practice?... So we're working on that now… making sure we have something that another person or people can come in, see that framework and say, 'Okay, here's what we said we would do, I can work with that.' Rather than inventing it or not knowing. That's really important… So I think it's really important that they've got this framework for them.*"

### 6.1.4 Co-Management and Indigenous Partnerships

MPA managers have the responsibility and opportunity to work in partnership with and through co-management with Indigenous Peoples (Sullivan-Stack et al., 2022). Although codified into some national and site-level initiatives and plans, common goals regarding Indigenous rights and authority within the context of MPAs are still ambiguous in the Great Lakes. Much of this stems from a persistent ambiguity over what common terms like "consultation," "Indigenous rights," and "authority" mean. This was heard in Canada as well where one Indigenous interviewee expressed the situation, *"if we looked at that language, and demonstrated a change that looks at responsibility, then we can change the perspective on what that looks like, because ultimately, the responsibility is authority. But they're truly two different definitions. And we're trying to redefine what we're trying to do. So let's start by even defining what authority means."*

Broadly in the US, NOAA continues to strengthen its consultation and collaboration with Indigenous Peoples, acknowledge sovereignty, and establish policy with Indigenous officials in areas such as Indigenous self-government and treaty rights (NOAA ONMS, 2022b). In the realm of MPAs, the US's NMSA provides some direction for Indigenous relations, providing that the sanctuaries are to "develop and implement coordinated plans for the protection and management of these areas with… Native American tribes and organizations" (National Marine Sanctuaries Act, 2000). Further, as outlined in the Office of National Marine Sanctuaries' vision for 2022–2042, NOAA commits to the fundamental priority of embracing "the concept of collaborative management with tribal and Indigenous communities and as appropriate, codify those approaches in management plans and Agreements" (NOAA ONMS, 2022b).

In the past there have been both successes and shortcomings by NOAA at engaging Indigenous peoples in the MPA process, both of which offer lessons learned. The Intergovernmental Policy Council (IPC), a policy-level forum involving the Makah, Quileute and Hoh Tribes, Quinault Indian Nation, the State of Washington, and NOAA, for the Olympic Coast NMS is one example of a collaborative structure that NOAA attempted during the designation process of the Olympic Coast NMS (National Marine Protected Areas Center, n.d.). Olympic Coast NMS made progress in terms of consultation, but it was not done perfectly. In fact, many Indigenous tribes felt left out of the conversation when a new boundary was decided that excluded crucial access to treaty fishing waters for the tribes. A workshop that took place during the designation process recommended "Proposed No-Take Marine Reserve Areas" which would have negative effects on these sovereign tribes as they rely on fishing as one of their major economic leverages. The

Indigenous tribes were not invited nor present at this workshop (National Marine Protected Areas Center, n.d.). Initiatives taken place on the national scale can be used to further advance future partnerships with Indigenous communities moving forward.

In the Great Lakes, NOAAs relationship with Indigenous communities continued to be a priority, as highlighted in interviews with agency staff. Still the designation and future management of NMS in the region require further communication and partnerships between NOAA and the Indigenous peoples to promote trust. Ensuring Indigenous treaty rights and traditional access and activities connected to the Great Lakes is essential within every management activity.

> *"Speaking with KBIC, one of the big questions that comes up is how does this [an NMS] impact treaty rights? That's supreme law, it cannot in any way impact treaty rights harvesting, gathering."*
>
> *- NGO Employee"*

In Canada, at the national level, there has been growing recognition of the need to meaningfully engage with Indigenous tribes, First Nations, and Metis people regarding the establishment and management of MPAs (NOAA ONMS, 2022a; NOAA ONMS, 2022b; Fisheries and Oceans Canada, 2022). As a signatory to the UN Declaration on the Right of Indigenous Peoples, the country has enacted legislation to fulfill this Declaration by taking steps to "ensure the laws of Canada are consistent with the United Nations Declaration on the Rights of Indigenous Peoples" (United Nations Declaration on the Rights of Indigenous Peoples Act, 2021). For Parks Canada, the NMCA requires that designation and management of actions of MPAs "shall consult with relevant federal and provincial ministers and agencies, with affected coastal communities, aboriginal organizations, aboriginal governments and bodies established under land claims agreements" (Canada National Marine Conservation Act, 2002). The CNMCAA also explicitly includes Traditional Ecological Knowledge (TEK) in planning and management of NMCAs (Canada National Marine Conservation Areas Act, 2002). Consistent with these legislations, Parks Canada encourages further collaboration through agreements with federal and provincial ministers and local and Aboriginal governments among others. This includes during the development of NMCA policies and regulations, and for the establishment or modification of NMCAs as well (Canada National Marine Conservation Areas Act, 2002). Through their policies and goals, Parks Canada expects the outcome of "Reconciliation with Indigenous peoples is advanced, including through co-management of NMCAs" (Parks Canada Agency, 2022a).

At the site level within the Great Lakes, Parks Canada has taken steps to further define Indigenous consultation. This has included joint partnerships at FFNMP with the Saugeen Ojibway Nation (SON) through Parks Canada's Indigenous Guardians program like Together with Giigoonyag to collaboratively research the Lake Huron whitefish decline. Two Indigenous communities exist in the FFNMP area, the Chippewas of Nawash Unceded First Nation and Chippewas of Saugeen First Nation, collectively identified as SON (Parks Canada Agency, 2018). Although SON has had limited engagement in the management of FFNMP since its establishment in 1987, the relationship has improved over the past ten years. As identified in Fathom Five's State of the Park Report in 2018, the relationship between Parks Canada and SON, represented by Indigenous

Relations Indicators, has been rated as Fair and improving to reflect the positive efforts to build and strengthen this relationship. Still, the Report recognizes that there is still significant room for improvement as seen in Figure 12, where only one of the five indicators (mutual respect) was categorized as "Good." Indigenous Accessibility and Support for Indigenous Communities were considered "Fair," and Indigenous Partnerships and Incorporating TEK were considered "Poor" (Parks Canada Agency, 2018).

> *"As a foundation, having clear, collaboratively-developed objectives for what the road to achieving these goals would look like… I guess that might tie in to governance and understanding the core vision and objectives, but sharing knowledge, especially in terms of respecting and trying to understand how to incorporate Indigenous perspectives and knowledge."*
>
> *- Agency Employee*

**Fathom Five National Marine Park Indigenous Relations Indicators**

| Indicators | Measures | Status and Trend | Description |
|---|---|---|---|
| Indigenous Partnerships | Indigenous Collaboration in Heritage Place Planning and Management | ↑ | In recent years, Parks Canada and SON have increased collaboration through Partnership Agreements, Memoranda of Understanding and Contribution Agreements. In 2015, a SON Parks Team was established to provide a forum for regular, ongoing engagement between SON councilors and the park management team. A technical working group of SON and Parks Canada specialist have also cooperated in planning projects. |
| | Indigenous Collaboration in Heritage Place Operations | ↑ | |
| Indigenous Accessibility | Indigenous Partner Access to Heritage Place Traditional Lands and Activities | ↑ | Parks Canada provides free entry to all SON community members and has provided transportation to island sites for several ceremonial or archaeological activities. Parks Canada has begun discussions on broader strategies to facilitate traditional harvesting practices, and SON continues to manage a commercial fishery in FFNMP through an agreement with the Province. |
| Mutual Respect | Team Member Commitment to Building Mutual Respect, Trust, and Understanding with Indigenous Partners | ↔ | The SON-Parks Team provides an important forum for building Mutual Respect, Trust, and Understanding. SON has performed pipe, smudge and tobacco offering ceremonies at the discretion to recognize their culture and traditional lands, and SON Chiefs and Elders have provided opening remarks at park functions. Parks Canada has supported the Northern Bruce Truth and Reconciliation Group to increase public awareness about reconciliation with Indigenous Peoples, and annual staff training has provided information on SON's historical and contemporary connections to FFNMP. |
| | Extent of Reconciliation with Local Indigenous Communities | ↑ | |
| Incorporation of Traditional Knowledge | Incorporating of Traditional Knowledge | ↑ | Some park interpretive programs incorporate Traditional Knowledge (TK) and Resource Conservation staff is considering methods to incorporate TK into long-term monitoring programs. The recent contribution agreements will support the development of an Indigenous Land Use and Occupancy Study to better understand SON's traditional use of FFNMP and Bruce Peninsula National Park. Medicinal plant harvesting and traditional resource harvesting activities have been led by SON members in recent years. |
| | Use of Indigenous Languages | ↑ | |
| Support for Indigenous Communities | Economic Opportunities for Indigenous People's | ↑ | Parks Canada employs SON community members across a range of positions and tenures. A variety of skill-building and certification-based training opportunities have been offered and promoted to SON members, including work placements. |
| | Capacity Building for Indigenous People's | ↑ | |

**Figure 12.** Fathom Five National Marine Park State of the Park Report 2018 Indigenous Relations Indicators. Indicator conditions are presented by Good, Fair, and Poor, represented by green circles, yellow triangles, and red squares respectively. Arrows indicate the trend of the indicator, with improving

trends presented by up arrows and stable trends presented by the double ended arrows (Parks Canada Agency, 2018).

### 6.1.5 International Coordination

In the Great Lakes, transnational cooperation has long been practiced (Sullivan-Stack, et al., 2022). While there are formal structures in place for multinational coordination broadly in the Great Lakes (the Great Lakes Commission, International Joint Commission, and GLFC), there are more limited efforts between NOAA and Parks Canada for coordinated MPA management across the Canada-US Border. This includes few formal collaboration structures to encourage multinational coordination. The lack of regional integration and coordination of MPAs was outlined in FFNMP's 2010 State of the Park Report where it is stated, "Parks Canada has limited participation with lake-wide partners such as… Environmental Protection Agency, and National Oceanic and Atmospheric Administration" (Parks Canada Agency, 2010). Still, there exist other collaborative efforts in the Great Lakes between NOAA and Parks Canada that take the shape of informal partnerships. One prominent informal structure utilized by the US and Canada to encourage further collaboration is GLPAN. GLPAN is a working group made up of members from Canadian and US resource management agencies including NOAA, Parks Canada, US National Park Service, US Fish and Wildlife Service, Great Lakes Fishery Commission, Ontario Parks, and Environment and Climate Change Canada (GLPAN, 2021). The informal structure of GLPAN was highlighted by an agency employee stating *"Like a lot of my work, the Great Lakes Protected Area Network (GLPAN) is just side-of-the-desk. So to have a mandate where we're working towards an explicit mandate that we want to establish a binational marine protected area network. That would be very encouraging."* The goals of GLPAN are outlined below and include:

- Improve communication and information exchange related to Great Lakes coastal and Marine Protected Areas.
- Increase the profile and role of protected areas as nature-based solutions to lake-wide conservation issues.
- Enhance the effectiveness of protected areas and agencies through a more coordinated network.

The Great Lakes Coastal Assembly also offers similar benefits, as heard by one interviewee who shared with us, "*That's really the purpose of the Great Lakes Coastal Assembly - to facilitate collaboration for coastal conservation and coastal resiliency in the future."* These goals are imperative as all transboundary initiatives require cooperation between the managing entities (Mackelworth, 2012). Collaboration and coordination on transboundary initiatives have been dominated by the terrestrial environment (Mackelworth, 2012). Yet, multinational initiatives involving cross-country collaborations have been increasing within marine management (Mazor et al., 2013). With this, due to marine ecological dynamics and connectivity, marine environments may offer easier opportunities for multinational collaboration (Mackelworth, 2012). Mackelworth, 2012 found that in regions where international relations are positive, political boundaries may be flexible allowing parks to develop cooperation at management level. An example of this is the Waterton-Glacier International Peace Park, dedicated through collaboration by the US and Canada. Despite the collaboration's informal nature, the management teams from both parks engage in joint efforts concerning areas such as research, wildlife management, search and rescue

operations, and visitor services (Mackelworth, 2012). These types of collaborations between two countries are perceived to have large costs and require many resources, yet Mazor et al. (2013) found that conservation efficiency can significantly improve when countries collaborate for the management of marine parks.

Cross-border collaboration of MPAs is perceived to be lacking in the Great Lakes region, as heard from our interviews. When discussing what opportunities exist for collaboration between LSNMCA and Isle Royale National Park an agency employee stated "*It's a great question. And I don't know. I've always kind of wondered what we should be doing with them. Some of the stuff around their island and some of the fisheries work that's done there, we could use the same types of protocols that they're using to look at some of the fish populations that we have… But aside from trying to use the same protocols, I don't know what we would do with them."* In the Great Lakes, studies have also stated that the current state of data sharing across jurisdictions could be advanced. This includes identifying missing data as a large issue for MPA management and limited cross site sharing and lack of consistency between sharing as well (Fisheries and Oceans Canada, 2021; NAMPAN, 2021a; NAMPAN, 2021b; Ives et al., 2018). Concerns were raised in interviews about the lack of binational coordination, including an agency employee stating how management on one side of the border may impact the other "*As far as the various layers of jurisdiction and rules… Some of the concerns that I have for the areas that are not receiving a high level of protection is if you stop activities from happening over here, all the people that carry them out are gonna have to do them over here… if we were more restricted, well, then everybody would just go north of the border. If it's more restricted up there, then everybody's going to come through Canada. They'll just change their route based on what the rules are."*

Accessible data on allowed and regulated marine activities at multiple scales are critical for estimating the current status of marine protections and to inform marine spatial planning for new protections and emerging marine activities (e.g., renewable energy) (Sletten, 2021). While both NOAA and Parks Canada work collaboratively with other federal agencies within their own countries, nonprofit leaders and local stakeholders expressed some desire for more formal interagency collaboration, both nationally and internationally. There is also the desire for more clarity about overlapping federal and state/provincial jurisdictions and regulations between both countries as an NGO leader expressed, *"Authorities vary as you go from place to place in the Great Lakes. So there is no one entity you can turn to and say, "Hey, you should do this better," or "you should not do that."*

### 6.1.6 Community Participation and Advisory Groups

A growing body of evidence suggests that seeking and incorporating community knowledge and participation in conservation activities increases the likelihood of continued stewardship and compliance with protected area regulations (Pretty and Smith, 2004; Andrade and Rhodes, 2012). Although the United States and Canadian governments historically designated and managed protected areas using a top-down approach (Andrade and Rhodes, 2012), NOAA and Parks Canada have made efforts to incorporate local priorities into their Great Lakes MPA programs. NOAA designated TBNMS in the 1990s using a top-down approach, which was initially met with significant local opposition and fears of federal government intrusion that eventually transitioned to broad community support after implementation (Wiesen et al., 2017). When Parks Canada established both the FFNMP and LSNMCA, the processes included community referenda. More broadly, Parks Canada's latest NMCA policy expressly requires that the agency "engages

Indigenous peoples, coastal communities, stakeholders and the public in NMCA establishment and management" (Parks Canada Agency, 2022a). From an agency perspective we heard consistent themes of what effective community participation entails from both agencies. This was summarized by an agency employee who said:

> *"If you're truly looking for meaningful stakeholder engagement, it has to be early and meaningful and honest… I think consistent messaging is important… Depending on where you're engaging, go to the communities rather than asking them to come to you, meet them where they're at and where they're comfortable at like a community center or a town hall. Transparency. Being honest about what you can and can't be accountable for is huge… Community members are the experts often of the area, if you're looking at a local context, they know the area, they've lived on it for years, they know how it works. And so really, tapping into that and looking at them as partners is crucial."*
>
> *- Agency Employee*

As part of local engagement, both agencies and their respective MPAs have advisory councils or committees that are made up of diverse stakeholders to provide advice about the management of the site. NOAA has established sanctuary advisory councils for TBNMS, WSCNMS, and the proposed designation in Lake Ontario. Parks Canada has established a management advisory committee for each NMCA, including FFNMP and LSNMCA. In the US, community involvement and stewardship are vitally important for achieving the goals of NMSs (NOAA ONMS, 2022c). Advisory councils have played a vital role in enabling community engagement and serve as liaisons between their constituents and the sanctuary, keeping sanctuary staff informed of issues and concerns (NOAA and State of Michigan, 2009; NOAA ONMS, 2022c).

Advisory councils are not managing bodies of the sanctuaries and thus do not create regulations. However, the councils bring together a diverse range of representatives to support the sanctuary designation process for proposed sites or offering guidance on managing established sanctuaries. Under the NMSA, every advisory council has the goal to "advise and make recommendations to the Secretary [of Commerce] regarding the designation and management of sanctuaries." Therefore, based on their unique experiences, stakeholders can influence NMS management decisions. An agency employee said the following about advisory councils, "*Our advisory councils are a pretty strong voice in communicating you know, how important sanctuaries are and what activities might be detrimental because you're bringing together a group of diverse people with very different interests, its fishermen or historians or ecologists. It's a powerful voice. So I can really see Advisory Councils as being influential. It's harder for - I've always felt it's harder for elected officials and agencies to ignore the advice from advisory councils."* TBNMS's advisory council was established in 1997. The proposed Lake Ontario NMS advisory council was established in 2019, with WSCNMS following in 2022 (NOAA ONMS, 2022c). Detailed descriptions of each site's Advisory Council and their positions can be found in Table 11.

Similar to NOAA, Parks Canada also establishes advisory groups, or advisory committees, for NMCAs (Parks Canada Agency, 2022a). This aims to advance the goal of advancing effective collaboration for management, where sustained collaboration and engagement are recognized as

fundamental to the success of the NMCA program. Management of NMCAs is thus shaped through collaboration and engagement from a diverse range of knowledge, perspectives, and active involvement. Parks Canada establishes a management advisory committee for each NMCA to provide advice and guidance on the formulation, review, and implementation of the management plan. They may also establish other advisory committees as well to reach these goals (Parks Canada Agency, 2022a).

In FFNMP, the Park Advisory Committee (PAC) is composed of representatives from 19 organizations with local, regional, provincial, and national interests in the national marine park (Parks Canada Agency 2010; 1998). PAC advises Parks Canada on site management, communicated information with member organizations, and other initiatives which make it essential for consulting with the local community and seeking input on management planning (Parks Canada Report, 2010). Some of the groups that have been represented in the past include but not limited to: Bruce Peninsula Sportsman's Association, Bruce Peninsula's Tourist Association, Chippewas of Nawash first Nation, County of Bruce, Ontario Underwater Council, Tobermory Chamber of Commerce, and Saugeen First Nation (Parks Canada Agency, 1998). First Nation input in Fathom Five has historically mainly been sought through the parks Advisory Committee, until the courts began defining consultation and the Saugeen Ojibway Nations withdrew from participation in the Park Advisory Committee because they did not want their attendance at meetings to be construed as formal consultation (Parks Canada Agency, 2010). LSNMCA has also different committees created to advise the site's advancement to becoming formally established (Campbell, 2022). This includes an Interim Management Advisory Board and an Interim Liaison Committee (ILC). The ILC acts as a platform for partners, stakeholders, and the LSNMCA team to exchange information. During their meetings, the LSNMCA Site Manager will offer updates on ongoing projects and solicit input from local communities and stakeholder organizations concerning NMCA related matters in the region (Campbell, 2022).

**Table 11.** Composition of NMS Advisory Committees in the Great Lakes.

| | **Thunder Bay NMS** (NOAA ONMS, 2020a) | **Wisconsin Shipwreck Coast NMS** (NOAA, n.d.c) | **Proposed Lake Ontario NMS** (NOAA ONMS, 2019) |
|---|---|---|---|
| Year Council Established | 1997 | 2022 | 2019 |
| Voting Seats | Alpena City Council (1 seat)<br>Alpena County (1 seat)<br>Alcona County (1 seat)<br>Presque Isle County (1 seat)<br>Thunder Bay underwater Preserve Committee (1 seat)<br>Citizen-at-Large (3 seats)<br>Tourism/Recreation (1 seat)<br>Business/ Economic Development (1 seat)<br>Fishing<br>(recreational, charter, and/or commercial) (1 seat)<br>Diving (1 seat)<br>Education (K-12, home school, charter) (1 seat)<br>Education (higher education) (1 seat)<br>Maritime Industry/Business (1 seat) | Citizen-at-Large (3 seats)<br>Diving/Dive Clubs/Archaeology (2 seats)<br>History, Heritage, and Public Interpretation (2 seats)<br>Education (K-12) (1 seat)<br>Education (Higher Education) (1 seat)<br>Tourism and Marketing (2 seats)<br>Economic Development (1 seat)<br>Fishing (Recreational, Charter, and/or Commercial) (1 seat)<br>Recreation (1 seat)<br>Maritime Industry (1 seat) | Citizen-at-Large (2 seats)<br>Divers/Dive Club/Shipwreck Exploration (2 seats)<br>Education (2 seats)<br>Maritime History and Interpretation (2 seats)<br>Tourism (1 seat)<br>Economic Development (2 seats)<br>Recreational Fishing (2 seats)<br>Recreational Boating (1 seat)<br>Shoreline Property Owner (1 seat) |
| Non Voting Seats | State of Michigan<br>US Coast Guard<br>Chippewa Ottawa Resource Authority<br>Friends of Thunder Bay National Marine Sanctuary | Ozaukee County<br>Sheboygan County<br>Manitowoc County<br>Kewaunee County<br>City of Port Washington<br>City of Sheboygan<br>City of Manitowoc<br>City of Two Rivers<br>United States Coast Guard | United States Coast Guard<br>Port of Oswego Authority<br>Cayuga County<br>Jefferson County<br>Oswego County<br>Wayne County<br>City of Oswego |

### 6.1.7 Financial and Staff Resources

All the governance processes discussed in this chapter require management capacity (i.e., staff to administer the processes and funding to support those staff), thus adequate funding and staff resources are essential enabling conditions for effective MPA management. One study of MPAs across the globe even suggested staff and budget capacity are the "strongest predictors of conservation impact" when compared with the predictiveness of other MPA features (Gill et al., 2017). Other broad evaluations of MPA governance practices confirm that secure sources of funding and local governance capacity are necessary to support broad types of management processes, such as community engagement and enforcement (Bennett and Dearden, 2014; Gleason, 2010). The sustainability and durability of MPAs depend on long-term funding for

management staff, monitoring, and adaptive management (Sullivan-Stack, et al., 2022). Conversely, insufficient financial and staff capacity can lead to the failure of MPAs to reach their intended conservation goals (Dehens and Fanning, 2018; Gill et al., 2017; Gleason, 2010).

Although the literature concerning MPA management capacity primarily focuses on oceanic MPAs, we found that funding limitations also impact Great Lakes MPAs, particularly in the US. In fiscal year 2020, NOAA received appropriations of approximately $55 million from Congress for the NMS system, despite managing sanctuaries with a surface area of 400 million acres (National Academy of Public Administration, 2021). Comparatively, to meet the past 25% goal of protected waters by 2025, the federal government of Canada invested $976.8 million dollars over five years to the effective management of existing MPAs and OECMs and establishment of new MPAs (ECCC, 2023). Further, when compared on a dollar-per-acre basis, the appropriation for NMSs is significantly less than the appropriations for other federal conservation systems, like the National Park, National Wildlife Refuge, and National Landscape Conservation systems, as illustrated in Figure 13. This suggests that Congress underfunds the system of NMSs, rather than allocating too many resources to land-based programs. In seven of the last 11 fiscal years, Congressional appropriations to NOAA have been $100 million to $1 billion less than NOAA's requested budgets (Congressional Research Service, 2023; Quiñones, 2024). Budget limitations for the NMS are particularly acute in the Great Lakes, for decision makers often direct larger funding streams towards ocean programs. For example, while the Inflation Reduction Act provided $50 million for improving infrastructure at NMS sites, all six sites were outside the Great Lakes region (NOAA, 2023b). One NOAA interviewee from the Great Lakes summed up the funding issue facing the region, saying "*I would say that a lack of funding is by far the most important barrier we have to fulfilling our mission completely.*"

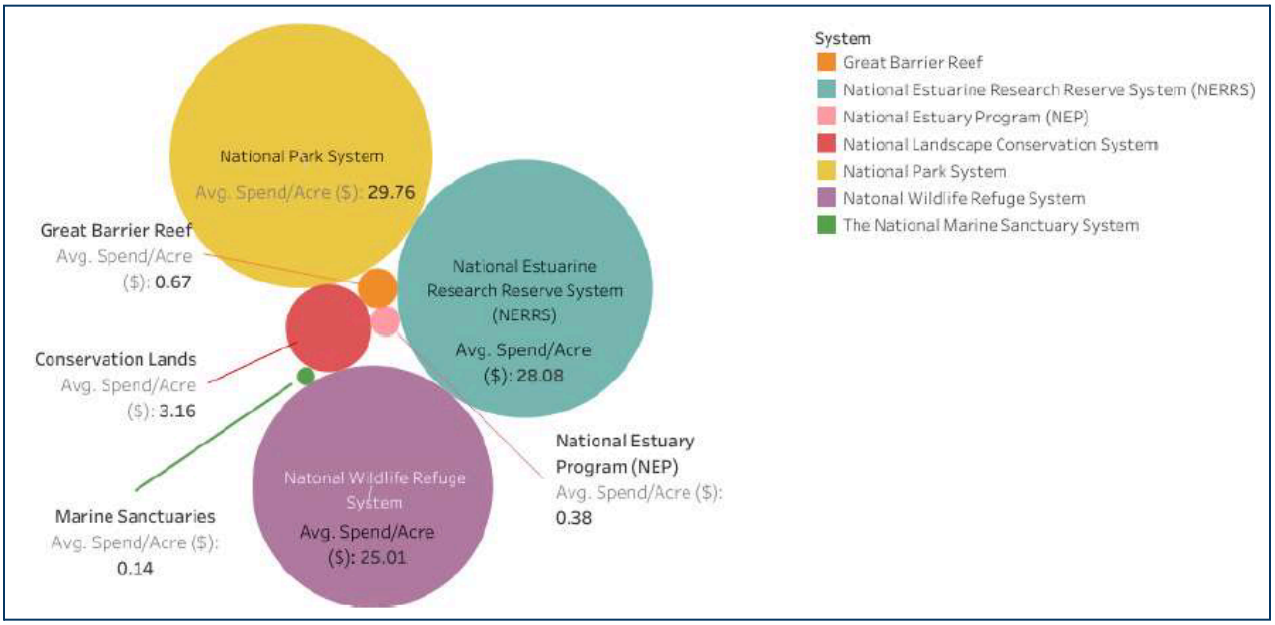



**Figure 13.** Comparison of spending per acre by federal land or water management agency (National Academy of Public Administration, 2021).

Interviewees expressed a concern that expanding the MPA program in the Great Lakes without allocating more resources would stretch management capacity thinner and constrain conservation and social outcomes. One NOAA interviewee highlighted the social impacts of the Great Lakes Maritime Heritage Center at Thunder Bay NMS but worried that new MPAs in Lake Erie and Lake Ontario might not have similar educational benefits unless the new sites receive sufficient resources.

> *"if we can't spread [those impacts] to other parts of the Great Lakes… because we don't have the money to build a multimillion dollar visitor center, hire the staff, or have the boats to be on the water to conduct the research and education outreach, it's going to be really difficult for us to really make a difference."*
>
> *- Agency Employee*

Without adequate funding from the federal government, NOAA has relied on nonprofit foundations for additional capacity support, whereas Parks Canada has not received philanthropic support for its MPA program. The National Marine Sanctuary Foundation is the nonprofit arm for NOAA and directly supports "programs and projects at individual sanctuaries, across the System, and in the watersheds that connect to them" (National Marine Sanctuary Foundation, n.d.). One NOAA interviewee emphasized the foundation's role in broadening the goals that NOAA can set, "*as our resource base grows.*" As described by another NOAA interviewee, "*[The Foundation] funds our education [and] community programs. Some of it funds research. A little bit of it funds… our mooring buoy programs…*" Both interviewees highlighted the importance of funding support from the foundation and other partners for expanding the conservation and socioeconomic impacts of the NMS.

While MPA staff capacity naturally relies on funding, ensuring sufficient staffing remains a distinct challenge for MPA managers, extending beyond adequate financial support. Staff capacity is one of the most important factors for determining goals and ecological outcomes of MPAs (Gill et al., 2017; Dehens and Fanning, 2018). Interviewees from NOAA, Parks Canada, and the National Park Service (NPS) brought up concerns about having adequate staff resources to achieve conservation goals. One interviewee cited lack of resources as one of the greatest threats to Great Lakes MPAs, whereas another interviewee observed that an agency's ability to evaluate MPA performance and incorporate feedback into management hinges on staff capacity. Even if an MPA receives sufficient funding, managers may still struggle to secure sufficient staff if the site is remote, like Isle Royale National Park (NP). As an interview stated, "*We have too much work… because we're too successful getting funds. The limitation really is just boots on the ground in terms of having a year-to-year workforce for implementation.*" However, a few interviewees noted that partnering with local communities, Indigenous groups, state and provincial agencies, nonprofits, and business owners has supplemented agency capacity, such as for performing ecological stock assessments, at several Great Lakes MPAs.

In our discussions, we found that staff capacity issues were more diverse than just a lack of capacity. While some MPA sites have staff dedicated to community engagement, one Parks Canada interviewee expressed a need for staff that specialize in working with local communities:

"*One of the struggles is we don't have somebody whose actual job is to do [community funding] agreements, and it takes a long time to put them in place… Those sorts of things, where they support our mandate, and we fund the communities… can go a long way as far as increasing [community] well-being.*" Another Parks Canada interviewee discussed the transition from establishing an NMCA to managing an NMCA and proposed that management team staff include members of the establishment team to help managers fulfill promises made to the local community during establishment. The current transition process involves a handoff from the establishment to a sometimes completely new management team, and that new management team might struggle to achieve the goals defined by the establishment team.

## 6.2 - Opportunities for Great Lakes MPA Governance for 2030 and Beyond

### 6.2.1 Opportunities for Holistic Management of Regions Natural Resources

Throughout our interviews and review of literature, a recurring theme underscored the significance of holistic management in conservation efforts (IJC, 2022; NOAA ONMS 2022a; NOAA ONMS 2022b; Fisheries and Oceans Canada, 2021; Acreman et al., 2020; Linke et al., 2019; Abell et al., 2007; Ernest, 2003). Beyond just MPAs, the IJC emphasizes improving management decisions to pursue the development of a plan to "to conduct holistic and proactive science activities that advance our ability to forecast and proactively manage the Great Lakes for the future (IJC, 2023). The idea of holistic management of the Great Lakes is evident and has manifested in various facets. These encompass treating the entire basin as a unified system through coordinated management, incorporating social and ecological outcomes within MPA sites, and integrating strategies for open waters, coastal zones, and land management. Yet, holistic management is more limited than it could be in the Great Lakes, leading us to identify opportunities for NOAA and Parks Canada to create a more regionally connected system of MPAs within the basin.

Included in holistic management in the concept of governing the entire basin as one connected system. This includes needing a whole ecosystem view, encouraging agencies to use a wide lens to management ecosystems (Minns, 2014). For many, specifically fisheries, this whole ecosystem or basin view has become the established precedent in the Great Lakes (Minns, 2014). In interviews it was noted that from an US perspective the Great Lakes MPAs have a certain level of unity, particularly at the federal level where, *"taken together, those four National Marine Sanctuaries bring together that idea of the Great Lakes as its own community… As always, these are the Great Lakes National Marine Sanctuaries. I think that's an important cultural motivator for folks who live and work and consider the Great Lakes their home. Senator [Tammy] Baldwin always refers to it as our Great Lakes sanctuaries. Senator Peters of Michigan is the same - he wants to do things to support all four of the sanctuaries rather than just the one in his state."* A similar sentiment was heard in Canada between FFNMP and LSNMCA. Further, the Fathom Five State of the Park Report from 2018 states that the park continues to collaborate with several partners on a wide range of local initiatives, yet it has not participated in important lake-wide initiatives or been active among the network of MPAs in the Great Lakes (Parks Canada Agency, 2018). From a site specific MPA perspective, whole basin holistic management needs a regional system of MPAs and a shift towards looking at the lakes as a larger system, even across international borders.

To this end, to effectively manage MPAs in the Great Lakes, we highlight the opportunity to establish a formal MPA network that expands across the basin, connecting existing sites and fostering a coordinated approach to conservation. Coordinated and cross-border initiatives among agencies are vital for addressing various challenges, such as habitat degradation and invasive species, ensuring consistency in MPA management practices and regulations. This approach necessitates strong partnerships among stakeholders to develop comprehensive management strategies. Therefore, we identify that both agencies have the opportunity to work together to develop integrated management plans that consider entire basin topics such as identifying priority areas for conservation, establishing conservation goals and objectives, and implementing management strategies that address ecosystem-wide challenges. By leveraging their expertise, resources, and partnerships, NOAA and Parks Canada can play a pivotal role in advancing holistic management and establishing a regional system of MPAs in the Great Lakes basin.

Within specific MPAs in the Great Lakes, there is a growing discourse on the need of management strategies to integrate both social and ecological considerations into management. Further, as highlighted in interviews, stakeholders express a growing recognition of the significance of this type of holistic management, emphasizing the need to not only incorporate ecological concerns but also encompass broader social dimensions within the framework of MPA management as well. Agency staff seem to understand that these two aspects are essential to MPA management and in some cases are reinforcing to each other, as heard from one interviewee, *"There's a shift towards a more holistic focus for MPAs. So not just ecological outcomes, but those social outcomes as well. I think as they shift to include those social outcomes we'll meet the ecological outcomes, as well, just because they kind of go hand in hand."* From this, we recognize the opportunity for both agencies to further incorporate social well-being into decision making. The repeated theme in interviews emphasizes the interconnectedness of social and ecological elements, suggesting that addressing social issues within MPAs can additionally enhance ecological outcomes, and vice versa. To achieve an integrated approach such as this, we highlight that NOAA and Parks Canada should continue to enhance collaboration, communication, and partnerships among various agencies and communities.

Along with these, there is also the opportunity for holistic management of the Great Lakes through management of the open waters, coastal, and land. There is much research into the connections between terrestrial habitats, processes, and/or development and aquatic conservation within the Great Lakes (IJC, 2022; NOAA ONMS, 2022b; Fisheries and Oceans Canada, 2021; Acreman, et al., 2020; Linke et al., 2019; Abell et al., 2007; Ernest, 2003). Through these, integrated coastal management and systematic conservation planning is emphasized as one approach for conserving coastal areas. Therefore, we identify that a national systematic planning framework, focused on inventorying coastal areas and flows of ecosystem services, could offer scope for identifying synergies between area-based conservation (including OECMs), climate change mitigation and adaptation, and ecosystem services. Establishing a national coastal protected and conserved area working group that convenes practitioners and knowledge-holders in protected and conserved areas, coastal and ocean management, and watershed management to collaborate in a national-level working group (or advisory panel) could be utilized to advance both planning and management (Lemieux, et al., 2023). Integrated coastal management also offers the opportunity to fill freshwater protection gaps through combining freshwater and terrestrial conservation objectives (Flitcroft et al., 2023). As highlighted by Flitcroft, et al., 2023 this could

include using OECMs in terrestrial areas to further aquatic conservation efforts due to the effect of terrestrial activity on marine habitats (Flitcroft et al., 2023).

In Figure 14, we show the terrestrial protected areas adjacent to both TBNMS and WSCNMS to demonstrate the potential for coordinating terrestrial and MPA management. Currently, there are relatively few terrestrial protected areas adjacent to either TBNMS or WSCNMS. This alignment could foster conservation efforts and leverage terrestrial land protection to mitigate ecological impacts on MPAs. This type of holistic management was noted in an interview where one NGO employee highlighted potential agricultural OECMs benefits to MPAs, stating, "*related to harmful algal blooms… there are actions on the land that are not in the Great Lakes… But I would consider that it's a conservation measure effect. That's what a lot of people are doing - investing in agricultural best management practices to improve water quality in the Great Lakes. That has a protective influence on the Great Lakes.*" In the US, NOAA is seen as an entity to bridge the gap between open water and coastal communities (NOAA ONMS, 2022b). Parks Canada offers a similar role for Canadian communities as well. Heard from all interviewee types, there is the desire for coastal and land management to become incorporated into a holistic management framework for MPAs in the Great Lakes. Through this, we identify that both agencies have the opportunity to work towards more holistic management of terrestrial and marine areas through further communication and partnerships with land-based conservation efforts and practices.

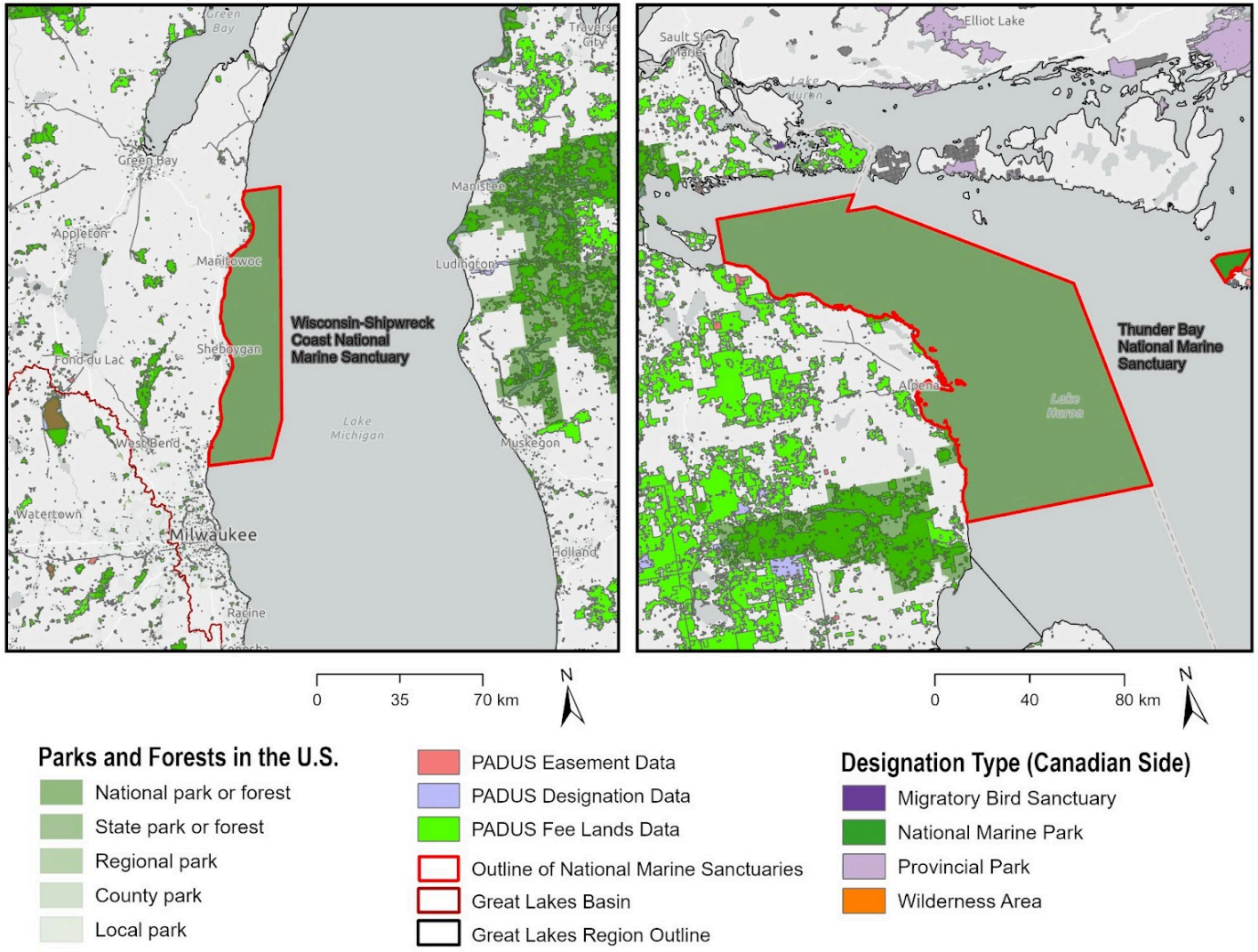



**Figure 14.** Map of TBNMS and WSCNMS and Adjacent Terrestrial Areas (Sources: MPA Inventory, 2024; CPCAD, 2024; NOAA, 2024; Great Lakes Commission, 2022; ESRI, 2022; PAD-US, 2022).

### 6.2.2 Opportunities to Utilize Zoning and Special Management Areas for 30x30

Utilizing zoning and special management areas presents a significant opportunity for NOAA and Parks Canada to advance their conservation goals, including those aligned with the 30x30 initiative. In comparison to their ocean counterparts, the employment of zoning and special management areas in the Great Lakes by both agencies is underutilized. This disparity can be attributed to factors such as lack of formal establishment of NMCAs in Canada, limited public support for restricted use, or the perceived lack of necessity for zoning to meet specific MPA objectives. The feasibility of more restrictive zoning in the Great Lakes is up for debate due to the lack of public support, with one interviewee noting, "*It's not going to be something that's going to happen here. Because it's absolutely not feasible to do that."* The significance of concerns regarding restricted resource use and zoning was consistently expressed throughout our interviews with Great Lakes stakeholders, underscoring the importance of resource use and accessibility in the region. Still, there are opportunities to work around these barriers, while recognizing their importance, to advance ecological conservation of Great Lakes MPAs through the use of zoning within MPAs. We identify the key opportunities related to utilizing zoning within the Great Lakes, including demonstrating the effectiveness of zoning in the Great Lakes, which can aid in aligning zoning types to maximize MPA benefits.

Demonstrating the effectiveness of zoning is crucial, particularly in the context of the Great Lakes region where there may be controversy surrounding the establishment of more restrictive zones, or "no-take" areas. Without sufficient evidence of their benefits, decision-making regarding the implementation of such zones can become challenging. Currently, there is a lack of research into the effectiveness of these zones in the Great Lakes, hindering the ability of management agencies to understand or justify their necessity. If the ecological impacts of zoning are better understood and realized, it may promote their use in the future, depending on if they are effective.

> "*The Chamber of Commerce in Florida originally opposed no fishing zones, no use zones, or research only zones. Because of the perception that the Florida Keys were not open for business. But when they realized that the coral reefs improved, and the fish came back, it really supported tourism, so they really changed their tune on the value of zoning."*
>
> *-Agency Employee*

To advance the understanding of zoning effectiveness, we identify that there is the opportunity for comprehensive research agendas focused on evaluating the impacts of restrictive zones on habitat protection and fishery health within the Great Lakes. While evidence supporting spillover effects from no-take zones exists in ocean environments, its applicability to the Great Lakes remains uncertain. Therefore, we recognize that further research and monitoring initiatives are essential to assess the ecological impacts of zoning and inform future management decisions. This presents NOAA and Parks Canada with the opportunity to focus some of their efforts and current or future resources to this work and invest in research and monitoring programs specifically tailored to the Great Lakes. This could allow agencies to enhance their capacity to evaluate the effectiveness of zoning measures, identify potential challenges or unintended consequences of zoning, and refine management approaches accordingly. We consider that this approach would align with the broader

goal of achieving sustainable conservation outcomes in the Great Lakes region and underscore the importance of scientific evaluation in guiding conservation practices.

We also identify that the utilization of zoning could also play a crucial role in enhancing the ecological conservation of MPAs in the Great Lakes. From LSNMCA, we heard that the type of zoning had an impact on whether it will be considered for 30x30, as an interviewee stated *"I don't know if the whole entire site would be included in 30x30, I suspect that it will be. Or if they're going to be really strict on what protection actually means and if it would only be components of the site that are at a higher level of protection based on the zoning. I don't know if they're gonna say the whole thing is, or if they're gonna say only Zone 1 and 2 are where you don't have extracted uses occurring are going to be considered."* Therefore, we highlight that similar zoning types between MPAs could be used to maximize the benefits seen within those zones. Aligning MPA zoning types across the Great Lakes could benefit both agencies and ecosystems by promoting consistency, collaboration, and efficiency in management efforts. We also recognize that by establishing common frameworks and terminology for zoning designations, both agencies could also more effectively communicate and coordinate conservation priorities and actions across jurisdictions. While Parks Canada has categorized zones with specific regulations pending for its NMCAs, NOAA does not. Therefore, we highlight that NOAA has the opportunity to incorporate multi-use protected areas, which accommodate various use zones within designated areas within NMSs to protect areas that are either ecologically sensitive or of importance for biodiversity. This could include following NMCA structures where, *"The marine conservation areas are designed to support multiple different uses. So it's not excluding people entirely. The intent is to have some zones that will be non-extractive. So that's good in terms of ensuring that species continue and users are sustainable, and some certain areas, more sensitive areas, are protected."*

As NOAA and Parks Canada strive to achieve the 30x30 target, the feasibility of implementing more restrictive zoning measures is based on demonstrating zoning effectiveness. These zones play a crucial role in enhancing ecological resilience, protecting vulnerable species, and preserving biodiversity hotspots. By strategically deploying restrictive zoning where appropriate, we accentuate that both agencies can support ecosystem protection while advancing the goals of 30x30. Still, we recognize that flexibility in zoning approaches is essential, acknowledging the diverse needs of different MPA sites, their resources, and connected communities. This was highlighted in interviews where we heard, *"Every site is going to have zones… But how those zones are put into place are going to vary or where they are. So that's where there will be the variation from site to site. So they will be rigid, but they will be able to put them in place with flexibility. But once they're there, everybody has the same set of rules."* This adaptability enables agencies to design zoning strategies to ecological priorities and stakeholder preferences.

### 6.2.3 Opportunities Advance Federal Partnerships Management Strategy

We recognize that opportunities exist for NOAA and Parks Canada to advance the understanding of MPAs throughout the Great Lakes region through clearly defining their management structures and partnerships with other federal agencies. As outlined, both NOAA and Parks Canada partner with other state/provincial governments and federal agencies for some management activities. However, as heard in interviews, regulation of MPAs can be unclear to those not directly involved in MPA management, including to NGOs and community members. Further, a limited understanding of how MPA management is connected to state/province fishery regulations and

other federal regulations was heard in interviews as well. Therefore, we identify that there needs to be clear guidelines, processes, and criteria for governance and agency partnerships in the Great Lakes, particularly due to the many jurisdictions that exist throughout the basin. It is crucial that NOAA and Parks Canada members involved in management to clearly define roles and responsibilities early on in the process and continue to make these aware to the public in order to promote understanding of MPA management to the public. This would help to ensure that the initial driving goal of each MPA is sustained and creates an opportunity for MPA managers to expand their roles as collaborators and convenors to outside partners for management as well.

We also identify the opportunity for MPA management agencies to establish more robust processes and structures for better cross-department or agency coordination. Promoting intra- and inter-agency coordination could ensure that planning and information regarding connectivity and corridor efforts are not siloed within individual agencies or within distinct programs within those agencies. We highlight a few general strategies to achieve this, including clearly reiterating protections by other jurisdictions in management plans and enhancing data and science sharing to promote connectivity between partners (Canadian Parks and Wilderness Society, 2021; Sullivan-Stack et al., 2022). In the US, reinstating and empowering the MPA Federal Advisory Committee (FAC), can provide expertise to help advise, review, and assess the US's successful implementation of effective and equitable MPAs to other federal agencies (National Academy of Public Administration, 2021; Sullivan-Stack et al., 2022; Gleason et al., 2010). An additional opportunity exists to strengthen the NOAA MPA Center with long-term funding, which could advance partnerships and communications (Council on Environmental Quality, 2023). Through these opportunities, NOAA and Parks Canada can increase the transparency and efficiency of their federal partnerships in the Great Lakes.

> *"I think that government agencies definitely have a tendency to work in silos and focus on their own work objectives. We certainly need to check in with each other more and make sure lines of communication are open and make sure that we know who's working on what and what person is the contact for specific things. I think consistency, there's definitely a lot of staff turnover in the government and so it's easy for things to get lost or fall by the wayside or have folks only working side-of-desk on specific things. I think that it's important to set objectives for those partnerships and be clear about what outcomes you want to achieve as a group."*
>
> *- Agency Employee*

### 6.2.4 Opportunities for Complementary MPA and Fishery Management

Effective MPAs and fisheries management are essential tools for managing marine resources and provide complementary benefits (Sullivan-Stack et al., 2022). Prevention of MPA degradation and effective biodiversity conservation requires active fisheries management across the entire range of target species (Lausche et al., 2021; Sletten et al., 2021; Ohayon et al., 2021). In the Great Lakes there also has to be active collaboration across the entities in charge of fisheries. Despite the absence of direct management authority in the realm of fisheries, there exists opportunities for NOAA and Parks Canada to work separately but collectively with states and provinces to advance

the goals of fisheries through the management of MPAs. This entails increased collaboration and, prominently, the protection of fishery resources by MPAs management and restrictions.

### Furthering Collaboration for Fishery Management

The decentralized management of the Fisheries resource in the Great Lakes presents the opportunity for both agencies to collaborate to advance their efforts in aligning the priorities of MPAs with fisheries management. From this we recognize that there exist opportunities for NOAA and Parks Canada to align their efforts with fishery managers to meet management goals while also protecting the fishery resource. Therefore, both NOAA and Parks Canada can work towards a more integrated approach to fisheries management through more direct communication with the staff and stakeholders of GLFC, Great Lakes Indian Fish and Wildlife Commission, and Indigenous natural resource managers. Both agencies could also take proactive steps to increase their communication with fishery managers in States and Provinces to align their priorities as well. This opportunity aims to achieve what one interviewee hoped to see in the future, *"I think that's what I'd like to see us get more towards, is where you could ask a colleague in Fisheries and Oceans, 'what is your contribution to Marine Protected Areas in the Great Lakes?' and they'd be able to answer that*." This can create policies and regulations that are effective at achieving the goals of fisheries but through the management of MPAs without overstepping the agency's jurisdiction.

There is the opportunity for both agencies to partake in managing fisheries data collection and sharing between entities as well. Great Lakes States and Provinces monitor and manage fish populations differently, and mostly the states and provinces do not share data consistently. When discussing fishery data one Lake Superior stakeholder stated, "*NOAA could play a role here, without stepping on toes and creating an additional layer of jurisdiction, [and] that would facilitate a much more open exchange of management ideas and information between agencies already at play… It would be helpful if NOAA provided the additional types of resources to help understand and to monitor the trends over time from the fisheries and things. I know that NOAA Fisheries is a huge force, especially in the oceans and such. So I think there would be a lot of unique fisheries opportunities here to kind of look at like this relatively natural and unimpacted ecosystem."* Yet, NOAA's experience and capabilities in fisheries science and management make it well-positioned to facilitate this collaboration. We identify that with its established network and expertise, NOAA, in coordination with Parks Canada, can provide technical assistance and support to streamline data sharing processes among stakeholders and states/provinces. This could involve developing digital platforms or databases for storing and accessing fisheries data, making it easier for agencies to collaborate and exchange information. In terms of these fisheries, it is crucial to increase the availability of data and accessibility of the stock assessment process must increase outside of the fisheries science community (NAMPAN, 2021a; Saloman et al., 2011).

### Advancing Fishery Protection Through MPA Management

This collaboration between NOAA, Parks Canada, and regional authorities presents a strategic opportunity to align management efforts in the Great Lakes, particularly to further support fisheries priorities. When designed together and effectively, management measures provided by MPA and fisheries management authorities can offer sustainable protection to marine resources (Sullivan-Stack et al., 2022). While the agencies cannot formally partake in fishery management and in the past have been hesitant to deal with areas regarding fisheries, there are aspects of MPA

management that could be utilized to advance the goals of fisheries. Interviewees highlighted this, including one who stated, "*Fisheries management is one [means] to ensure that overfishing does not occur in the future. And that that be adaptive in nature… Continuing that collaborative fishery management is important."* Crucially, through interviews and the literature review highlight that MPAs can be used to protect essential habitats for fish populations and adding extra levels of protections that provide beneficial impacts for populations as well. A lack of aligned fishery efforts within MPAs and the broader lake environment can prohibit effective conservation. This is highlighted in the literature where gaps in protection can allow extractive uses that are not compatible with biodiversity conservation goals to occur, including if fishery management measures are temporary and impactful fishing is allowed within MPAs, or the MPA is not at a level of protection that sufficiently conserves biodiversity (Sullivan-Stack et al., 2022).

> "If there was a threat to habitat that supported fisheries, then that's something that we could address. But we're not not in the fisheries management business in the Great Lakes"
>
> *-Agency Employee*

Additionally, collaborative and adaptive fisheries management (harvest regulations, total allowable catch limits, size limits, etc.) are key means of protecting against overfishing. Overlapping gear restrictions in protected areas can provide additional protection for marine life in a particular location, depending on the ocean governance system in place (Sletten et al., 2021). Therefore, the role of stronger restrictions (i.e., prohibit harmful gear) over larger areas in protected areas should be considered. (Lausche et al., 2021; Hedges et al., 2010; Sletten et al., 2021; Ohayon et al., 2021; Saloman et al., 2011). In the Great Lakes fisheries groups are already accustomed to certain restrictions on gear, seasonal activities. Similarly, some people in Canada feel as though bottom trawling should not be allowed in MPAs and that more measures should be included to manage and prevent future increases in fishing activity and reduce impacts of fishing. (Canadian Parks and Wilderness Society, 2021). MPA agencies could make a good case for types of regulations that align with both MPA and fishery objectives (as agreed to by states/provinces/tribes) if they are brought forth in a collaborative way and based on scientific evidence. Communicating potential no-take zones through the GLFC and state or provincial fishery managers may mitigate potential pushback from fishery groups. The management of MPAs therefore can offer support to fisheries activities, while not directly engaging in fishery management.

### 6.2.5 Opportunities to Advance Indigenous Partnerships and Co-management of MPAs

Numerous agencies, such as NOAA and Parks Canada, are increasingly prioritizing relationships with Indigenous Nations. This direction holds promise, contingent upon whether it is done deliberately and meaningfully. Moving forward in mutual, trust-based relationships and partnerships between Indigenous peoples, management agencies, and stakeholders is critical to the success of MPAs. These relationships must be developed and sustained as long-term goals, often beyond western centered research, funding, and project timelines (Sullivan-Stack et al., 2022). Within the Great Lakes region, we identify that both NOAA and Parks Canada have the opportunity and responsibility to further partner and collaborate with the Indigenous peoples,

communities, and Nations within the MPA designation and management process. This includes future co-management of MPA sites as well. Along with the direct partnership between managing agencies, we recognize that there is the potential for both NOAA and Parks Canada to further participate in Indigenous lead initiatives as well. Within the Great Lakes region, there are many Indigenous lead initiatives to promote Indigenous priorities within conservation. Therefore, we identify that there are opportunities for NOAA and Parks Canada to engage in these types of partnerships and promote the current initiatives along with future ones as well to further advance Indigenous involvement in MPAs. An elevation of these programs, along with collaboration with Indigenous Nations that wish to utilize these resources would help strengthen these relationships and protect the Great Lakes.

In order to advance and continue to strengthen relationships with Indigenous Nations, NOAA and Parks Canada also have the opportunity to elevate Indigenous-led conservation initiatives. This could be achieved by providing resources to Indigenous Nations connected to the Great Lakes and by involving these Indigenous-led initiatives in the management plans of MPAs. There are many examples on the US side showing other agencies uplifting and supporting current Indigenous-led initiatives. There are 4 Keweenaw Bay Indian Community institutions that are engaged with various state, regional, and federal stewardship initiatives. National Resource Department activities have expanded beyond fish hatchery and water monitoring programs to include air quality and brownfield programs, wildlife and wetland management, and remediation and restoration projects within the 1842 ceded territory (Gagnon, 2016). The Great Lakes Restoration Initiative (GLRI) has also provided funds to the Keweenaw Bay Indian Community's (KBIC) various natural resources and has substantially contributed to strengthening ongoing restoration work and provided the capacity to support projects. Specific programs and staff supported through GLRI funds, such as Tribal Resiliency Grants, include the Sand Point Restoration project, and the Great Lakes and Lake Superior programs. NOAA GLRI funds provided funding to the KBIC as a part of Manoomin (wild rice) management and restoration initiatives in partnership with many sister Great Lakes Tribes, the Great Lakes Indian Fish and Wildlife Commission, and federal and state agencies (Gagnon, 2016). Therefore, we identify that NOAA can actively support and promote partnerships with Indigenous communities by facilitating access to resources and integrating Indigenous-led initiatives into the management frameworks of MPAs through collaborative planning and decision-making processes.

Canada also has examples of Indigenous-led conservation initiatives, some of which Parks Canada has been directly a part of. An example of this is the work done with Gwaii Haanas and the Gwaii Haanas Gina 'Waadluxan KilGuhlGa Land-Sea-People Management Plan, which demonstrates how two nations can achieve coastal conservation through cooperation and consensus (Lemieux et al., 2023). As one Agency highlighted this experience and the importance of Indigenous partnership moving forward, "*I think there won't be a new NMCA or a new site established without a co-management agreement with Indigenous people. And it could be that co-management is on a spectrum. It could be shared decision making, right through to actual responsibilities and accountabilities. I think there's a chance for complimentary Indigenous protected areas… Gwaii Haanas as an example. It's a National Park and a National Marine Conservation Area, but it's also a heritage site. So recognition, that the Haida, the First Nations also see that they have their space too that they're trying to protect as a Haida site."* Beyond just Co-management there are also Indigenous Protected and Conserved Areas (IPCA) in Canada, such as the Raush Valley for the Simpcw First Nation are Indigenous governed protected areas.

Canada has allocated nearly $CAD 1.8 billion into Indigenous-land conservation but only three IPCAs have been created as of 2023 (Cyca, 2023). Moreover, Parks Canada has actively engaged in Indigenous partnerships through multiple initiatives and policies, showcasing its commitment to collaborative conservation efforts. However, we identify that Parks Canada could further strengthen these partnerships by continuing to prioritize Indigenous-led initiatives, facilitating co-management agreements, and amplifying Indigenous voices in decision-making processes, thus fostering a more inclusive and impactful approach to conservation.

### 6.2.6 Opportunities to Advance International Collaboration

Limited formal international collaboration by NOAA and Parks Canada within the Great Lakes offers the opportunity for the agencies to enhance cross border and binational/multinational initiatives. The need for this is evidenced in the 2010 State of the Park Report for FFNMP, which highlights that the "opportunity to collaborate is high," notably emphasizing opportunities for regional integration with NOAA (Parks Canada Agency, 2010). This was also heard throughout interviews; therefore, we identify that there are opportunities to increase coordination across the US and Canadian border to ensure similar goals throughout the region and watershed. This includes utilizing already existing avenues for collaboration, engaging in specific management actions, and implementing other strategies for improved coordination by both NOAA and Parks Canada.

There are already established structures for international collaboration within the Great Lakes, yet we highlight that NOAA and Parks Canada could actively utilize them increasingly more in the future. Specifically, we find that there are opportunities exist for the agencies to utilize GLPAN, the Great Lakes Coastal Assembly, Great Lakes Water Quality Agreement (GLWQA), and the GLFC to support regional governance. There are many potential benefits from going beyond site-specific or agency-specific teams to coordinate, and many opportunities to do so (NAMPAN, 2021a). GLPAN emerged as an effective framework and structure for coordinating international coordination efforts, as emphasized by interviewees. To enhance collaboration with GLPAN, NOAA and Parks Canada could enhance communication channels with its members, create deeper partnership and involvement among agency members, and leverage its binationally structured framework as a model for future collaborative groups. Moreover, we identify that exploring joint research initiatives, sharing technical expertise and data, and actively participating in GLPAN-led initiatives could further strengthen the effectiveness of this platform in promoting transboundary conservation efforts. Similarly, as heard in an interview, *"I think also maybe leaning a little more on these non governmental or non authoritative entities, like the Great Lakes Coastal Assembly, ensuring that those collaborative groups are funded and have the capability of informing decisions. That's really the purpose of the Great Lakes Coastal Assembly - to facilitate collaboration… and it's working, but then linking that to formal decision making structures."* Collaborating with the Great Lakes Coastal Assembly also aligns with the GLWQA as heard, *"Within the Great Lakes Water Quality agreement, the annex that's focused on habitat and species is aware of the Great Lakes Coastal Assembly, and they value what the Coastal Assembly was doing."* Similar to GLPAN, the Great Lakes Coastal Assembly provides both agencies with the chance to enhance their collaboration through intensified communication, frequent meetings, funding, and other avenues of cooperation. GLWQA also serves as a platform for facilitating binational conservation coordination. However, as highlighted in an interview, introducing another form of international treaty would entail significant effort, especially when existing

structures, such as those stated in this section, could fulfill similar roles. Additionally, the Great Lakes Fishery Commission is an additional structure highlighted for NOAA and Parks Canada to utilize to increase international collaboration, which is discussed more in Section 6.2.6. Therefore, we find that both NOAA and Parks Canada can utilize these strategies to further align and advance international collaboration in the Great Lakes through MPA governance.

We further identified specific opportunities to enhance specific area based international collaborations in the Great Lakes. One example of this that we highlight is within Lake Superior where the relationship between Isle Royale National Park and LSNMCA informs the opportunity for increased collaboration between the US and Canada MPAs, and thus enhancing a bination MPA network. Insights from interviews highlight the pivotal role of MPA interpersonal dynamics, particularly the relationship between these two parks depended heavily on the superintendent at the time. This underscores the importance of MPA sites having robust connections and effective communication channels among agency personnel in the region. Instances where communication faltered, particularly due to inadequate outreach by Isle Royale's superintendent, revealed a lack in collaboration, despite their geographic proximity. Therefore, we find that it is essential for NOAA and Parks Canada to develop structures and frameworks for those with management power to effectively communicate with other protected areas. This includes ensuring that interpark communications and connections can work into the future and do not hinge on the personal directions for the park. We also highlight that ensuring that interpark communications and connections are sustainable and not reliant solely on individual leadership directives. We identify that this could promote a transition towards more formal and official coordination mechanisms, fitting the importance of binational communication. Still, central to the success of these frameworks is the allocation of adequate funding. Financial support is essential for coordinating aligned management and research efforts across parks, yet it could thereby amplify the efficacy of conservation initiatives on an international level.

### 6.2.7 Opportunities to Strengthen Financial and Staff Resources

We identified a few strategies NOAA and Parks Canada might consider to address the financial and staff resource limitations discussed in Section 6.1.7. One opportunity entails developing more robust valuations of the ecosystem services conserved by Great Lakes MPAs to advocate for additional capacity investments from federal legislators. Another opportunity includes focusing resources on the MPA Center as a central source for data sharing and collaboration. With this, there is the possibility of incorporating expanded external partnerships into management and staff planning to augment internal MPA site resources. However, this list is by no means comprehensive, nor are these strategies catch-all solutions for improving NOAA’s and Parks Canada’s capacity in the Great Lakes. Because adequate funding is a key factor in the success of MPA network planning processes and for gathering and managing data to demonstrate MPA effectiveness of MPAs, long-term funding from governments or committed philanthropic partners is necessary. That long-term funding is not guaranteed, though, and the strategies we discuss can help secure such funding, target investments, or advance the MPA management goals without expanded funding.

NOAA and Parks Canada might justify additional capacity investments from their respective federal governments by expanding or supporting efforts to estimate the value of ecosystem services and natural capital the agencies’ Great Lakes MPAs conserve. Regional Great Lakes collaborative bodies have called for comprehensive and concerted efforts to incorporate

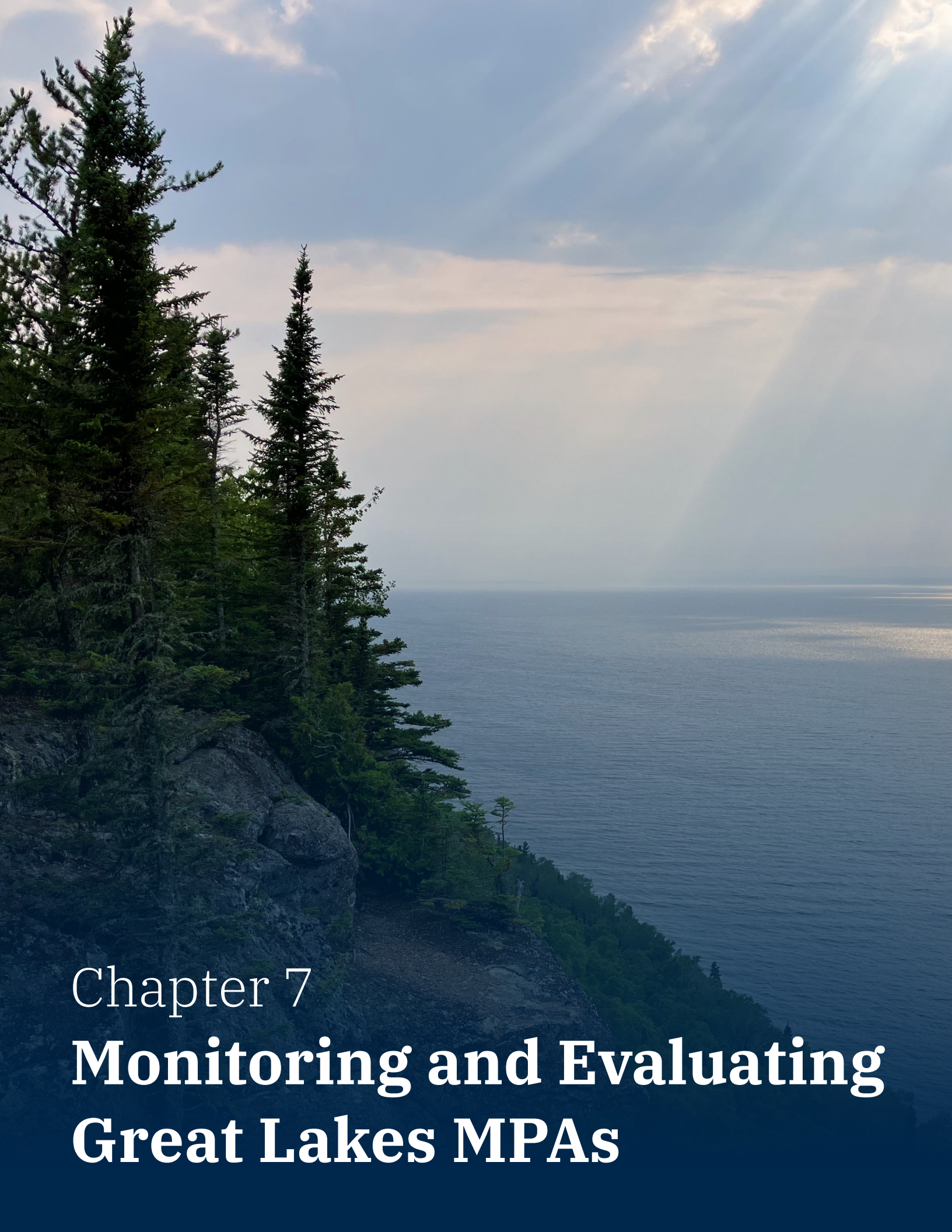
ecosystem services into Great Lakes management processes (Steinmen et al., 2017; Livernois, 2021). NOAA and the agency's partners have reviewed the agency's statutory and regulatory authority to perform ecosystem service valuations, evaluated actions NOAA might take to incorporate ecosystem services into management, and assessed applying socioeconomic analyses to the NMS sites, but the existing body of ecosystem services evaluation has not included NOAA's Great Lakes NMS sites. A recent analysis by Parks Canada estimated that the agencies' NPs and NMCAs protect terrestrial and aquatic resources worth between US$115 billion and US$433 billion annually (Mulrooney and Jones, 2023). For FFNMP and LSNMCA, the estimated ranges were US$8 million to US$147 million and US$140 million to US$13 billion, respectively. An analysis of the US NPS used a similar methodology to estimate the ecosystem services provided by all NPs in the contiguous US, not including National Lakeshores, to be US$107 billion (Sutton et al. 2019). For Isle Royale NP, the estimated ecosystem services value was US$5.6 billion. Both sets of natural capital estimates are two orders of magnitude greater than the respective management agency's budget, suggesting that current funding allocations for the agencies are insufficient. A similar analysis of NOAA's Great Lakes NMS sites might produce similar results. Showing the wide gap between the natural capital and ecosystem services conserved by Great Lakes MPAs is one strategy for NOAA and Parks Canada to bring more legislative attention and funding to the region.

Beyond allocating additional resources to fill the capacity gaps identified in Section 6.1.7, augmenting NOAA's MPA Center with further funding and staff can have an outsized impact on establishing a Great Lakes MPA network. As one NOAA interviewee observed, the MPA Center is "*a clearinghouse and a connector. [The Center helps] bring different offices together, share information, try to figure out where [different agencies] can work together, and build a portal that has GIS data that various agencies can use.*" Advancing NOAA's and Parks Canada's progress towards 30x30 goals requires expanded reporting, research, and communication across jurisdictions, and strengthening the MPA Center with long-term funding can aid these efforts because the Center can serve as a "centralized source" for MPA data and cross-jurisdictional collaboration (Sullivan-Stack et al., 2022).

> "*The MPA Center doesn't actually create MPAs or change regulations. We just connect people who do and help them to see commonality, see opportunity, and see ways to leverage knowledge from one to the other… to help them to see the potential for the network. [The MPA Center] works with sister sites and other countries where [there are] common interests and tries to connect and build the community around shared interests and shared resources across international borders.*"
>
> *-Agency Employee*

If resources for Great Lakes MPAs remain limited, developing plans to maintain or expand partnerships with state agencies, other federal agencies, and external groups, like nonprofits, academic researchers, local businesses, and volunteers, can help NOAA and Parks Canada supplement their capacity. Agencies can take advantage of partnerships at any stage of the MPA process. For example, at the designation or establishment stage, agency staff might engage researchers for technical expertise or pursue public-private partnerships to augment funding and

staff for planning activities (Gleason et al., 2010; Fox et al., 2013). Additionally, public-private partnerships could function within a "Blue Economy Strategy," where agencies work with the financial sector to develop tools to de-risk private sector investments in innovative conservation projects (Fisheries and Oceans Canada, 2021). For collecting and managing data, one Parks Canada interviewee discussed establishing partnerships with a provincial agency and the Canadian Wildlife Service for evaluating climate change impacts and for waterbird surveys, respectively, because Parks Canada MPA staff did not have sufficient internal resources for those activities. Agencies can also leverage partnerships to bring in additional funds for MPAs; one NOAA interviewee offered examples of grants that a state agency, but not a federal agency, would be eligible for and vice versa. All these partnerships can be temporary as MPA agencies build out onsite capacity. More broadly, one evaluation recommended that MPA management agencies update their workforce planning approaches (National Academy of Public Administration, 2021), and strategically planning for partnerships can help NOAA and Parks Canada further their progress towards achieving their 30x30 conservation goals in the Great Lakes, even if federal legislators are reticent to offer more MPA funding.



Chapter 7

# Monitoring and Evaluating Great Lakes MPAs

The monitoring of both ecological and social aspects of Marine Protected Areas (MPA) is essential for understanding and evaluating the benefits that protected areas contribute to the Great Lakes region. Therefore, monitoring must be a crucial part of MPA activities. In this chapter we provide an overview of the current monitoring operations employed by both the National Oceanic and Atmospheric Administration (NOAA) and Parks Canada. The chapter begins with an overview of current monitoring measures employed by the agencies and their relation to 30x30 targets. We follow this with a discussion about the need for monitoring within Great Lakes MPAs, as well as about the opportunities for NOAA and Parks Canada to advance their monitoring and evaluation operations for current and future Great Lakes MPAs, with a specific focus on Lake Superior. For the purposes of this chapter, monitoring and evaluation are broken down into two broad categories: ecological monitoring and social monitoring.

## 7.1 - Current Monitoring and Evaluation Programs for Great Lakes MPAs

### 7.1.1 - Monitoring and 30x30 Goals

In any conservation effort, some success criteria must be developed in order to measure outcomes relative to a baseline (Jurjonas et al., 2023). These evaluations take the form of monitoring programs undertaken to determine the "success" of the effort relative to the effort's goals and objectives. Consistent monitoring and evaluation are key to creating a coordinated management program that is adaptive to a landscape that is constantly evolving, particularly in a world rapidly changing under the effects of climate change (Nature United, 2023). International efforts including the Kunming-Montreal Global Biodiversity Framework's (GBF) 30x30 have recognized the importance of monitoring to achieve effective conservation and management. For instance, element 3 of 30x30 reads:

**Box 2.** Element 3 of GBF Target 3 (From Appendix E).

| | |
|---|---|
| **3. Effectively conserved and managed** | Protected areas and OECMs must be managed with the primary objective of achieving positive outcomes for biodiversity. Effective management and *sustained positive outcomes for biodiversity conservation requires* the adoption of appropriate management objectives and processes, governance systems, adequate and appropriate resourcing and *consistent monitoring*. (emphasis added). |

A more robust monitoring and reporting process has been proposed in the GBF that includes not only the headline indicator (e.g. coverage of protected and conserved area for Target 3), but indicators for subcomponents such as effectiveness, equity, and connectivity (Lemieux et al., 2023). Additionally, as recognition grows regarding the interconnectedness between people and the ecosystems that support them (and vice versa), social monitoring efforts need to be incorporated into management.

### 7.1.2 - Current State of Ecological Monitoring in Great Lakes MPAs

As heard in interviews, MPAs offer ecological protection in the eyes of the MPA community, even if designated for cultural purposes, but this connection is unproven and unclear to others outside the community. Monitoring, or lack thereof, is likely a limiting factor to establishing the connection between MPAs and desired ecological protection goals. However, establishing

effective ecological monitoring in the Great Lakes is complicated by a number of factors including the sheer size of the Great Lakes ecosystem, cross-site sharing limitations, lack of consistent data collection and reporting, and funding limitations (Fisheries and Oceans Canada, 2021; NAMPAN, 2021a; NAMPAN, 2021b; Ives, et al., 2018). The scale of the Great Lakes and the rate of change within the lakes make monitoring efforts difficult, leading to gaps in fundamental science and baseline data about various biotic and abiotic phenomena. While federal MPAs in the Great Lakes do not strive to monitor the entire Great Lakes, there is a recognition that MPA managers need to coordinate and execute monitoring activities across sites in ways that optimize the creation of knowledge for effective decision making (Nature United, 2023). Both Parks Canada and NOAA have similarly recognized the need to partner with local communities and other agencies to collect needed data, with one interviewee telling us, "*Parks Canada alone definitely doesn't have the capacity. I think it's taking advantage of those partnerships with local communities and Indigenous groups, hiring local communities and Indigenous peoples to work with us to gather that data. Take advantage of the amazing work that's already been done and local knowledge.*"

In places where sufficient data does exist, monitoring efforts have been complicated due to discrepancies between data collection in multiple jurisdictions. For instance, Great Lakes states and provinces monitor and manage fish populations differently, and, despite some collaboration, the states and provinces do not share data consistently. Many interviewees noted that where data is available, it is often not synthesized and easily digestible for practitioners, with one interviewee saying "*there's a lot of data everywhere… I think what's lacking, I'm just thinking about fish species is something that's really synthetic and that is easily referenceable and digestible. I know the Great Lakes Fish Commission works on some of that. But I think primarily they're setting research priorities, and maybe not providing that synthesis, sort of where things are at.*" Additionally, while Parks Canada has guiding legislation to enter into management agreements with the provinces for fisheries management, NOAA does not with the states due to its cultural resource focus in the Great Lakes, leaving the two agencies on unequal footing for baseline monitoring. While direct monitoring of Great Lakes fisheries by NOAA and Canada is likely infeasible and perhaps even undesirable due to resource limitations and existing management from the GLFC and USGS, monitoring of other important parameters related to ecological conservation does occur (described below), even within culturally-focused management plans.

Other Effective Area Based Conservation Measures (OECMs) provide a point of even more confusion within the Great Lakes. OECMs, like traditional MPAs, need to provide evidence of long-term protection, and, like MPAs, OECMs don't currently have one agreed upon set of criteria for evaluation. While the Canadian government has established OECM criteria concerning longevity of measure, accounting standards, discrete biodiversity conservation benefits, long-term governance and management by a lead agency, and governance and management that provide durable biodiversity conservation benefits (Fisheries and Oceans Canada, 2022), a similar set of criteria has not been formally established in the US. Moreover, even when OECM criteria exist, studies evaluating conservation outcomes resulting from the monitoring of these areas have been inconclusive or absent (Cook, 2023). This is outlined in Flitcroft et al., 2023 which states, "Ultimately, measuring near-term progress towards a GBF protection target may require falling back on intersecting maps of freshwater ecosystems with protected areas and OECMs. However, the effectiveness of established place-based protected and conserved areas for freshwaters will likely depend on additional measures, creating a network of coordinated interventions that support

eco-hydrogeomorphic processes necessary to maintain biodiversity and resilience" (Flitcroft et al., 2023).

Ecological monitoring from Great Lakes MPAs has been relatively limited, with substantial discrepancies between the specific monitoring aims and objectives of NOAA and Parks Canada. The aims and objectives are embedded through individual site management plans, while the downstream reports from the implementation of site monitoring are found through Condition Reports and State of the Park reports in the US and Canada, respectively. Below is a brief summary of these plans and reports for the 4 existing Great Lakes Federal MPAs.

### Fathom Five National Marine Park

Fathom Five National Marine Park's (FFNMP) most recent 1998 Management Plan placed substantial attention on ecological monitoring, providing direction for actions to be carried out in future State of the Park reports. The Plan calls for the use of a suite of indicators for monitoring ecological integrity with prioritization for sensitive sites and Zone 1 areas. Monitoring efforts in the Plan focus on both effects from visitor use (e.g., "Programs will be monitored to ensure that impacts arising from providing public opportunities to experience the park remain within acceptable limits") as well as more traditional ecological measures (e.g., "A monitoring program for fish resources will be established to assess population structures and harvest sustainability… Monitoring efforts must extend beyond boundary in cooperation with Ontario and others") (Parks Canada Agency, 1998).

These efforts were put into practice through the 2010 and 2018 State of the Park reports. Included in the 2010 report were indicators measures for coastal wetland water quality, coastal fishes, coastal connectivity, offshore water quality, and lake trout, while other measures like benthic community and species at risk were included but not evaluated (Parks Canada Agency, 2010). However, due to resource constraints associated with high costs of marine operations, the more recent 2018 report did not rate many other these same indicators of ecological sustainability, only reporting on coastal wetland fishes, coastal wetlands, and coastal wetlands water quality, although some other indicators did have data collected, but in insufficient quantities for reporting purposes (Parks Canada Agency, 2018). The 2010 report noted that monitoring and reporting could be a vessel for Parks Canada to engage with other agencies and interests on Lake Huron, particularly given the limited geographical extent of the park relative to the area of Lake Huron.

### Lake Superior National Marine Conservation Area

Despite not being formally established, Lake Superior National Marine Conservation Area (LSNMCA) has taken steps to pursue monitoring through its Interim Management Plan. The initial 2016 Management Plan notes that performance indicators and targets for the State of the Park reports are still under development, and that in the interim, critical factors and desired outcomes for addressing desired ecological conditions will be derived from the Lake Superior Lakewide Action Management Plan (LAMP). Some of these ecological indicators are referenced in the 2017 Resource Conservation Report for LSNMCA. The report cites monitoring efforts for Phragmites (but no other invasive monitoring), coaster brook trout (and that other sentinel fish species were under consideration for monitoring efforts), some habitat monitoring, and the potential to monitor microplastics and water quality in the future, though only limited data was collected on these indicators (Tate et al., 2017). Additionally, LSNMCA helped to contribute to

the Lake Superior Cooperative Science and Monitoring Initiative (CSMI), with one employee noting that, “that [2021] was the first year that Parks Canada had a presence here adequate to contribute. So we did the Lake Sturgeon index netting at a couple of sites in Nipigon Bay, and then a third site in Black Bay, we did collaboratively with the local Ministry of Natural Resources.” Similar to other Great Lakes MPAs, the 2016 Management Plan calls for partnerships to assist in these monitoring efforts, engaging youth, visitors, partners, and stakeholders in this process.

### Thunder Bay National Marine Sanctuary

Thunder Bay National Marine Sanctuary (TBNMS) is one of NOAA Sentinel Sites which “offer the opportunity to monitor, observe and investigate the ocean on a local, regional and national scale” as “places where government, academic and citizen scientists work collectively and share information on sanctuary conditions and emerging threats” for regional issues like habitat degradation, climate change, and the impacts from invasive species (NOAA ONMS, 2024). TBNMS has similar wording embedded in its management plan, seeking to further understanding about the physical, biological, and chemical processes of the sanctuary through collaboration with interdisciplinary Great Lakes researchers from sanctuary advisory councils, government agencies, academic institutions, and NGOs, as well as through the development of marine observation infrastructure and capabilities to reach objectives as a Sentinel Site. Additionally, as a cultural resource-focused site, TBNMS has monitoring specifically built into their management for human and natural threats to the submerged resources. The 2013 site Condition Report notes exceptions for non-archaeological resources, stating that “this condition report does not directly address other aspects of the ecosystem (e.g., habitat and living resource quality). Exceptions, however, occur when there is a causal relationship between maritime archaeological resources and the ecosystem (e.g., the colonization of shipwrecks by non-Indigenous mussels). Water quality issues are addressed in the report, but only where a nexus between shipwrecks and water quality could be identified (e.g., chiefly where poor water quality might prohibit public visitation of sanctuary resources).” As such, few ecological indicators have been monitored in TBNMS, though the potential remains for additional monitoring where the connections between ecological factors and cultural resources exist (NOAA ONMS, 2013b).

### Wisconsin Shipwreck Coast National Marine Sanctuary

Wisconsin Shipwreck Coast National Marine Sanctuary (WSCNMS), like other NMSs with a primary resource focus on submerged cultural resources, has the functions of its management plan focused around those resources. For instance, WSCNMS has objectives to develop a 5-year monitoring plan to assess human and natural impacts on the sanctuary’s shipwrecks. Key to these plans is the documentation to provide baseline data to evaluate current state against changes from natural impacts like invasive mussels or changes in ice. While the cultural resources remain the primary focus, the 2021 Management Plan has sought to align with the Office of National Marine Sanctuaries Sentinel Site Initiative by facilitating “the study of Great Lakes ecology including the study of climate change, invasive species, lake biology, geology, and water quality.” The Plan aims to facilitate these “broader conservation efforts" in the sanctuary through partnerships with multi-disciplinary researchers and organizations including local communities, private businesses, NGOs, educational and cultural institutions, and other governmental agencies. Given WSCNMS's recent designation in 2021, such documentation of partnerships like these have been relatively

sparse, although significant work has been done to establish baseline abiotic data through lakebed mapping (NOAA ONMS, 2020b). Additionally, no condition report has been published to date.

### 7.1.3 - Current State of Social Monitoring in Great Lakes MPAs

Development of social/community performance standards that reflect specific social values is often as important as the development of ecological performance standards for MPAs, particularly given how deeply MPAs can and seek to be embedded within their respective coastal communities (Saloman et al., 2011). Indeed, adopting a linked social-ecological approach for monitoring that can feed into adaptive management may prove necessary for effective MPA management (Nature United, 2023). Many interviewees from around the Great Lake emphasized the interconnectedness between the ecological and social dimensions of MPAs, with one interviewee saying, "*as they [MPAs] shift to include those social outcomes we'll meet the ecological outcomes as well, just because they go hand in hand,*" and another telling us, "*it's [conservation] always much more than the ecological indicators that are often considered. What are the human well-being indicators that might be impacted by this? It's not just how many jobs will be created? It's also about identity and quality of life.*" The importance of the social dimensions of MPAs have been reflected in the two countries' respective site management plans in the Great Lakes.

On-the-ground collection of social monitoring data (e.g., monitoring of educational outcomes) has proved difficult to collect and interpret, particularly over the long term. As one interviewee told us, "*How do you measure the value of connecting the people with culture? It's kind of subjective, it's a person by person kind of thing. However, we want to measure things, because that's how the public can grab on to these numbers.*" Despite these difficulties, Parks Canada has recently progressed their MPA social monitoring efforts nationally through the development of a well-being program that includes a monitoring and reporting framework for tracking the well-being targets of the program. However, the creation of specific indicators and measures for assessing well-being through MPAs is still in the process of development (Ban, 2023). Given the importance of social goals to Great Lakes MPAs, monitoring these social indicators is key to ensuring that Great Lakes MPAs are achieving positive outcomes. Below is a brief summary of the current social monitoring and indicators within the 4 existing Great Lakes Federal MPAs.

#### Fathom Five National Marine Park

Fathom Five National Marine Park (FFNMP) has recently taken substantial steps to understand information about visitor use. As of the 2010 State of the Park Report, social indicators specific to Fathom Five were still under development (Parks Canada Agency, 2010). The more recent iteration of the State of the Park Report in 2018 included indicators for visitor experience including enjoyment, learning, and satisfaction, with most information derived from visitor surveys (Parks Canada Agency, 2018). However, additional indicators about the relationship between the park and other social indicators like socioeconomic impact of the park in Tobermory and nearby communities, or long-term monitoring of educational outcomes has not yet occurred.

#### Lake Superior National Conservation Area

Lake Superior National Conservation Area's (LSNMCA) 2016 Interim management plan notes that while it does not currently have visitor attendance and monitoring programs established, it

plans on adapting the Parks Canada NMCA visitor attendance and monitoring framework in a way that "supports Parks Canada's reporting, visitor experience concept development, and its collaboration with partners and stakeholders" (Parks Canada Agency, 2016). Included in this is an assessment of the state of performance expectations about public support and visitor enjoyment, though to date these have not been developed.

### Thunder Bay National Marine Sanctuary

Thunder Bay National Marine Sanctuary (TBNMS) has been viewed by many as the sanctuary perhaps most-well integrated into its coastal community. For instance, one interviewee expressed this sentiment, saying, "*there's very few parks or particularly Marine Protected Areas that have integrated themselves more in the community than [TBNMS].*" The large visitor center has been cited as a key reason for this integration, providing numerous opportunities to connect with the community, including educational partnerships with local high schools and community colleges for activities like underwater robotics research. Additionally, it provides the ability to quantify visitorship to the sanctuary (NOAA, 2018). The 2008 Management Plan calls for a process for "periodically assessing the levels of understanding, applied skills, and stewardship resulting from the current education and outreach programs" with results used to recommend improvements for those education and outreach programs. Despite this objective, assessing educational outcomes through monitoring has proven to be difficult due to staff and funding limitations and inherent difficulty in tying educational indicators to specific sanctuary practices. Similar difficulties constrain the ability for TBNMS to conduct a quantitative assessment of the economic impact of the sanctuary, although interviewees familiar with the sanctuary noted the qualitative benefits, saying, for example, "*What I've seen happen in Alpena from what it was before the sanctuary came to what it is today is just mind blowing… With the presence of the sanctuary, it has brought people, it has brought money, it has brought prosperity to the area and it is tremendously cleaned up from what it was in the 70s.*" TBNMS has also stated the desire to monitor the recreation use of sanctuary resources (and their effects on those resources) through collaboration with charter boats and dive stores to document visitor use away from the sanctuary's visitor facility, and through the development of procedures to "allow users to easily and voluntarily report recreational use of the resources and provide incentives for reporting use" (NOAA and State of Michigan, 2009).

### Wisconsin Shipwreck Coast National Marine Sanctuary

As a recently designated NMS, Wisconsin Shipwreck Coast National Marine Sanctuary (WSCNMS) currently has limited social monitoring in place. However, the site management plan has activities for working with "partners such as the NOAA National Centers for Coastal Ocean Science " for a socioeconomic baseline study, as well as for working with local diving charters and clubs to monitor recreational use of sanctuary resources (NOAA ONMS, 2020b). However, other social aspects of management like education and outreach do not have built in measures for monitoring included in the management plan as of this report.

> *"A place like Sheboygan has 50,000 people and they have a really robust tourism arm to the community. So they know how many people are coming to their visitors or to their beaches, they know where they're coming from, and those sorts of things. So I think we [WSCNMS] have a good sense of what the activities are [that people are doing in the sanctuary], I think we have access to figuring out sort of some baseline metrics on who visits where they come from, and that sort of thing."*
>
> *- Agency Employee*

### 7.1.4 - Current Uses for Monitoring Data

Monitoring is a fundamental piece of creating management regimes that are flexible and adaptive in the face of rapidly changing ecosystems like the Great Lakes. Monitoring across a range of restricted or managed activities is needed to validate management decisions to ensure that continued management does not undermine the objectives of the MPA or the MPA network (Balbar et al., 2020). Similarly, MPA managers within a network should use the evidence derived from coordinated monitoring activities to accordingly adjust decision-making (Nature United, 2023). However, despite monitoring efforts around the Great Lakes (including those performed by MPAs), a lack of consistency in monitoring has limited the ability to compare and contrast, with one interviewee telling us, "*If you've ever looked at condition reports that the sanctuaries have done over the years, they've evolved. But they haven't evolved consistently from place to place. And so there's no ability to really compare and contrast.*" While individual sites are able to use their (potentially limited) monitoring data to inform adaptive management, difficulties arise when attempting to integrate data across sites and across borders. Part of this difficulty arises from, as one interviewee put it, "*If we think about how to collect data over time to be effective in driving analysis of change and in identifying opportunities for improved conservation, we need to build the standards to collect the data consistently, then we need to collect the data consistently. We need to analyze it consistently. Then we need to build strategies from the results of that analysis.*" Thus, monitoring data collected by MPAs has primarily been used to inform adaptive management over a limited suite of indicators that are site-specific rather than representative of the broader lake ecosystem. For example, Parks Canada has cited intentions in their management plans to use monitoring efforts to inform future zoning plans in LSNMCA, while US NMSs have noted the need for data from monitoring to be used in the context of archeological protection (i.e., individual shipwrecks) (Parks Canada Agency, 2016; NOAA and State of Michigan, 2009; NOAA 2020b).

Beyond the need for evaluation to inform adaptive management at the network level, monitoring is needed in order to demonstrate, from an objective scientific perspective, how effectively MPAs have conserved Great Lakes ecosystems, species, and processes and advanced social goals. A current paucity of integrated monitoring and evaluation data has limited Great Lakes MPAs from demonstrating these effects. For instance, one interviewee told us about the need for Great Lakes MPAs to monitor for key indicators, saying, "*It's the monitoring first. And that's the distillation of that monitoring data into coherent and easy to understand information for the public and politicians, the policymakers, and the funders so they can understand that 'this is what the Great Lakes has today in terms of Marine Protected Areas, we think we need more of them. But here's*

*why we need more of them. This is what our monitoring and science has shown us today."*" However, some studies have suggested that even when resources and indicators for monitoring outcomes are available, MPA staff for MPAs without a primarily ecological focus are often too unfamiliar with freshwater ecosystems to apply these towards demonstration of effectiveness or to incorporate into adaptive management (Thieme et al., 2012).

In addition to ecological monitoring, interviewees noted that the development of with indicators, outcomes, and measures of progress for integrating more social metrics of well-being is still in its infancy for the Great Lakes, saying "*the movement to protect and restore the Great Lakes is becoming more inclusive, looking not just at ecological metrics, but also integrating social metrics… Issues around jobs and community benefits have been lacking and even climate resiliency. We're making some headway and really trying to come up with some outcomes and indicators and measures of progress that we can start to track.*" Although MPAs have collected some social data about visitor use and education, there is little information as to how this collected information has been used to adjust programs in furtherance of social outcomes.

## 7.2 - Opportunities to Enhance Monitoring and Evaluation

Monitoring conservation and social indicators is vital to ensuring that desired outcomes are being achieved, and to ensuring that those outcomes are adequately conveyed to the public, policymakers, and beyond. Monitoring is a priority of achieving 30x30 goals since without quantifiable determinations derived from monitoring, element 3 of Target 3 has suggested that a given MPA should not be considered under 30x30, given that effectively conserved and managed protected areas must have "consistent monitoring" to establish sustained positive outcomes, evoking the adage "you can't manage what you don't monitor" (Box 2; Appendix E). This sentiment was expressed within the Great Lakes, with one NGO employee noting that, *"It's very easy to run the numbers and tally up and say we met a goal. But in reality, we have not met a conservation goal, because those areas aren't effectively managed. I'm not aware of ways in which we can ensure that these areas are actually managed effectively, improved, and enhanced, and that issues like climate change will not affect them in the future. So it's from a policy perspective and running numbers and saying that Canada or the US have met their goals. I think it would raise an eyebrow unless we can demonstrate the effectiveness of these areas.*"

Similarly, measuring the extent and value of natural capital, and by extension demonstrating and reporting of the benefits of healthy environments to the public and politicians, can assist with justifying investments in land acquisition to expand the network of protected areas, expand the size of a protected area, or connect protected areas through ecological corridors (Mulrooney and Jones, 2023; Nature United, 2023). These sorts of justifications are necessary considering that other existing protected areas (typically terrestrial in focus) have had perceived failures, and due to an inability to extend past terrestrial and marine successes to the conservation work of freshwater protected areas (Abell et al., 2007). As one interviewee framed it, "*with terrestrial parks we see the value of experience. People are comfortable with them and are very much in acceptance of parks on land. And we're getting there with Marine Protected Areas in the ocean… we're not there yet with freshwater protected areas. The Great Lakes, they're the poor cousin to the Marine Protected Areas."* Thus, we underscore that consistent monitoring of key indicators and evaluation of conservation efforts is a major means by which Great Lakes MPAs can help to build the acceptance and justification for MPAs.

Long-term monitoring of key indicators for climate change has also been a top priority of the Great Lakes region. Limited long-term monitoring of ecosystems and social change has made it difficult to predict the future of Great Lakes ecosystems and communities, with one interviewee telling us, "*it's also difficult to monitor the scale and rate and to monitor change in the Great Lakes and understand and predict where the ecosystem is going. So there are gaps in science. There's uncertainty with respect to the future because of those gaps in science.*" Indeed, the International Joint Commission's (IJC) Third Triennial Assessment on the Progress of Great Lakes Water Quality has noted the need to enhance capacity to long-term monitoring efforts for indicators of climate change, as well as echoed the recommendation of Nature United to enhance the role that binational collaboration and coordination plays in fulfilling these monitoring efforts and overcoming regional capacity constraints (IJC, 2023; Nature United, 2023). Additionally, regional priorities from agencies like EPA and NGOs like the Healing Our Waters Great Lakes Coalition have sought to work beyond ecological aspects of conservation to bring social and organizational dimensions into the fold, but the monitoring of these objectives are still underdeveloped (Williams et al., 2023). As such, we identify that Great Lakes MPAs administered by NOAA and Parks Canada are well-positioned to help contribute to the monitoring efforts required by 30x30 and desired in the Great Lakes region.

### 7.2.1 - Opportunities for Consistent Ecological Monitoring Efforts in Strategic Locations

For MPA management generally, there is a need to build standards for consistent data collection and analysis, and open access dissemination (NAMPAN, 2021b; Saloman et al., 2011). This is particularly true for key indicators and processes like biodiversity, physical divers, critical habitats, and the projected and realized impacts of climate change on those indicators and traits least resistant to environmental stress in order to guide the establishment and management of climate-ready MPAs (Sullivan-Stack et al., 2022; Brock et al., 2012; CEC, 2012). Within the Great Lakes, there are additional gaps in monitoring itself, and gaps that limit the ability to monitor effectively. For example, some interviewees expressed a desire for fundamental baseline data for bathymetry and other abiotic features crucial for species, with one interviewee telling us, "*we're also lacking really basic data. The big one for me… is the lack of high-resolution bathymetric data… We still have these huge gaps in really good high-resolution data. Some of it we're collecting ourselves… but things like invasive species and even just substrate like, what does the bottom look like? Because in some ways, we don't even know that… So really, a lot of it is basic mapping data that really needs to be done.*"

Additionally, while some highly touted measures of MPA success like fisheries spillover effect have been demonstrated in marine settings, the disaggregation of MPAs and fisheries, along with other species management efforts in the Great Lakes, has hindered the implementation of monitoring efforts to observe similar effects occurring in the Great Lakes. As such, some interviewees noted the need for the demonstration of both short and long-term benefits of MPAs in conjunction with a Great Lakes fisheries research agenda that evaluates the impact of no take zones and critical habitat protection on fisheries health. The desire for a bridge between various domains of research and protection in the Great Lakes through monitoring has likewise been noted by the IJC, with the commission calling for "Enhanced capacity for science infrastructure can better connect the efforts of water quality and fishery managers, contribute to more sophisticated modeling that links upper and lower food webs, and provide more comprehensive monitoring data to enable our understanding of, and reporting on, stressor interactions" as well as

to “develop common, basinwide and scalable climate resiliency goals with transparent and accountable performance metrics and assessment processes” (IJC, 2023).

However, monitoring over the scale of the Great Lakes is a resource-intensive process, and as such NOAA and Parks Canada have to be able to leverage their limited resources for monitoring in strategic areas. For example, in Australia, qualitative management effectiveness evaluations have been implemented in light of a lack of long-term monitoring data with Addison et. al. (2015) thus recommending the use of these evaluations as a bridge towards more targeted, quantitative condition assessments of long-term monitoring (Addison et al., 2015). Other means of targeting limited resources to track progress is through monitoring of key biodiversity areas (nationally, regionally, or globally important areas for species, ecosystems and biological processes identified through standard global criteria) which can help clarify and focus conservation actions and reporting on global and regional priorities and can support decision-making and resource-allocation by governments (Sullivan-Stack et al., 2022; Kraus et al., 2023). Although monitoring over the vast scales represents an inherent challenge of area-based protection, MPA managers can leverage emerging monitoring technologies to overcome regional capacity constraints and enable a wider range of indicators to be consistently monitored across the region (Nature United, 2023).

We identify that supporting consistent, coordinated ecological monitoring that leverages emerging technologies in abutting or adjacent MPAs in the Great Lakes could be a key mechanism for establishing data needed to demonstrate benefits like those that have been shown to exist in terrestrial and marine settings. For instance, in Lake Superior many interviewees noted the role that an expanded buoy data collection network and lakebed mapping efforts could have in supporting ecosystem monitoring and prediction efforts by creating baseline data as a reference for evaluating the effectiveness of protected areas. MPAs, like WSCNMS, have previously facilitated efforts like this, with one interviewee telling us, “*We've now mapped the entire sanctuary. So that's 962 square miles [2,492 km$^2$], mapped in high-resolution with multi beam sonar, and that was done by the Office of Coast Survey. That only happened because we happen to have this weird rectangle box here off the shore of Wisconsin. Cultural resource management obviously is improved by it, but the habitat mapping that's possible because of that probably outpaces what we're going to use the information for to manage cultural resources,*” while other MPAs, like LSNMCA, have a yet unrealized need for that same type of bathymetric mapping data, with another interviewee saying, “*there's a lot of unknowns. I like to refer to it as a black hole of data. There's a lot of stuff, even basic knowledge that we don't know about this very large area. So that's something we're trying to work towards, as well as filling in some of those gaps like basic, good, high-resolution bathymetric data. I mean, it's a problem across the Great Lakes, but Lake Superior in particular*.” We highlight that Academic institutions like Michigan Technological University may be able to assist in the mobilization of emerging technologies with research equipment like autonomous survey boats that could assist NOAA, Parks Canada, and Isle Royale NP in these monitoring efforts without the need for extra boots on the ground, with one interviewee noting, “*data associated with the navigational buoys - and there's some limited data buoys out there, like I think Michigan Tech has a couple - I think some good currents and wind driven currents and that type of modeling would be really good. But I was thinking specifically to like the movement of villagers out of these ports and into the broader lake and what that might mean in terms of spread and establishment of zebra mussels and quagga mussels.*” Indigenous entities like the Keweenaw Bay Indian Community bring an additional level of ecosystem

monitoring expertise through the incorporation of traditional ecological knowledge to evaluating the effectiveness of MPAs which could be utilized further. Biological monitoring like that beginning at LSNMCA could also be furthered in conjunction with these same academic and agency entities, utilizing technologies like remote sensing to enable a wider range of indicators to be monitored across the region (Nature United, 2023; Tate et al., 2017).

Prioritizing monitoring efforts into key biodiversity areas spread across a range of levels of protection could prove valuable to demonstrating the value of MPAs to reaching conservation targets (Kraus et al., 2023; Sletten et al., 2021). Joint efforts between these entities should attempt to choose prioritized indicators through a transparent and collaborative selection process that considers indicators that are relevant to the multiple types of management questions and outcomes that are inherently required by each agency's legislated management responsibilities. Additionally, collaboration of this nature should mean reaching consensus on analytical workflows before data collection takes place (Nature United, 2023).

Although MPA management agencies and fisheries managers have distinct jurisdictions in the Great Lakes, we identify that partnerships among MPA managers, the Great Lakes Fishery Commission, Great Lakes Indian Fish and Wildlife Commission (GLIFWC), Indigenous natural resource managers, state and provincial agencies, and the fishing industry might help integrate monitoring approaches and supplement limited agency capacity for monitoring. Several interviewees highlighted difficulties arising from the separation between the monitoring activities performed by NOAA and Great Lakes fishery managers. One first step to advancing partnerships between MPA managers and fishery managers is expanding open access to data, particularly fisheries data and stock assessments, managed by MPA agencies and by fishery managers (NAMPAN, 2021a; Saloman et al., 2011). Thus, we find that NOAA and Parks Canada, through their own infrastructure or through research performed by academic partners, can provide additional resources for understanding and monitoring fishery trends. On the other side, fishing businesses can serve as key technical partners for both the GLFC and MPAs, as proposed by one Lake Superior community stakeholder, "*charter fishing business in particular can be a really good source of data and science. It kind of crosses citizen science… A charter fisherman is still a professional and very scientific in what he does to catch fish… Involving a fisherman or a fishing business as a technical partner, in any sort of fisheries management or assessing populations.*" A few interviewees suggested that a valuable role for NOAA and Parks Canada could be as integrators of existing disparate monitoring data on fisheries, with one agency interviewee telling us, "*I think we can be an integrator of information. And we can be a facilitator of the dialogue… I think part of it is building the culture around collaborative comanagement of ocean space.*" Therefore, we find that helping to create interpretable documentation of trends in fisheries monitoring from numerous partners and sources could be a key means of providing utility on a topic like fisheries that might otherwise be outside the domain of NOAA and Parks Canada in the Great Lakes.

### 7.2.2 - Opportunities to Advance Social Monitoring

A more robust monitoring and reporting process has been proposed in the GBF that includes not only the headline indicator (e.g. coverage of protected and conserved area for Target 3), but indicators for subcomponents such as effectiveness, equity and connectivity (Lemieux et al., 2023). Relatedly, it is important for those studying the well-being outcomes of MPAs to combine

previously tested indicators with a broader set of indicators that represent holistic domains of human well-being (Ban, 2023).

> *"If the coastal communities are doing well, they care about the marine environment. I think it's a win-win."*
>
> *- Agency Employee*

MPAs - as place-based protected areas - are uniquely situated to monitor socioeconomic data. Socioeconomic and well-being indicators have been recognized within the Great Lakes community as an emerging priority, and MPAs may be able to leverage their physical infrastructure and embeddedness within their respective communities to help achieve these goals through the monitoring of well-being and socioeconomic indicators (Jurjonas et al., 2023; Williams et al., 2023). Solid baseline data is the foundation against which effective monitoring can occur (Sullivan-Stack et al., 2022). However, like ecological monitoring, social well-being and community use data can be intensive to collect, and Parks Canada and NOAA employees have noted that the individual sites do not have the full capacity needed to collect all the data that they need. Therefore, NOAA and Parks Canada must rely on partnerships with the people and entities of the local communities that they are embedded within. Indeed, this desire may be mutual with one stakeholder telling us, "*the thing that just annoys me is that we have so much to offer… It's just that when we turn it around and we offer it off to Parks Canada, I guess they got too much going on, there's too much happening and too many balls in the air and stuff. And they're moving their projects and programs forward as best that they can. But again, it's the reality of the little things and the deeds that are occurring which would be good to recognize because it's raw data that could then be utilized to help give them further direction.*" As heard from interviewees, we identify that formalizing partnerships with local businesses, nonprofits, and other stakeholders may be one way to surpass internal agency limitations towards the creation of the baseline data about communities and their use of MPAs while also helping to provide additional social data encompassing equity, human rights, biocultural rights in the future (WWF and IUCN WCPA, 2023).

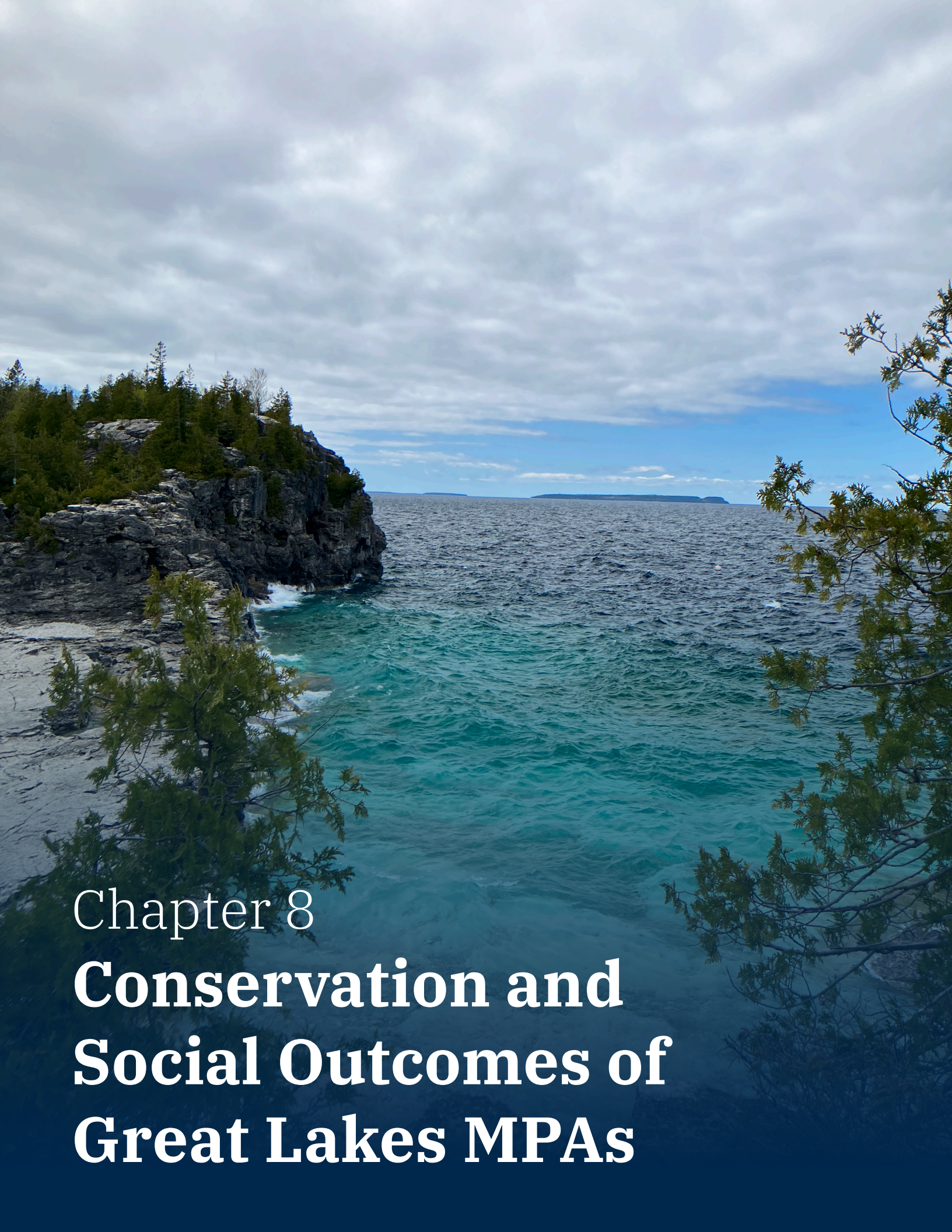
In conjunction with the development of this baseline community data, Great Lakes MPAs have the opportunity to leverage their deep integration in their respective communities to expand upon the existing measures of community well-being programs like that described for the NMCA system by Ban (2023). Parks Canada has begun to develop community well-being measures at the national level for their NMCA program in order to move from a singular focus on monetary value, to an idea of well-being that is informed by, "*historical source of conflict, community values, community sense of place… places for access, and what the right environment means to community members,*" as one agency interviewee told us. Ban has suggested that the implementation of well-being indicators like these be considered at both the national and site-level scales (Ban, 2023). We identify that at the site-level, forums like NOAA's Sanctuary Advisory Councils and Parks Canada's Management Advisory Committees may serve as a means to hold workshops to start developing conceptual diagrams about how the NMS or NMCA has and might affect well-being. Such workshops and the resulting outcomes can be a starting point to get staff and partners to think about well-being at the site level and to develop ideas of what a

coastal community well-being program could look like for the site, including what metrics might be included for monitoring (Ban, 2023). While Canada has begun the development of a national set of MPA well-being indicators, site-level plans like these have not yet been created specifically for Great Lakes MPAs. Some are on the right track, with one agency employee telling us, "*we have some funding this year to do a baseline socio economic study… One of the things we really want the context for this being is 'we found resources through a socioeconomic study, what kind of information do you guys want?'*" The development of such a plan can then serve as the framework against which future well-being, human use, and socioeconomic data collected in partnership and collaboration with local communities can then be monitored and refined.

Additionally, while Ban (2023) suggested the creation of well-being indicators at the national and site-level, we recognize that there is an additional opportunity for the Great Lakes MPAs to create a consistent framework for community well-being indicators at the regional level. The development of social indicators has been noted as a burgeoning priority for restoration and protection efforts in the Great Lakes with efforts like the GLRI, but in many circumstances these measures go unreported, leaving the full value of the effort underestimated (Jurjonas et al., 2023). MPAs offer the temporal stability within their communities that is needed to begin to monitor long-term social well-being data required to establish the relationship between MPAs and the furtherance of regional well-being targets. Social well-being indicators may necessarily be unique to each site in many regards, but we also recognize that ensuring that some commonalities between sites in the US and Canada may be a kick-starter for elevating the role of MPAs moving forward. Therefore, we find that emulating at the regional level the structure recommended by Ban for initiating national well-being indicators with an existing binational forum like GLPAN may be an ideal starting point for creating this regional consistency (Box 3). Ensuring that MPAs in the Great Lakes create and monitor for this data will be critical to the longevity and effectiveness of these MPAs and the communities that they are in.

**Box 3.** Strategies to initiate a community well-being program at a national scale (Ban, 2023).

National: hold workshops or other relevant ways of two-way communications to obtain input into elements of coastal community well-being program design. This could include, as a first step, seeking feedback into the co-creation framework proposed in this report, and further developing program principles, goals, etc, as already started at internal workshops.



Chapter 8

# Conservation and Social Outcomes of Great Lakes MPAs

Marine protected areas (MPAs) in the Great Lakes produce conservation and social outcomes to varying extents. Social outcomes include economic benefits for local communities, education, and research. For example, MPAs often provide economic benefits through tourism such as dive charter. As one interviewee said, *"There's those economic opportunities that are somewhat sustainable, having people coming through and having that extra level of protection and designation. Showing people that this is a really special place, and here's why it's special. That can then elevate that economic opportunity within our place. So I really see it being beneficial to many people, but also, all of the beings that live in the lake."* Yet, for this report, we focused on the educational, research, and ecological outcomes of MPAs within the Great Lakes. This chapter outlines current conservation and social outcomes of great lakes MPAs. We also discuss ways to expand conservation and social outcomes of MPAs to a larger scale, further demonstrate those outcomes, and align data integration. Further demonstrating MPA outcomes can enhance the perceived value of MPAs for future stakeholders and decision makers.

## 8.1 - Current Conservation and Social Outcomes of Great Lakes MPAs

### 8.1.1 Education and Research Outcomes

Both our literature review and our interviews demonstrated that MPAs create opportunities for education and research. A comprehensive systematic literature review of the ecosystem services and social benefits provided by MPAs found that scientific research, knowledge development, and education were some of most frequently recognized socioeconomic benefits of MPAs (Marcos et al., 2021). Although much of the existing academic literature focuses on the broad educational and research impacts of MPAs, through our interviews, we observed that education and research are also important outcomes in the Great Lakes.

Evaluations of MPAs have long acknowledged the educational opportunities that MPAs create, and our interviews demonstrated that education is an important social outcome for NOAA and Parks Canada in the Great Lakes. Given that MPAs are located at unique aquatic sites, MPAs provide "focal points for education about marine ecosystems and human interactions with them" (Kenchington et al., 2003). Our interviews expressed that Great Lakes MPAs also serve as focal points for education and sites for "*experiential learning*." An agency interviewee remarked that one of the National Marine Sanctuaries (NMS) "*has become an environmental hub for the whole region for school kids to come and learn about the Great Lakes*," while an interviewee from Parks Canada reflected that the agency has "*put a lot of emphasis on education*," which has been "*really important and a great way to really spread [the agency's] ideas… have people reduce their footprints, and [have] people really care about the lake.*" As several interviewees additionally noted, educational programming offered by MPAs can raise public awareness about the value of Great Lakes ecosystems, threats to the lakes, and actions the public can take to mitigate those threats.

An MPA's physical site and education staff play important roles in teaching visitors about aquatic ecosystems and services (Kenchington et al., 2003). Interviewees from both Canada and US emphasized the importance of physical infrastructure, particularly visitor centers, as crucial tools for connecting the public with the Great Lakes. Figure 15 shows the Great Lakes Maritime Heritage center, Thunder Bay NMS's visitor center. Multiple agency employees stated how difficult it is for the general public to access submerged resources like shipwrecks and that visitor centers can make an area's history and shorelines "*more accessible*." One unique feature we

observed about Parks Canada's education approach was Park Canada's Visitor Experience teams. A Parks Canada interviewee emphasized the value of that team for "*teaching and educating people on what [the agency does] and what [the agency's] priorities are.*" However, as we noted in Chapter 3, the remote locations of existing Great Lakes MPAs limit who can take advantage of educational opportunities. Still, NOAA and Parks Canada have both made efforts to expand who can access education offered by their MPAs, and NOAA's two proposed NMS in Lake Erie and Lake Ontario will be close to major population centers, expanding the educational opportunities of NMSs.

*"One of the things that [the Biden Administration] has really been focused on that I think is long overdue is… equity – who has access to these places and how they get to engage. We see a lot of urban communities or rural communities that have never been able to get to the shore to the Great Lakes, where the kids don't know how to swim. They've never had that opportunity. So, how can we help bridge that gap and make sure that people are having that opportunity to connect?"*

*-Agency Employee*

**Figure 15.** Thunder Bay National Marine Sanctuary Great Lakes Maritime Heritage Center in Alpena, MI (NOAA ONMS, n.d.-d)

The broader body of literature on MPAs has recognized the value MPAs offer for researchers. An assessment of MPAs administered by European Union nations identified scientific knowledge and research as key benefits of MPAs (Hattam et al., 2018). Properly designed and managed MPAs provide "undisturbed control or reference sites serving as a baseline for scientific research and for design and evaluation of management of other areas" (Kenchington et al., 2003). MPA management agencies can also "operate directly as the providers of other infrastructure and services" (Hattam et al., 2018). Our interviews indicated that these observations concerning the research impacts of MPA also apply to the Great Lakes.

MPAs have served as sites for novel research into Great Lakes processes and ecosystems. As one NOAA interviewee described, "*in Lake Huron, [NOAA] has done work in sinkholes and other other things where, if the Sanctuary wasn't there as a focal point and able to provide resources to these multidisciplinary researchers… [the research] probably wouldn't have transpired the way it did.*" A Parks Canada interviewee expanded on the notion of Great Lakes MPAs as research test beds, noting that even sites designated for cultural resources like Thunder Bay National Marine Sanctuary (TBNMS) or Fathom Five National Marine Park (FFNMP) have contributed to ecological research. NOAA and Parks Canada also have infrastructure (e.g., research vessels), services, and expertise that provide for the foundation and continuation of Great Lakes research. When discussing the recent designation of Wisconsin Shipwreck Coast National Marine Sanctuary (WSCNMS), a NOAA interviewee informed us that the agency had recently mapped the entire lakebed within the NMS - "*962 square miles [2,492 km$^2$], mapped in high resolution with multi-beam sonar.*" A part of that mapping can be seen in Figure 16 which looked at clay outcrops within the NMS. The interviewee emphasized that NOAA only completed the mapping work because of the nomination and designation of the NMS, thus highlighting the connection between MPAs and research outcomes. Another NOAA interviewee described MPAs as places to "*test different technologies and different techniques for restoration in an area where there's an infrastructure*" like a small boat or staff.

Within the Great Lakes region, the International Joint Commission (IJC) has called for the prioritization of "basic process research" that expands "understanding of the physics, biogeochemistry, food webs, climate forcing and dynamics of the interactions between the lakes and their watersheds" and that anticipates future scenarios that might jeopardize the economic and social well-being of the region (IJC, 2022). As we have presented in this section, Great Lakes MPAs are situated to facilitate and provide the infrastructure to perform this research, but Parks Canada and NOAA have opportunities to expand research impacts and partnerships, as well as educational outreach, as discussed further in Section 8.2.

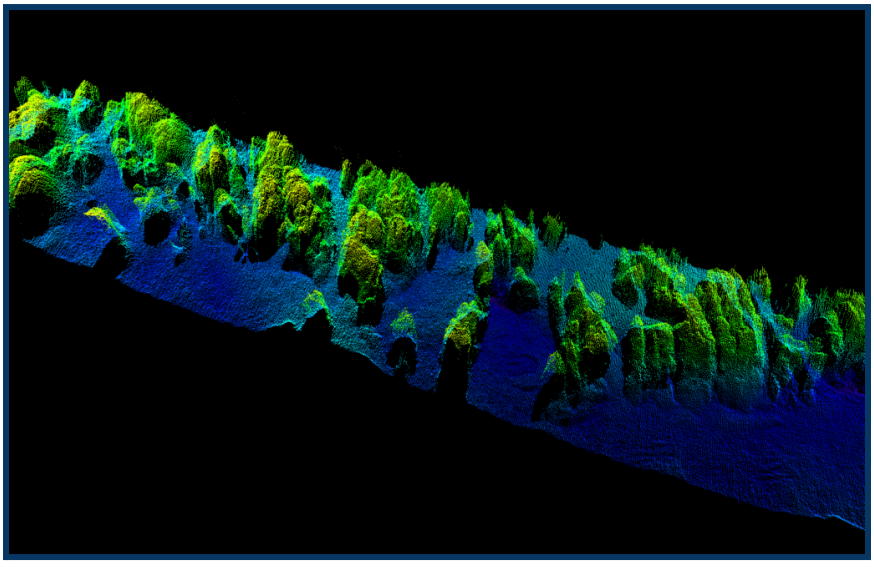


**Figure 16.** A bathymetric model of clay outcrops in Lake Michigan within the WSCNMS (NCCOS, 2020).

### 8.1.2 Ecological Outcomes

Within the US Great Lakes, both NMSs are designated for the purpose of protecting cultural resources. These MPAs provide additional levels of protection in order to maintain culturally and historically nationally significant parts of Great Lakes history. As a result of these NMSs, tourists who may not have explored these regions if it were not for the historic shipwrecks present, are exposed to the natural, social, and cultural history of the Great Lakes. However, due to the cultural resource designation nature of the current NMSs, many within the US feel as though Great Lakes MPAs could be doing more to conserve the ecological aspect of the Great Lakes. Yet, as we heard in interviews, many feel as though current MPAs contribute to conservation even when designated for historic or cultural purposes. For example, one NGO interviewee said, *"Those shipwrecks provide structure for fish and other organisms. So, you're ensuring that those aquatic habitats remain. So there are some ancillary benefits to biodiversity through those Marine Protected Areas."* One other major ecological protection that culturally designated MPAs provide is that oil development becomes prohibited once a site is designated (NOAA, 2023a). While this has many potential benefits for species, there is still limited monitoring and data to show the specific and full extent of ecological outcomes of culturally designated sites. Even NMCAs, which are established with ecological conservation in mind, have the opportunity to expand research into the ecological outcomes of the protected areas, as discussed in 7.1.2.

Monitoring and research, including into species within the lakes, is required to gauge the efficacy of MPA networks in achieving their conservation objectives (Acreman et. al. 2020). It also can provide information needed to demonstrate that restricted access has provided benefits to biodiversity, as discussed in section 6.2.2. (Acreman et. al. 2020). Demonstrating ecological outcomes from Great Lakes MPAs will be a crucial tool in meeting 30x30 goals and meeting them in an effective manner.

> *"I think, what's lacking for myself and maybe many other people, from a scientific perspective, is what does it mean? What has it done? How have we effectively conserved the areas? How does it manifest itself in terms of the fish populations and wildlife populations or the care that has been taken of that land-water interface, the shoreline, right? So I have not seen science, I have not seen qualitative proof that these areas are actually working."*
>
> *- NGO Employee*

### 8.1.3 Current State of Data Sharing

Data helps to shape MPA management approaches, promotes research of key species, habitat and lakebed mapping, and helps to enhance communication and management planning with stakeholders, rights holders, decision makers, and the public. Additionally, having current, accurate, and comprehensive data is crucial for MPA programs to meet their objectives and goals (NAMPAN, 2021b). However, there is a lack of consistent data collection and monitoring between different sites, agencies, and across borders within the Great Lakes. The current gap in this collection and monitoring may limit agency's ability to compare, contrast, and collaborate

across sites for the management of MPAs and protections that they provide. This gap also makes information less clear or digestible to the general public. Several studies from the literature highlighted missing data as an issue in MPA management and pointed to limited cross site sharing, lack of consistency, and specific data gaps, like nutrient and energy flow (NAMPAN, 2021a; 2021b). Additionally, reviews of freshwater protected area effectiveness have been inadequate due to lack of quality data input (Flitcroft et. al., 2023).

Gaps in understanding can limit manager comfort or ability to plan for more connective and adaptive management. Making data available requires open access to data to facilitate transparency (NAMPAN, 2021a). Therefore, there is a need to collect additional data, across a range of topics (physical drivers, maps of critical habitats, food webs, ect.). Further, the availability of fisheries data and accessibility of the stock assessment process must increase outside of the fisheries science community (Salomon et al., 2011). Making this data available to managers and practitioners is crucial in order for that to clearly define objectives and measuring progress within MPAs.

## 8.2 - Opportunities for Conservation and Social Outcomes of Great Lakes MPAs

### 8.2.1 Opportunities to Expand Education and Research and Outcomes

Although we have documented that Parks Canada's and NOAA's MPAs are crucial sites for Great Lakes education and research in Section 8.1.1, the agencies have several opportunities to expand their impacts. Therefore, we highlight that strategies for NOAA and Parks Canada to advance education impacts in the Great Lakes include broadening the agencies' educational footprint through outreach in new locales and new MPAs and developing more climate change programming. In 2011, the MPA Federal Advisory Committee called on NOAA to expand the agency's outreach ties to museums, schools, and cultural heritage programs (Marine Protected Area Federal Advisory Committee, 2011). While the management plans for all NOAA's and Parks Canada's Great Lakes MPAs already include educational outreach, increasing the footprint of these programming efforts to schools and museums farther away from MPAs can help foster awareness of the Great Lakes among communities with limited access to the lakes. As one academic and former NGO leader told us, "*MPAs could be a way of bringing more communities in contact and caring about the Great Lakes, and MPAs could add value, if they're done the right way, to the communities that are most vulnerable.*" Designating new MPAs can also broaden the educational impact of NOAA and Parks Canada. An interviewee from a Lake Superior community offered an example of the impacts of a new MPA: "*I think about our K-12 communities and what an amazing opportunity [it] would be to have a sanctuary… for education and outreach, for place-based education, and experiential learning within our communities.*" From a subject matter standpoint, several interviewees from different disciplines spoke about raising awareness of climate change and its impacts on the Great Lakes, suggesting that NOAA and Parks Canada have an opportunity to develop educational programs for place-based climate change education within NMS and NMCA sites.

Educational programming is also a means for NOAA and Parks Canada to foster support for MPAs and more broadly the Great Lakes as well. When asked how Parks Canada can raise awareness about MPAs, an agency employee responded, *I think that's on the government for our*

*communication. Doing it in a way that appeals to people, not necessarily just throwing information at them, those classic statistics that you see, but communicating it in a way that's exciting, that's human, that makes people feel connected to the ocean. Ocean literacy is a huge part of that.*" While that interviewee focused on connection with oceans, the same can be said about the Great Lakes.

Building on the existing research benefits of MPAs discussed in Section 8.1, we find that climate change is a priority research area in which NOAA and Parks Canada can advance their impacts. While MPAs can function as sites for research into climate change, such research also serves the interests of MPA managers, as prior guidance has recommended that MPA managers assess the projected effects of climate change on biodiversity and identify ecosystem and resource traits least resistant to environmental stress (CEC, 2012). As noted in Section 3.2.1, advancing climate change research within MPAs can also help managers to understand the role of MPAs in promoting climate resilience for protected resources and guide the establishment and management of durable MPAs (Sullivan-Stack et al., 2022; NOAA ONMS, 2022a). One National Park Service interviewee gave an example of a research product that would be immediately beneficial for MPA managers: "*One of the things that's missing is a really decent climate change model for Lake Superior because it just messes up everything… So there's no good model for that. That would benefit a ton of people, a ton of agencies, a ton of tribes.*"

In Section 6.2, we considered opportunities for NOAA and Parks Canada to expand collaborative management with the Great Lakes Fishery Commission and fishery managers. One specific means to accomplish that end is through mutually beneficial research into Great Lakes fisheries. A Parks Canada interviewee identified a need for "*a research agenda that evaluates the impact of no-take zones and protecting certain critical fishery habitats on fishery health, size, diversity, etcetera. There's a body of evidence supporting spillover effects from no-take zones in ocean environments.*" Therefore, we identify that research partnerships between MPA managers and fisheries managers could demonstrate similar effects in the Great Lakes. NOAA and Parks Canada might facilitate the growth of research on climate change and fisheries in the Great Lakes through fostering a network of MPA managers, research scientists, Indigenous nations, and fisheries experts. A NOAA interviewee envisioned such a network, noting that there are "*opportunities for collaboration in terms of sharing resources, sharing expertise, really creating this community of experts and assets.*" Approaching fisheries and climate change research from a network perspective is particularly appropriate given the regional economic importance of Great Lakes fisheries and the international scope of climate change.

### 8.2.2 Opportunities to Further Demonstrate Ecological Outcomes

By demonstrating ecological outcomes of MPAs, agencies can better demonstrate the value that Great Lakes MPAs provide to the region. Marine environments are limited in their assessment due to the complexity of defining and valuing biodiversity and ecosystem services of near, mid, and offshore waters. Nature United (2023) presents several recommendations for establishing monitoring and evaluation systems, including developing support resources and a maintenance plan for those systems, selecting an indicator framework, and deciding on analytical methods for MPAs.

We recognize that a strong assessment and valuation of ecosystem services can help to address conflicts among different benefits, beneficiaries, and uses of protected areas (Stolton et al., 2015). In other words, it can help promote the needs of communities while also addressing the needs of the areas being protected. These types of ecosystem benefits include qualitative indications of value, quantitative data, and monetary value. When approaching protected area valuations, it is important to consider all values and all stakeholders over a lengthy period. Valuation should not look at a single snapshot in time but should consider long-term implications as well: some values are short term while others exist for years, decades or even centuries. This makes valuation inherently complex; understanding of benefits and their value changes over time (Stolton et al., 2015). However, there are opportunities to enhance marine natural capital appraisal, especially as governments commit to expanding MPAs (Mulrooney and Jones, 2023).

> *"Until we can agree on the terms of what a positive conservation outcome is, we can't achieve it, we can't get towards it… I think it almost always comes back to that same point."*
>
> *- Agency Employee*

We identify that one crucial part of demonstrating ecological outcomes is determining the effectiveness of management plans. We highlight that this is an opportunity for both NOAA and Parks Canada to quantify the effectiveness of their MPAs in the Great Lakes. This includes understanding the effects that regulations have on species and habitats within both ecologically established sites and culturally designated sites in Canada and the US, respectively. Australian agencies have implemented a Management Effectiveness Evaluation (MEE), which is based on qualitative condition assessments that rely on expert judgment due to a lack of available quantitative data (Addison et al., 2015). Thus, we identify an opportunity for the US and Canada to implement a similar evaluation strategy, particularly if the agency is faced with limited ecological data or resources for comprehensive assessments.

With this, we recognize that it may not be realistic to simply dedicate more resources to monitoring as that can be costly, yet we highlight that there is a clear opportunity for Great Lakes MPAs on both sides of the border to promote collaboration between agencies and academic communities to create strong long term monitoring programs. MPA managers can include communities in long term monitoring by strengthening local capacity for data collection, management, and analysis to enhance regional monitoring activities. By strengthening this local capacity in collaboration with local and Indigenous communities agencies can better align past and current cultural context, knowledge, and practice (Nature United, 2023).

### 8.2.3 Opportunities for Integrating Data for Outcomes

In order to demonstrate the value of MPAs there needs to be uniform, clear, and collaborative databases. As we move towards the future there is becoming an emphasis on more data minded place-based conservation. With this, there is also a shift towards preservation and looking at the lakes as a larger system that all impact each other. MPA managers can leverage emerging monitoring technologies to overcome regional capacity constraints and enable a wider range of indicators to be consistently monitored across the region (Nature United, 2023). Therefore, we find that pursuing a set of standardized data collection methodologies and harmonizing

monitoring and data collection between the US and Canada can further improve indicator reporting and progress assessments. This could be particularly useful for fish and wildlife consumption, habitat and species, aquatic invasive species, groundwater data (IJC, 2023). We identify that the standardization of this data is crucial for communication and cooperation across borders and highlight that programs such as the Great Lakes Restoration Initiative (GLRI) seem poised to assist in the furtherance of data inclusion and monitoring efforts.

Yet outside of MPAs, GLRI appears to lack the bridge between social, cultural, and ecological data. The initiative has a lot of strong programs dedicated to furthering data programs and involving communities, however, there is less data and work being done to measure human use of the Great Lakes. Many of our interviewees expressed an interest in monitoring who is coming to the Great Lakes and MPA sites, what they are taking away from the Lakes, and how the lakes are impacting local communities in the long terms. Thus, we identify that NOAA and Parks Canada stand poised to help fill this gap with data collection and monitoring at MPA sites. The key to many of these gaps in data is collaborations and discussion between agencies and across borders, as many of these organizations are able to fill the gaps of each other's programs. Establishing trust, discussing data sharing needs, and negotiating data sharing agreements with monitoring partners as early as possible would allow for stronger data collection without stretching resources too thin for an agency (Nature United, 2023). Both agencies currently collaborate with and utilize communities to assist in most social data monitoring. Therefore, we underscore that this collaboration should be encouraged and utilized for other types as data, such as fisheries, in the future.

*"Effective conservation happens when we have both support and engagement from our constituency and when we use a standardized data driven approach to looking at how MPAs are doing and tracking that progress over time. So those two things, I think, are critical to looking at the design, and then tracking the effectiveness of MPAs. Those are both places where I think we have a wide range of opportunities to improve."*

*- Agency Employee*

Chapter 9

# Opportunities to Advance Great Lakes MPAs

As we have discussed in the preceding chapters of this report, NOAA's and Parks Canada's current approaches to setting goals, designing and planning of MPAs, governing those MPAs, monitoring resources, evaluating MPA performance, and demonstrating outcomes all provide a solid foundation which the agencies might build upon in order to reach their 30x30 goals in the Great Lakes region. However, in each chapter, we identified opportunities for NOAA and Parks Canada to adjust or build on their existing approaches to more efficiently and effectively reach those 30x30 goals and to elevate MPAs as a tool for broader environmental management in the Great Lakes. We summarize all these opportunities in this chapter and offer ideas for incorporation into current governance practices. We have organized the chapter into two sections. The first section reviews opportunities that may be feasible in the near term (i.e., between 2024 and 2030), and the second section presents opportunities that may be achievable over a longer planning horizon.

## 9.1 - Near-Term: Getting to 30% by 2030

We have indicated each near-term opportunity in the boxes below. Following each box, we have provided contextual information and ideas for how NOAA or Parks Canada might incorporate the opportunities into their existing practices. We have organized the opportunities by chapter and have noted the corresponding chapter for each opportunity in brackets.

**Opportunity 1**: Within the context of regional environmental goals, define a set of common outcomes for the Great Lakes that both NOAA and Parks Canada can use to track their progress towards their respective national 30x30 targets. [Chapter 4]

NOAA and Parks Canada have national goals concerning 30x30 targets, as well as site specific goals in management plans. However, aside from stated goals to establish MPAs in each Great Lake, the agencies have not defined explicit outcomes desired from an MPA network in the Great Lakes. Clearly defining conservation and socioeconomic goals as a foundation for a network is crucial to building a high degree of legitimacy to move MPAs forward. Aligning goals for Great Lakes MPAs across the agencies, as well as with their partners, might encourage expanded connectivity among Great Lakes MPAs. Considering how those outcomes fit within the regional goals set by binational governance mechanisms, such as the IJC and LAMPs, may help integrate MPAs within broader regional environmental goals.

**Opportunity 2**: To advance connectivity of Great Lakes MPAs, develop a Great Lakes-specific strategy for identifying potential OECMs, setting evaluation and management criteria for those OECMs, and tracking OECMs for national PA accounting. [Chapter 5]

The Canadian government has adopted an approach for recognizing OECMs that aligns with the IUCN's Guidelines for Conserving Connectivity through Ecological Networks and Corridors, whereas NOAA has not designated a methodology for recognizing OECMs (Parks Canada Agency, 2023c). At the time we prepared this report, the Canadian government had recognized OECMs in the Atlantic Ocean, Pacific Ocean, and Labrador Sea but not in the Great Lakes

(Government of Canada, 2024b). As described in Chapter 5, incorporating OECMs in conservation accounting can recognize meaningful conservation contributions from other sectors. However, the research on OECM conservation impacts and standards for evaluating OECM conservation performance remain limited. Developing a strategy for recognizing OECMs that is specific to the Great Lakes can help NOAA and Parks Canada better account for how OECMs contribute to connectivity and avoid potential pitfalls related to improperly defined or managed OECMs.

**Opportunity 3**: To advance conservation of Great Lakes ecosystems and fish species, identify opportunities for strategic restrictive zoning in MPAs through collaboration with the GLFC, state and provincial fishery managers, and Indigenous nations. [Chapter 6]

As discussed in Chapter 6, states and provinces regulate Great Lakes fisheries. However, research suggests that well-managed MPAs have positive impacts on fisheries and ecosystems (Lausche et al., 2021). Parks Canada has required that all NMCAs include at least one zone providing full protection to special features or sensitive elements of ecosystems (Zone 1), whereas NOAA's zoning requirements for Great Lakes NMS sites only pertain to fishing activities that might damage submerged historical and cultural resources. Both agencies might work with the GLFC, state and provincial fishery managers, and Indigenous nations to identify strategic locations for no-take areas within NMSs and NMCAs that are mutually beneficial for conservation and fishing interests. In the Great Lakes, fisheries groups are already accustomed to certain restrictions on gear and seasonal activities. Communicating potential no-take zones through the GLFC and state or provincial fishery managers may mitigate potential pushback from fishery groups. To assist with negotiations, NOAA and Parks Canada might utilize decision support tools for defining restrictive zoning boundaries that minimize socioeconomic impacts (Stortini, et al., 2015).

**Opportunity 4**: Work with state and provincial fishery managers to develop shared goals and strategies for how MPA management can support Great Lakes fisheries and how fishery management can benefit MPAs. [Chapter 6]

Prevention of MPA degradation and effective biodiversity conservation requires active fisheries management across the entire range of target species. Additionally, past evaluations have recommended that the availability of data and accessibility of stock assessments must increase outside the fisheries science community (NAMPAN, 2021a; Saloman et al., 2011). Beyond strategic zoning, NOAA and Parks Canada have other opportunities to collaborate with fishery managers to improve MPA performance. Great Lakes states and provinces monitor and manage fish populations differently and do not always share data consistently. One interviewee noted that NOAA and Parks Canada could partner with GLFC to promote information exchange among states, provinces, and the federal governments. NOAA and Parks Canada might use the Lake Committees as communication platforms to initiate these proposals.

**Opportunity 5**: Bolster and formalize existing structures for collaboration between MPA management agencies and other federal agencies and for international coordination. Designate specific staff roles and responsibilities for interagency and international collaboration. [Chapter 6]

Several interviewees highlighted the value GLPAN offers for interagency and cross-border collaboration, but interviewees also expressed concerns about international collaboration not being a focal point for MPA managers. When asked about crucial elements of an MPA network one NGO interviewee noted that a network must involve leadership, where collaboration is not a task done "*off the side of [the leader's] desk.*" Additionally, interviewees noted that informal collaboration depends on relationships among individuals, and retirements and other attrition, without any formal knowledge transfer, might risk the continuity of collaboration. GLPAN is an informal working group, so Parks Canada and NOAA might advance the impact of GLPAN by formalizing the platform. Adding international collaboration to the work expectations of agency staff may also serve to make collaboration more sustained.

**Opportunity 6**: Leverage existing platforms to coordinate and facilitate data sharing and management among NOAA, Parks Canada, the NPS, fisheries managers, research organizations, and others. Where possible, define uniform standards for data collection, organization, and management that span jurisdictional boundaries. [Chapter 6]

In the Great Lakes, studies have observed that missing data, limited cross-site sharing, and a lack of data consistency are issues for MPA management. For MPA management generally, there is a need to build standards for consistent data collection and analysis and open access dissemination (NAMPAN, 2021b; Saloman et al., 2011). Collaborating with other jurisdictions and research organizations can fill gaps and reduce any single entity's need to collect data on its own. One specific strategy to facilitate data sharing and consistency across organizations is by augmenting NOAA's MPA Center with further funding and staff. A NOAA interviewee described the MPA Center as "*a clearinghouse and a connector.*" Indeed, NOAA strengthens the MPA Center with long-term funding, and the Center can serve as a "centralized source" for MPA data and cross-jurisdictional collaboration (Sullivan-Stack et al., 2022).

**Opportunity 7**: For Parks Canada, build on existing ecological monitoring programs to expand resource coverage and advance consistency across sites and over time. For NOAA, incorporate elements of Sentinel Site Program and develop ecological monitoring programs for Great Lakes NMS sites, either internally or through research partners, to demonstrate ecological impacts of sites designated for cultural resources. To overcome resource limitations, both agencies might target monitoring on key indicators important to the region, use MEEs when quantitative data collection is infeasible, or take advantage of emerging technologies. [Chapter 7]

Similar to the preceding opportunity, there is a need to build standards for consistent data collection and analysis, which is particularly true for key indicators and processes like biodiversity, physical divers, critical habitats, and the projected and realized impacts of climate change on those indicators least resistant to environmental stress. Although some measures of MPA success, like fisheries spillover effect, have been demonstrated in marine settings, the separation of MPA and fisheries management in the Great Lakes has limited monitoring in the Great Lakes. Because expanding monitoring is resource-intensive, we have identified various possible strategies. In Australia, MPA managers used MEEs as a bridge towards more targeted, quantitative condition assessments of long-term monitoring, in light of a lack of long-term monitoring data (Addison et al., 2015). Additionally, an expanded buoy data collection network and lakebed mapping efforts could support ecosystem monitoring and prediction efforts by creating baseline data. Academic institutions might assist in the mobilization of emerging technologies with research equipment like autonomous survey boats. Additionally, incorporating TEK can address monitoring gaps and limitations.

**Opportunity 8**: Increase the educational impacts of Great Lakes MPAs by broadening the footprint of outreach programs (e.g., to museums, schools, and cultural heritage programs) to locations farther away from MPAs, particularly communities with limited access to the Great Lakes. [Chapter 8]

Our literature reviews and interviews both emphasized that education is a key social outcome produced by Great Lakes MPAs. MPAs offer sites for experiential learning about the history of the Great Lakes, aquatic and coastal ecosystems, and threats to lake resources. Visitor centers, infrastructure, and visitor experience teams are especially important for connecting visitors to aquatic resources and ecosystems they might not be able to see from the shoreline. NOAA's proposed NMS sites in Lake Erie and Lake Ontario could catalyze the development of Great Lakes education programs in cities like Buffalo or Cleveland. Parks Canada might leverage existing urban education programs like their Learn-to-Camp workshops to craft MPA-specific learning experiences in Toronto and other cities along Lake Ontario.

**Opportunity 9**: Facilitate the growth of research on climate change and fisheries in the Great Lakes through fostering an international collaborative network of MPA managers, research scientists, Indigenous nations, and fisheries experts. [Chapter 8]

While MPAs can function as sites for research into climate change, such research also serves the interests of MPA managers for assessing the projected effects of climate change on biodiversity and identifying resources particularly susceptible to climate change stresses. Advancing climate change research within MPAs can also help managers to understand the role of MPAs in promoting climate resilience for protected resources. Climate change research can benefit MPAs designated for historical resources or for ecological resources, given that climate change poses risks to both. Approaching fisheries and climate change research from a network perspective is particularly appropriate given the regional economic importance of Great Lakes fisheries and the international scope of climate change.

**Opportunity 10**: Expand the collection and monitoring of human use of Great Lakes MPAs (e.g., for recreation, education, and other experiences) to further demonstrate the impacts of MPAs on visitors. [Chapter 8]

Many interviewees expressed interest in monitoring who is coming to the Great Lakes and MPA sites, what visitors are taking away from the lakes, and how the lakes are impacting local communities. Having more data on visitor outcomes for Great Lakes MPAs can serve as a case for additional investment from the respective federal governments. NOAA and Parks Canada already have some monitoring programs for human uses at their MPA sites, so the agencies can build on their existing programs. Both agencies also already collaborate with community partners to assist with visitor use data collection. Continuing to work with existing partners and developing data sharing agreements with new partners can broaden the scope of visitor use monitoring.

## 9.2 - Long-Term: Governing Beyond 2030

Much like the near-term opportunities, there exist further opportunities for NOAA and Parks Canada to advance their current practices beyond 2030. We have indicated each long-term opportunity in the boxes below. Following each box, we provide information and suggestions for how NOAA or Parks Canada could integrate these opportunities into their current strategies. These long-term opportunities are outlined further in previous chapters, yet are presented below, organized by chapter for clarity and ease of reference.

**Opportunity 11**: Further align MPA goals and management plans with broader regional goals set by the IJC, Lake Committees, GLC, and other national and international governing bodies. Simultaneously, continue to advocate for those governing bodies to better account for MPAs in their goals and reporting. [Chapter 4]

This opportunity builds on Opportunity 1 described in the previous section. Once NOAA and Parks Canada have developed a set of Great Lakes-specific outcomes, the agencies might consider how long-term MPA designation and management goals align with regional goals set by the various intergovernmental bodies of the Great Lakes basin. For example, in their Great Lakes Science Strategy for the Next Decade, the IJC recommended that the era of focusing resources and attention on restoration should eventually end and that "restoration should be replaced by a new era of sustainable management and protection" (IJC, 2022). MPAs clearly have a role to play in both "eras," but the intergovernmental bodies have not always considered how MPAs might fit into strategies to achieve long-term regional goals. To be clear, this opportunity is not a critique of NOAA's and Parks Canada's MPA goals. Rather, we are emphasizing that the agencies likely must continue to advocate that regional environmental goals incorporate MPAs.

**Opportunity 12**: Identify opportunities to partner with organizations that manage terrestrial lands adjacent to MPAs (e.g., land management agencies, park districts, land conservancies, Indigenous nations, private landowners, and others) and coordinate management activities with those partners to develop a more holistic conservation regime for coastal areas. [Chapter 6]

Terrestrial processes affect adjacent bodies of water, and effective terrestrial management can benefit freshwater ecosystems (Acreman et al., 2020; Flitcroft et al., 2023). Several interviewees highlighted that there is a gap between terrestrial area and freshwater management in the Great Lakes basin. Integrated coastal management can fill protection gaps through aligning MPA and terrestrial conservation objectives. Given NOAA's and Parks Canada's connections with coastal communities, both agencies are positioned to bridge the gap between freshwater protection and terrestrial management. One potential strategy is partnering with organizations, such as local park districts and the Nature Conservancy, that have developed conservation areas on lands adjacent to MPAs and encouraging these organizations to develop management practices that consider the connections between their lands and the lakes. Another strategy is developing criteria to recognize terrestrial OECMs, which might encourage coastal landowners to adopt better management practices.

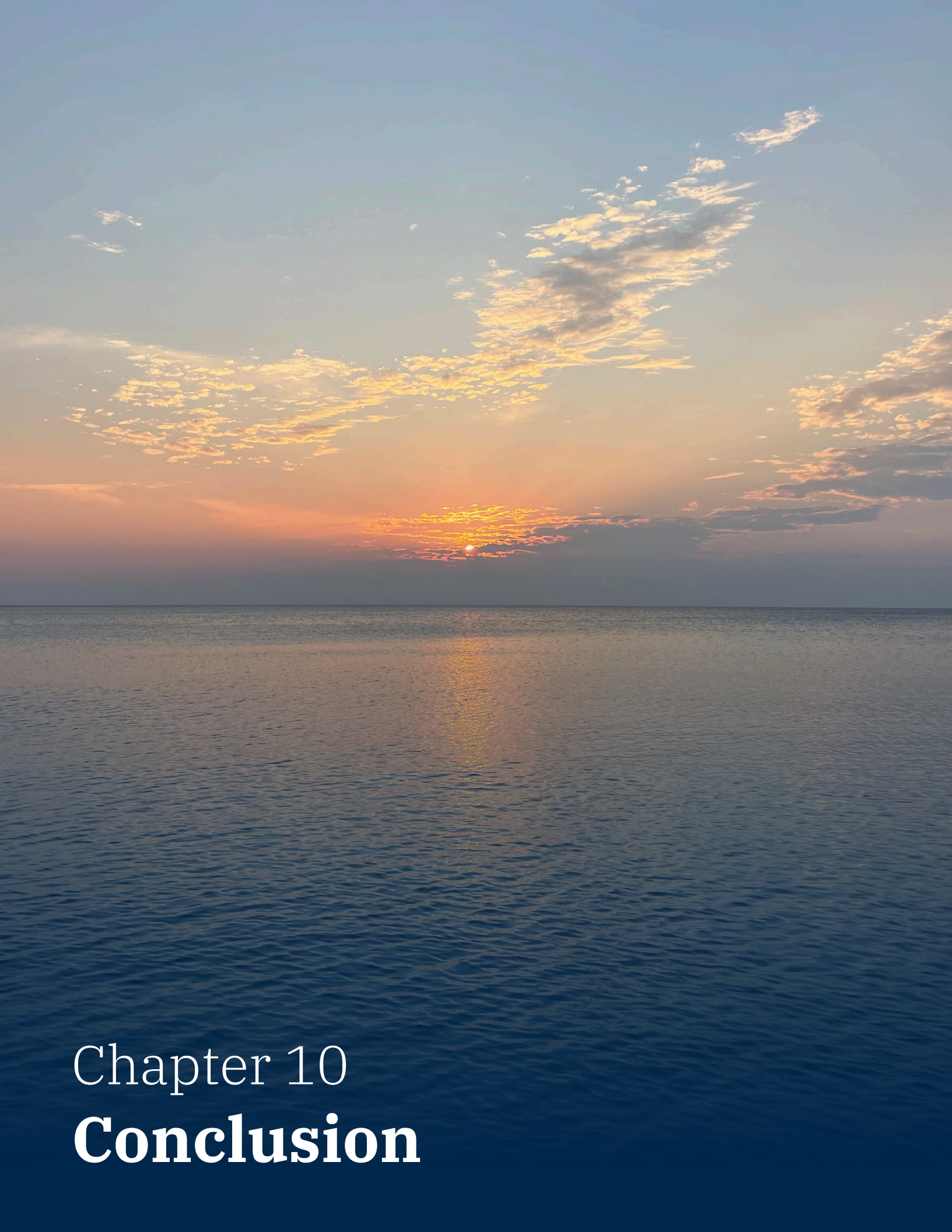
**Opportunity 13**: Develop more robust valuations of the ecosystem services, natural capital, and place-based significance conserved by MPAs as another means to demonstrate the value of MPAs to legislators and other decision makers that control funding and resources. [Chapter 6]

Researchers have developed valuation estimates of the ecosystem services and natural capital conserved within Parks Canada's and the NPS' Great Lakes sites, but not for NOAA's NMS sites. The natural capital estimates for the Parks Canada and NPS sites were two orders of magnitude greater than the respective management agency's budget. It is possible that a similar analysis of NOAA's Great Lakes NMS sites would produce similar results. Great Lakes MPA managers might use such gaps (i.e., between their budgets and the value of the resources they protect) to advocate for additional funding and resources. However, researchers who have developed the existing natural capital and ecosystem services estimates have acknowledged that their work is preliminary and exploratory. Before using these estimates to advocate for additional funding, the agencies might consider partnering with research institutions to build on initial estimates and develop more robust valuations.

**Opportunity 14**: Expand the role of Great Lakes MPAs as placed-based centers for social and community well-being monitoring and serve as a model for broader regional uptake of such monitoring. [Chapter 7]

Developing and monitoring social well-being indicators for coastal Great Lakes communities is a growing priority for programs, like the GLRI, that have largely focused on environmental metrics. As permanent sites, MPAs offer stable locations for evaluating long-term social well-being in the

surrounding communities and might serve as a catalyst and model for regional initiatives to assess well-being. Parks Canada has already initiated programs for developing and monitoring social well-being indicators, and NOAA might look to Parks Canada's approach to help create a more cohesive system for evaluating well-being. NOAA's Sanctuary Advisory Councils and Parks Canada's Management Advisory Committees may serve as forums for community workshops to develop or advance well-being monitoring programs.



Chapter 10

# Conclusion

The Great Lakes - the world's largest surface freshwater system - are essential for the ecosystems and human communities of the region. Canada and the United States (US) have developed several strategies, such as the Great Lakes Water Quality Agreement, Great Lakes Restoration Initiative, and binational commissions, to conserve the lakes' values for future generations. Marine protected areas (MPAs) have also played a valuable role in conserving Great Lakes resources yet have been undervalued compared with these other strategies. As Canada and the US work towards targets to conserve 30% of their lands and waters by 2030, MPAs can assume a more significant role in protecting the Great Lakes basin from myriad threats, help the US and Canada achieve 30x30 goals, and support local communities.

NOAA and Parks Canada have developed robust - yet disparate - processes for designating and governing Great Lakes MPAs. In this report, we have sought to identify ways for these agencies to further enhance MPA management and create a strong binational network of Great Lakes MPAs. We identified opportunities for NOAA and Parks Canada to build on and formalize existing partnerships, enhance long-term monitoring programs for ecological and social metrics, integrate data collection and management, and expand educational outreach and research programs. Through these opportunities, we hope that NOAA and Parks Canada might advance their current MPA programs towards reaching their full potential as a regional network at a scale necessary to achieve global 30x30 goals.

Through our work, it became clear that MPAs not only offer tangible ecological and social benefits, but also evoke an intangible sense of place within communities, deepening people's relationships to the region. The benefits from MPAs are apparent to those familiar with their management and impact; however, more needs to be done so that these benefits can be experienced and recognized by a larger audience. Additionally, the potential for MPAs as a protection mechanism within the shifting landscape of Great Lakes environmental protection has remained unrealized. We hope that this report will help to illuminate the value of Great Lakes MPAs and document opportunities for the US and Canada to ensure that MPAs in the Great Lakes continue to achieve regional and international goals for effective and equitable conservation.

*"What's my relationship [to Lake Superior]? It's a neighbor; I am in awe of it. I am thankful for it. And I feel it's my duty to learn and to help preserve the watershed."*

*- Lake Superior Stakeholder*

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# Appendices

## Appendix A - Literature Review Methodology

We defined three objectives for our literature review:

1. Develop comprehensive background information concerning the Great Lakes MPA programs administered by NOAA and Parks Canada, as well as other agencies.
2. Develop a set of MPA evaluation criteria to assess the performance of NOAA's and Parks Canada's existing Great Lakes MPA programs.
3. Synthesize recommendations for enhancing Great Lakes MPA governance from other external program evaluations, academic literature, and gray literature.

Achieving each objective required a different analysis method. As a result, we employed three distinct sets of analysis procedures to achieve our three literature review objectives. We have described the methods used for each objective below.

Literature Review Objective 1: Comprehensive Background Information
The methodology used for outlining the background on US and Canadian federal MPA governances is listed below:

1. The team identified and compiled MPA program guidance documents that define how each program (e.g., the National Marine Sanctuary system, the National Marine Conservation Area system) operates.
2. We used these documents to summarize the program-wide governance structures and processes for each program. These structures included statutes related to the programs, formal program-wide policies (e.g., program-wide regulations from an individual agency like NOAA), and informal program-wide guidance documents. Program wide processes included management plan development, stakeholder consultation, advisory council establishment, Indigenous partnership development or consultation, etc.
3. We also summarized area-specific governance structures and processes for the current federal Great Lakes MPAs, including Canadian NMCAs (Fathom Five NMP and Lake Superior NMCA) and US NMSs (Thunder Bay NMS and Wisconsin Shipwreck Coast NMS).
4. We then compared and contrasted the program-wide governance structures, program-wide governance processes, and area-specific governance processes among the programs and between the US and Canada.

Literature Review Objective 2: MPA Evaluation Criteria
We reviewed nine different frameworks for assessing the effectiveness and performance of protected areas and protected area governance. Because the number of frameworks specific to MPAs is limited, we included frameworks that focus on terrestrial areas or that cover both terrestrial and MPAs. Additionally, some evaluation frameworks contained criteria that are specific to individual MPAs, whereas other frameworks presented criteria for entire MPA programs (e.g., NOAA's National Marine Sanctuary [NMS] system) or for both areas and programs. We summarized the nine frameworks we considered, identified whether each

framework applies to a single area or across a program, and briefly described each framework in Table 3 within the main body of the report.

We employed the following procedure when reviewing, comparing, and contrasting the nine existing frameworks.

1. We identified which documents present frameworks or criteria for evaluating the effectiveness of protected areas (e.g., IUCN Green List, the MPA Guide, etc.). These documents included protected area design and governance frameworks and past MPA program evaluations.
2. We constructed a table that compiles all the evaluation criteria categories and evaluation criteria for each document. We determined whether the criteria and categories are intended for an individual protected area or whether they can be applied across a program. That table referenced the source document for each evaluation criterion and source category.
3. We compared and contrasted the evaluation criteria and categories among the different documents. We considered the following questions when comparing and contrasting the criteria and categories: Were there similarities in how the frameworks are organized? Did the frameworks use the same or similar criteria categories? Which criteria were used by more than one framework, and which criteria only showed up in one document?
4. We identified which criteria and categories were used most frequently across the documents.
5. Given the other frameworks and evaluations, we identified any evaluation gaps that appeared in each framework or set of criteria.
6. We assessed how widely each framework or set of evaluation criteria has been applied.
7. Given the assessments in steps 3-6, we made a decision about which criteria we would use for our project. In making that decision, we asked whether it would be better to use a single existing framework or whether it would be more appropriate to synthesize the criteria into a new set.
8. One team member, who did not analyze the evaluation criteria, reviewed the process that led to the criteria decision. All five team members agreed on the criteria decision.
9. We summarized the final recommended criteria in a memo, which we shared for review and used in our final report.

Literature Review Objective 3: Synthesized Recommendations from Existing Literature
We intended for this process to be a simplified subjective systematic literature review. Given our time and resource limitations, as well as the purpose of our project (internal recommendations for our clients, not an academic paper), we did not intend to thoroughly review all the relevant literature. Instead, with help from our clients, we selected the most relevant documents for our project's goals. This set of procedures focused on the academic literature concerning MPAs and actionable recommendations from past program evaluations. We also included strategic planning documents from the agencies and other relevant documents.

We employed the following procedures for this analysis:

1. To identify recurring themes, issues, and recommendations in the literature, we used a hybrid codebook that combines our interview codebook and the evaluation criteria from the Literature Review Objective 1 (Evaluation Criteria) analysis. Using a codebook

similar to our Interview codebook allowed us to more easily compare the findings from the literature review with the results of our interviews.

2. We created a spreadsheet to analyze, compare, and contrast all the documents we reviewed. In that spreadsheet, we listed all the codes in the first column and added relevant findings from each document in subsequent columns.
3. We extracted any relevant findings from a document that might apply to a code and listed those findings in the analysis worksheet in the same row as the corresponding code. In other words, we actively grouped findings from all documents that applied to a single code in the same row. For example, multiple documents might have recommended that the US or Canada devote more funding to restoration projects in MPAs, but they may have had different phrasings or caveats; we would have grouped all those similar recommendations within a single code group. There were cases when multiple groups of related findings or recommendations applied to a single code. In such cases, we created multiple rows for a single code.
4. At least one additional team member reviewed the code and finding groupings.
5. We compiled a final comprehensive tabular list of recommendations from the literature and used that list to develop our final report.

# Appendix B - Interview Methodology

## Interviewee Selection

We began by identifying key leaders of the current Great Lakes MPA system embedded in NOAA and Parks Canada programs. From these initial set of interviewees, we utilized a snowball sampling approach to have those key informants direct us to other key minds and stakeholders in the Great Lakes region. Additionally, to build out interviewees in the Lake Superior region we utilized the same approach, beginning with one key informant that assisted us in recruiting local interviewees with a range of backgrounds and expertises. 40 potential interviewees were emailed to participate in this project resulting in a total of 33 interviewees and subsequent interviews (Table B1).

**Table B1**. Breakdown of interviewees based on background and nation.

| | NGO/Academia | Agency | Stakeholder | Indigenous | **Total** |
|---|---|---|---|---|---|
| Canada | 1 | 6 | 1 | 1 | **9** |
| Indigenous | 1 | 1 | - | - | **2** |
| US | 8 | 9 | 4 | 1 | **22** |
| **Total** | **10** | **16** | **5** | **2** | **33** |

*Some interviewees maintained roles within their Tribe or First Nation, as well with Canada and the United States, and thus were included twice in this table.

## Interview Guide and Style

We developed four similar, yet distinct interview guides to match the general background of our interviewees. The interview guides were created through an iterative series of revisions, both before and during the interview process. Questions for each guide were crafted to elicit responses from interviewees about a particular topic in order to cover our range of project goals [Appendix A]. The four guides were divided into an academia/NGO guide, agency guide, Indigenous guide, and Lake Superior stakeholder guide, with each set of questions fit to the background of the respondents. For instance, the agency guide included questions about specific MPA programs, whereas the academia/NGO guide tended to focus more conceptually on the Great Lakes as a whole. Respondents from academia and NGOs were asked questions from the same interview guide due to similarities in the conceptual scope of questions needed for interviewees with this background, and due to similarities in the knowledge of these respondents. Additionally, while standard guides were utilized for all interviewees of a specific background, questions were tailored to each respondent's particular area of expertise (e.g., ecology) where appropriate. Sample interview guides are included in Appendix B. In instances where a particular respondent bridged multiple backgrounds (e.g., a member of an Indigenous tribe and federal employee, or an academic and a Lake Superior stakeholder) a custom set of questions was created, merging both relevant backgrounds. Interviews were coded and analyzed in aggregate, such that personalized interview guides had minimal bearing on the outcomes of the analysis.

# Appendix B - Interview Methodology

Respondents were interviewed using a semi-structured interview style, whereby individual lines of thought were able to be pursued in addition to the set of questions predetermined in the corresponding interview guide. Interviews were conducted both via zoom (N = 21) and in-person (N = 12) with each lasting approximately 50 minutes to 1 hour, with a small range of variation therein.

## Interview Analysis

Interviews were recorded using the Voice Memos app for in-person interviews and using Zoom for interviews conducted virtually. The resulting audio files were then transcribed, cleaned, and de-identified using Otter.ai.

Cleaned and edited transcripts were then uploaded to a qualitative data analysis software, Dedoose, for coding. Transcripts were assigned descriptors matching their background and country, tribe, or First Nation of primary affiliation. We began by creating a codebook to categorize segments of the text, creating a series of nested codes under our main research objectives (Chapter 2). High-level divisions or categories were researcher-generated based on research objectives, with the nested codes beneath created from participant-derived open coding. These codes were continually refined through project team discussions and peer-review, resulting in our final codebook (Appendix D).

We then applied this codebook to each interview transcript. We conducted this in three phases: an initial coding phase followed by a process of coder alignment, and then followed by a final coding application. In the initial phase, each coder blindly applied codes to a subset of two transcripts such that 10 total transcripts were each coded by two different interviewers. The twice-coded transcripts were then evaluated to locate areas of discrepancy or disagreement between coders. These areas of confusion or disagreement were then discussed by all coders, and adjustments to code titles, definitions, and organization within the codebook were made where appropriate. The resulting revised codebook was then applied to all 33 interview transcripts.

To further analyze the resulting coded segments of interview transcripts for common trends and themes, we viewed the data from two separate vantage points. The coded data was first evaluated for trends and discrepancies between backgrounds, analyzing each code by reading responses from only academia, agency, etc. (for instance, evaluating “what do NGO leaders think about Topic X, compared with thoughts from agency employees about Topic X?”) using the “Descriptor x Code” function in Dedoose. This same process was followed to elucidate differences between primary residence, for instance, “what do Canadian citizens think about Topic X, compared with thoughts from US citizens or Indigenous tribal and First Nation citizens about Topic X?” Findings from this analysis were compiled into a separate document while tracking the number of interviewees that provided claims that supported each finding. Finally, similar thoughts were manually grouped by conceptual similarities based upon overall project objectives, resulting in the final interview takeaways.

# Appendix C - Compiled Sample Interview Guides

| | | |
|---|---|---|
| Date: | Interviewer: | In Person?: |
| Start Time: | End Time: | Archival #: |

***Agency Employees***

**Opening:**

Hello, my name is _____ and I'm _____ and we are graduate students at the University of Michigan working with the National Oceanic and Atmospheric Administration (NOAA) and Parks Canada. Thank you for taking the time to speak with us today - we're very appreciative of your participation and feedback. As I mentioned in my scheduling email/call, we are analyzing the effectiveness and future design and governance of federal marine protected areas (MPAs). This is part of NOAA and Parks Canada's goal to create a more cohesive and effective network of MPAs in the Great Lakes.

As part of our analysis, my team and I are speaking with people involved with MPA governance, as well as individuals who benefit from or are affected by MPAs. Through these conversations, we hope to gain a better understanding of how the current MPA systems are working and how they can be improved. We will use the information we hear in these interviews to help us develop a set of recommendations for NOAA, Parks Canada, and the National Park Service, so your feedback is highly valuable.

Before we begin, is it ok if I record this conversation for transcription purposes? We're looking for trends across data in aggregate and won't be using specific names when reporting data. If we use specific quotes from this interview, we will remove any identifiers and give the quotes without direct attribution. If at any point you feel like you no longer wish to participate in this work, you have the right to opt-out, and we will discard any information you would like us to discard up to and before this point.

Feel free to interrupt me if you remember something that you want to revisit or clarify, if you don't understand something I'm saying, or if I perhaps get one of my facts wrong. With that said, do you have any questions for me before we begin?

**Background**

1. How did your career path lead you to your current role?
2. I know that _____ is your job title, can you briefly tell me about what your key job responsibilities are as they relate to MPAs?
3. When you think about the future of MPAs in the Great Lakes, what excites you the most?
4. What do you see as the most pressing threats to Great Lakes resources (e.g., water quality, biodiversity, cultural/historical resources)?
    a. [OR if staff at specific MPA]: What do you see as the most pressing threats to resources within [*Specific MPA*]?

**MPA Management for Ecological Outcomes**

1. What are the conservation goals of [specific MPA/the NMCA program/the NMS program]?

| Date: | Interviewer: | In Person?: |
|---|---|---|
| Start Time: | End Time: | Archival #: |

2. What adjustments could be made to the management responsibilities you're involved with to better meet [specific MPA's/NMCA program's/NMS program's] conservation goals?
    a. What about 30x30 goals?
3. For existing MPAs that you've worked on or are familiar with, where have you had difficulty meeting ecological conservation goals?
    a. Where have problems arisen?
4. To what degree do you feel that MPAs are an effective means of protecting the species and ecosystems of the lakes?
    a. [*If yes*] - How so?
    b. [*If no*] - What do you think is preventing MPAs from being an effective strategy?
5. [For higher level leader/manager positions] [Start question by defining OECMs][1] What role, if any, do you think other effective area-based conservation measures (OECMs) could play in conserving Great Lakes resources and achieving your agency's goals?
    a. What are some of the limitations you see for OECMs as a conservation tool?
    b. What are some of the best practices or opportunities for incorporating OECMs into MPA networks?
6. [For ecological and GIS positions] What types and sources of data should be considered when making decisions about protected areas in the Great Lakes?
    a. What do you think is missing right now?
7. What do you think would be the crucial elements of a Great Lakes MPA network? (e.g., design, governance, etc.)
    a. Should [NOAA/Parks Canada/the NPS] pursue a Great Lakes MPA network? If so, what benefits would such a network offer?

**General MPA Management**

1. What are the goals that you try to achieve in your role?
    a. What information do you track to gauge whether you are meeting these goals?

[1] "Other effective area-based conservation measure" means "a geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in situ* conservation of biodiversity, with associated ecosystem functions and services and, where applicable, cultural, spiritual, socioeconomic, and other locally relevant values" (CBD, 2018).

| Date: | Interviewer: | In Person?: |
|---|---|---|
| Start Time: | End Time: | Archival #: |

2. What has stakeholder engagement in the Great Lakes looked like in practice? What does it look like when working at its best? What about any problems or failures?
3. Could you describe your experiences working with Indigenous nations and peoples?
4. Can you describe how your agency has worked with other federal agencies to manage an MPA or resources within an MPA or across networks of MPAs?
    a. What is the nature of the relationship? (e.g., legal agreement, MOU, implied arrangement, other). Who has legal responsibilities?
    b. How are goals decided?
    c. How are roles decided?
    d. What is working well?
    e. What is not working well?
    f. What improvements can be made to collaborative management and partnerships?
5. Are there opportunities for collaborative management (e.g., for ecosystem conservation) across the border?
    a. If so, what?
6. In your MPA management role, have you had any specific encounters with statutory or regulatory barriers? Explain
    a. [If yes] How have you navigated those barriers?

**Integrating conservation goals with community values**

1. How do you communicate the value of MPAs to local communities near those MPAs? What about to non-local decision makers?
    a. Has this been effective?

**General follow-up questions**

1. In your experience, when MPA management is working well, what is driving success?
    a. Could you walk me through a time or two where this was the case?
        i. What was it about this instance that you think made it successful?
2. If you were comparing environmental protection and conservation tools for the Great Lakes, where would MPAs fall as a priority? (As compared with, for example: OECMs, voluntary partnerships, state/local/provincial MPAs, individual species protection programs like the ESA, etc.)

| | | |
|---|---|---|
| Date: | Interviewer: | In Person?: |
| Start Time: | End Time: | Archival #: |

3. Is there anything else you'd like to share or add that you think would be helpful to our work or help clarify my understanding of your viewpoints?

**Closing:**

Thank you again for taking the time to talk with me today. We really appreciate your honesty and level of reflection. If you'd like, we would be more than happy to follow up with you with the results of this work when the time comes. In the meantime, would it be alright if we followed up with you if we need to clarify or confirm any of your responses?

| | | |
|---|---|---|
| Date: | Interviewer: | In Person?: |
| Start Time: | End Time: | Archival #: |

***NGO and Academic Institution Staff***

**Opening:**

Hello, my name is _____ and I'm _____ and we are graduate students at the University of Michigan working with the National Oceanic and Atmospheric Administration (NOAA) and Parks Canada. Thank you for taking the time to speak with us today - we're very appreciative of your participation and feedback. As I mentioned in my scheduling email/call, we are evaluating the effectiveness and future designs and governance of federal Marine Protected Areas (MPAs). This is part of NOAA and Parks Canada's goal to create a more cohesive and effective network of MPAs in the Great Lakes.

As part of our evaluation, my team and I are speaking with people involved with MPA governance, as well as individuals who benefit from or are affected by MPAs. Through these conversations, we hope to gain a better understanding of how the current MPA systems are working and how they can be improved. We will use the information we hear in these interviews to help us develop a set of recommendations for NOAA, Parks Canada, and the National Park Service, so your feedback is highly valuable for us.

Before we begin, is it ok if I record this conversation for transcription purposes? We're looking for trends across data in aggregate and won't be using specific names when reporting data. If we use specific quotes from this interview, we will remove any identifiers and give the quotes without direct attribution. If at any point you feel like you no longer wish to participate in this work, you have the right to opt-out, and we will discard any information you would like us to discard up to and before this point.

Feel free to interrupt me if you remember something that you want to revisit or clarify, if you don't understand something I'm saying, or if I perhaps get one of my facts wrong. With that said, do you have any questions for me before we begin?

**Background**

1. What is your role at (____)?
2. What are your key job responsibilities?
3. How long have you been at (____)?
4. Walk me briefly through your background - How did you get to be in this position?
5. When you think about the future of ecological protection in the Great Lakes, what excites you the most?

**MPA Management for Ecological Outcomes**

1. What do you see as the most pressing threats to Great Lakes resources (e.g., water quality, biodiversity, cultural/historical resources)?
2. How much do you know about Marine Protected Areas?

| Date: | Interviewer: | In Person?: |
|---|---|---|
| Start Time: | End Time: | Archival #: |

a. If you don't know a lot, would it be helpful if I provided a little background on MPAs?[2]
b. Could you describe your understanding of what Marine Protected Areas (MPAs) are and their role in Great Lakes protection for me?

3. What should protected areas in the Great Lakes be protecting against?
4. Do you think that NOAA/Parks Canada/NPS are setting out to achieve the 'right' goals for ecological conservation in the MPAs they manage?
   a. [*If no*] - What do you think the right goals are?
5. What would you change about the way [*NOAA's/Parks Canada's/NPS'*] Great Lakes MPAs are *managed* to achieve 30x30 conservation targets?
   a. [*If not familiar*] - How do you think management for 30x30 goals should occur?
6. What types and sources of data should be considered when making decisions about protected areas in the Great Lakes?
   a. What do you think is missing right now?
7. [Start question by defining OECMs] What role, if any, do you think other effective area-based conservation measures (OECMs) could play in conserving Great Lakes resources?
8. How do you think Great Lakes protection can become more cohesive across borders?
   a. What role do you think MPAs could play in this?
   b. What role do you think NGOs or academia could play in this collaboration?
   c. What do you think would be the crucial elements of a Great Lakes MPA network? (Design, governance, benefits, etc.)

**Representation**

1. Who do you feel is impacted by Great Lakes MPAs? Why?
2. What does stakeholder engagement for Great Lakes protection look like when working at its best?
   a. What does it look like in reality now?
3. Do you feel that MPAs provide benefits to coastal communities?
   a. [*If yes*] - What benefits do you feel they provide?

[2]A defined region designated and managed for the long-term conservation of marine resources, ecosystems services, or cultural heritage.

| Date: | Interviewer: | In Person?: |
|---|---|---|
| Start Time: | End Time: | Archival #: |

b. [*If no*] - What do you think could be done to MPAs so that they may provide a greater impact to coastal communities?

4. Where do you see room for advancing the relationship between federal agencies and Indigenous Peoples in terms of Great Lakes protection?

**General Follow-up Questions**

1. If you were comparing environmental protection and conservation tools for the Great Lakes, how would you rank MPAs as a priority?
2. What do you think the role of MPAs could/should be in the Great Lakes?
3. Is there anything else you'd like to share or add that you think would be helpful to our work or help clarify my understanding of your viewpoints?
4. Is there anyone you feel we need to talk to?

**Closing:**

Thank you again for taking the time to talk with me today. We really appreciate your honesty and level of reflection. If you'd like, we would be more than happy to follow up with you with the results of this work when the time comes. In the meantime, would it be alright if we followed up with you if we need to clarify or confirm any of your responses?

| | | |
|---|---|---|
| Date: | Interviewer: | In Person?: |
| Start Time: | End Time: | Archival #: |

***Lake Superior Local Stakeholders***

**Opening:**

Hello, my name is _____ and I'm _____ and we are graduate students at the University of Michigan working with the National Oceanic and Atmospheric Administration (NOAA) and Parks Canada. Thank you for taking the time to speak with us today - we're very appreciative of your participation and feedback. As I mentioned in my scheduling email/call, we are evaluating the effectiveness and future use of federal Marine Protected Areas (MPAs). This is part of NOAA's and Parks Canada's goal to create a more cohesive and effective network of MPAs in the Great Lakes.

As part of our evaluation, my team and I are speaking with people involved with MPA governance, as well as individuals who benefit from or are affected by MPAs. Through these conversations, we hope to gain a better understanding of how the current MPA systems are working and how they can be improved. We will use the information we hear in these interviews to help us develop a set of recommendations for NOAA, Parks Canada, and the National Park Service, so your feedback is highly valuable for us.

Before we begin, is it ok if I record this conversation for transcription purposes? We're looking for trends across data in aggregate and won't be using specific names when reporting data. If we use specific quotes from this interview, we will remove any identifiers and give the quotes without direct attribution. If at any point you feel like you no longer wish to participate in this work, you have the right to opt-out, and we will discard any information you would like us to discard up to and before this point.

Feel free to interrupt me if you remember something that you want to add or clarify, if you don't understand something I'm saying, or if I perhaps get one of my facts wrong. With that said, do you have any questions for me before we begin?

**Background:**

1. How long have you worked at/been involved with _____?
2. Walk me through your background - how did you get to be here?
3. Can you describe your organization/business/group/governmental body?
4. What does your work entail?
5. Could you describe how you or the work that you do is connected to Lake Superior?
6. What do you see as the most pressing threats to Lake Superior? Why?
7. What does 'Great Lakes Marine Protected Area' mean to you?
    a. What does it conjure up images of?
    b. What do you wish you knew more about MPAs?
8. How do you or your organization interact with MPAs?
9. How do you feel you are/would be impacted by a local MPA?

| | | |
|---|---|---|
| Date: | Interviewer: | In Person?: |
| Start Time: | End Time: | Archival #: |

**MPA Management**

1. How would you describe your relationship/interactions with federal agencies (NOAA/Parks Canada/NPS)?
2. If you were running an agency that protects the Great Lakes, how would you approach interactions with groups/businesses like your own?
3. Have there been any MPA management practices employed by NOAA/Parks Canada/NPS that have affected you or your organization?
    a. [*If yes*] - Could you describe these practices?
4. Which management practices have had a positive impact on you or your organization?
    a. Do you see any ways that these practices could be made to have an even greater positive impact on your organization?
5. Can you describe any communication that has occurred between [*federal agency*] and your organization or community about the management of [*specific MPA*]?
    a. Have there been any instances in which there has been a communication failure between your organization and [*federal agency's*] during the management of [*specific MPA*]?
        i. [*If yes*] - Could you describe what you feel went wrong?
        ii. [*If no*] - What do you think it was that made communication run smoothly?
6. Do you feel [*specific MPA*] has been of value to you or your organization since its designation? [Alternatively] Do you feel a MPA could be of value to you or your organization?
    a. [*If yes*] - How so?
    b. [*If no*] - How do you think MPAs could be changed to provide value to you or your organization?
7. How do you think *your* needs have been considered or met, if at all, during the MPA designation and management processes?
    a. What about the needs of *your community*?
    b. What, if anything, is missing in the way things are operating right now that is keeping your needs from being met?
8. Do you have any concerns about [*specific MPA/Potential MPA*]?
    a. [*If yes*] - Could you describe these concerns for me?
    b. [*If no*] - What has been done to limit any potential concerns?

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|---|---|---|
| Date: | Interviewer: | In Person?: |
| Start Time: | End Time: | Archival #: |

**Ecological MPA Management**

1. In your own words, what does an 'ecologically healthy' lake look like?
2. Do you think that [*specific MPA*] has had an effect on the ecological health of the Lake?
3. Do you feel like there are opportunities for your organization to work with [*specific agency*] to protect the ecological health of Lake Superior?
    a. [*If yes*] - Like what?
    b. [*If no*] - What, if any, barriers are there preventing this?

**Representation:**

1. If you only had one opportunity to talk with a top official from NOAA/Parks Canada/NPS, what would you tell them?

**General Follow-up Questions:**

1. Is there anything else you'd like to share or add that you think would be helpful to our work or help clarify my understanding of your viewpoints?
2. Is there anyone you feel we need to talk to?

**Closing:**

Thank you again for taking the time to talk with me today. We really appreciate your honesty and level of reflection. If you'd like, we would be more than happy to follow up with you with the results of this work when the time comes. In the meantime, would it be alright if we followed up with you if we need to clarify or confirm any of your responses?

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| Date: | Interviewer: | In Person?: |
| Start Time: | End Time: | Archival #: |

***Lake Superior Indigenous Communities & Nations***

**Opening:**

Hello, my name is _____ and I'm _____ and we are graduate students at the University of Michigan working with the National Oceanic and Atmospheric Administration (NOAA) and Parks Canada. Thank you for taking the time to speak with me today - we're highly appreciative of your participation and feedback. As I mentioned in my scheduling email/call, we are evaluating the effectiveness and future design and governance of federal Marine Protected Area (MPA) programs in the Great Lakes region. This is part of NOAA and Parks Canada's goal to create a more cohesive and effective network of MPAs in the Great Lakes.

As part of our evaluation, my team and I are speaking with people involved with MPA governance, as well as individuals who benefit from or are affected by MPAs. Through these conversations, we hope to gain a better understanding of how the current MPA systems are working and how they can be improved. We will use the information we hear in these interviews to help us develop a set of recommendations for NOAA, Parks Canada, and the National Park Service, so your feedback is highly valuable for us.

Before we begin, is it ok if I record this conversation for transcription purposes? We're looking for trends across data in aggregate and won't be using specific names when reporting data. If we use specific quotes from this interview we will remove any identifiers and provide the quotes without direct attribution. If at any point you feel like you no longer wish to participate in this work, you have the right to opt-out, and we will discard any information you would like us to discard up to and before this point.

Feel free to interrupt me if you remember something that you want to add or clarify, if you don't understand something I'm saying, or if I perhaps get one of my facts wrong. With that said, do you have any questions for me before we begin?

**Background:**

1. Can you tell me a bit about your background?
2. [*For Indigenous leaders*] Would you mind describing your role within your Nation/community?
3. Can you describe your personal relationship (i.e., personal, professional, economic, cultural, etc.) with Lake Superior?
    a. What are your fondest memories or activities involved with the Lake?
4. As I understand it, the traditional territory for the _____ people extends from _____ to _____, could you share with me [*Indigenous Nation*]'s cultural ties to Lake Superior and the surrounding land?
5. What does 'Marine Protected Area' mean to you?
    a. What does it conjure up images of?

**General MPA Management**

| Date: | Interviewer: | In Person?: |
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| Start Time: | End Time: | Archival #: |

1. From your perspective, can you describe [*federal agency's*] approach to Indigenous nations and peoples with regard to its MPAs?
    a. What has been respectful and worked?
    b. What has been disrespectful and/or not worked?
2. How do you feel about [*federal agency*]'s administration of [*specific MPA*]?
    a. What elements of [*federal agency*]'s administration approach have worked well for you/your nation?
3. Do you have any concerns about [*specific nearby MPA*]?
    a. [*If yes*], could you describe these concerns for me?
    b. [*If no*], what has been done to limit any potential concerns?
    c. What are your thoughts on the causes of those concerns?
4. What changes would you recommend for [*federal agency*]'s approach to managing MPAs in the Great Lakes and potentially binational MPA networks?
    a. How would you like [*federal agency*] to incorporate Indigenous governance and management in MPAs?
5. Can you describe a situation in which there has been a communication failure…
    a. [*If individual*] …between [*federal agency*] and you concerning management of [*specific MPA*]?
    b. [*If government official*] …between [*federal agency*] and your nation concerning management of [*specific MPA*]?
6. What communication approaches from [*federal agency*] have been effective?

**MPA Management for Ecological Outcomes**

1. In your own words, what does an 'ecologically healthy' lake look like?
2. Do you think [*federal agency*] should advance indigenous-led conservation and/or incorporate traditional ecological knowledge into their management of [*specific MPA*]?
    a. What opportunities, if any, do you see for indigenous peoples and [*federal agency*] to work together towards this?
    b. What challenges, if any, do you see for achieving this?
3. Do you feel that there is common ground between [*specific Indigenous group's*] priorities and [*federal agency's*] priorities in terms of ecological outcomes for Lake Superior?
    a. [*If yes*] - What is this common ground?

| Date: | Interviewer: | In Person?: |
|---|---|---|
| Start Time: | End Time: | Archival #: |

b. [*If no*] - What do you think can be done to bridge this divide?

4. How should [*specific Indigenous group's*] fishing rights be incorporated into management of [specific MPA]?
    a. Is there a place for fish refuges/sanctuaries in MPAs?

**MPA Designation**

1. How did you feel about interactions with federal agencies (NOAA/Parks Canada/NPS) during the designation of [*specific MPA*]?
    a. Could you describe any instances where things went particularly well?
2. What do you wish could have been done differently during the designation process if it were to be done over again?
    a. [Alternative Question] How would you change things?
    b. What aspects of the government-to-government relationship could have been improved?
3. Can you describe a situation in which there was a communication failure between [federal agency] and you/your nation during the MPA designation process?

**Representation:**

1. What would you talk with a top leader from NOAA/Parks Canada/NPS about and/or what would you tell them?
2. Could you walk me through what ideal Prior Informed Consent would look like to you in the designation process?
3. Could you walk me through what ideal Prior Informed Consent would look like to you in the management process?
4. What opportunities do you feel may exist that NOAA/Parks Canada may have missed when interacting with Indigenous groups/Nations?

**General follow-up questions:**

1. Could you describe your vision for a MPA that works for you and your community?
2. Is there anything else you'd like to share or add that you think would be helpful to our work or help clarify my understanding of your viewpoints?

**Closing:**

Thank you again for taking the time to talk with me today. We really appreciate your honesty and level of reflection. If you'd like, we would be more than happy to follow up with you with the results of

this work when the time comes. In the meantime, would it be alright if we followed up with you if we need to clarify or confirm any of your responses?

# Appendix D - Interview Codebook

| | | | |
|---|---|---|---|
| **General, broad thoughts on MPAs** | Future of MPAs | Social Justice | Future of MPAs and the growing movement of societal change and social justice, e.g. Indiginous engagement. Inequitable access. |
| | | Community-Building | Involvement of communities that extends from before designation or establishment through governance that results in a community that is meaningully engaged with the MPA. Almost like an informal involvement in the conservation process |
| | | Holistic Management | MPAs as a means of integrating aquatic protection with terrestrial and coastal protection |
| | Threats to the Great Lakes MPAs | Climate Change | The threat of climate change and its impacts to the Great Lakes region and its resources. |
| | | Overfishing | The threat of overfishing and its impacts to the fish populations/ecosystem of the Great Lakes |
| | | Invasive Species | Threat of invasive species to native biodiversity and human use |
| | | Pollutants | Impacts due to discharge or runoff from human activities like wastewater treatment plants, industrial facilities, and agriculture |
| | | Development | Development impacts on coastal processes and habitats |
| | Value of MPAs | Sense of Place | MPAs having value due to their ability to connect society to nature |
| | | Education | MPAs offer opportunities to educate visitors/users and increase public awareness about Great Lakes ecosystems, threats, and management efforts. Creation of future advocates for protection of place |
| | | Research | MPAs provide research opportunities for scientist and data collection areas |
| | | Prevention against future threats | MPAs protect against degradation of existing habitats by restricting allowable activities |
| | | Restoration | MPAs may offer opportunities for restoration of degraded habitats and ecosystems |
| | | Economic Opportunity | Mention of activities that the public partakes in at MPAs that generate economic activity |
| | | Limitations | Ways in which MPAs offer limited value in achieving Great Lakes conservation goals |
| | Purpose | Preservation | Purpose of MPAs is to preserve the way things are now, or the way things were; preserving the places that *need* to be protected; not just that can be protected easily. Long-term protection v. need for money in the short term |
| | | Conservation | Purpose of MPAs is to conserve resources but still promote their use/developement |
| **MPA Management For Ecological Outcomes** | 30x30 Goals | MPA tool to reach area-based | Specifically MPAs role as a tool to meet 30x30 goals. This can include ecological, land conserved, and social outcomes of 30x30 |
| | | OECMs | The role of OECMs in conservation and reaching 30x30 goals |
| | | Connectivity | Discussion of connectivity between ecosystems and habitats for species (and ecologically important abiotic processes) to be connected. Included in this is connectivity between MPAs and how this relates to 30x30 goals. |
| | | MPA Network | Intentionally connected set of MPAs with integrated management approaches & alignment of ecological priorities |
| | Ecological Data Needs | Data Scale | Using different data scales (e.g., geographical) for various management purposes |
| | | Missing Data | Data that is currently un-considered or absent from current MPA management |
| | Fisheries | | Management specifically regarding fisheries and how they might be addressed given the geopolitical landscape of the Great Lakes |
| | Current Managment | Current Management | Recognizing past management and current management processes (e.g., current charter fishing guides) when considering future management. Consideration of how current management processes may constrain, provide intertia for, or otherwise affect NOAA/PC management |
| | Regulation | | Examples of regulations pertaining to ecological outcomes (e.g., permitting, zoning, restrictions) |
| **General MPA Management** | Indigenous Partnerships | Co-management | Indigenous Groups Co-managing MPAs |
| | | Collabrative Partnerships | Indigenous Priorities and Input for management |
| | | Indigenous knowledge | Incorporating Indigenous knowledge (or Traditional Ecological Knowledge) into MPA management processes and decisions |
| | Agency Collaboration | Federal Agency Partnerships | NOAA/Parks Canada working with other federal agencys within their border for MPA conservation. Improvements that could increase collaboration, and barriers that are preventing it. |

| | | | |
|---|---|---|---|
| | | Role of Federal Agencies | NOAA, Parks Canada, and other agencies can serve in a role that facilitates collaboration among other agencies, groups, and communities. |
| | | Federal and State / Provincial Collaboration | Allocation of governance roles between states / provinces and federal agencies and collaborative management approaches between states / provinces and federal agencies. Improvements that could increase collaboration, and barriers that are preventing it. |
| | Binational Coordination | Authority | Groups that lead or coordinate binational Great Lakes management efforts and enforcement capacity for binational efforts |
| | | Existing Formal Mechanisms | Existing *formalized* governmental and nongonvernmental institutions, working groups, or frameworks that allow for binational Great Lakes management coordination. |
| | | Existing Informal Mechanisms | Existing *informal* governmental and nongonvernmental institutions, working groups, or frameworks that allow for binational Great Lakes management coordination. |
| | Communication | Face-to-face | Instances of people mentioning the need for more face-to-face communication |
| | Role of Academia | Academia | Any ways that academia may further MPA management (partnerships, coordination, consistency, advocacy, resrouce aquisition, pedigree, etc.) |
| | Role of NGOs | NGOs | Any ways that NGOs may further MPA management (partnerships, coordination, consistency, advocacy, resrouce aquisition, pedigree, etc.) |
| | Agency Resources | Funding | How agencies do/do not have funding, and how and where available funding might be leveraged effectively |
| | | Lack of Data | The data available for effective management practices is lacking. Gaps or not data available |
| **Integrating conservation goals with community values** | Community Benefits | Vulnerable Communities | Integrating community values, specifically those of vulnerable communities, in ecological conservation and looking at how the two are interconnected. |
| | | Stakeholder Engagement | Incorporating the views and priorities of stakeholders in MPA designation and management decisions |
| | | Wellbeing | Long term social, economic, and cultural benefits from MPAs to the communities that they impact |
| | Resources | | Sharing of resources between federal agencies and local communities |
| | Communication With Community | Alignment | How the level alignment/divergence between NOAA/PC values or priorities and a community's values or priorities affects communication. |
| | | Clarity/Misconceptions | Incorporation of community values through clearly demonstrating how MPAs are/will be in line with community values |
| | Recognition of Community Assets | | Federal recognition and possible incorporation of local conservation practices into MPA management |
| **Representation** | Indigenous Engagement | Effective Communication | Communication strategies and recommendations for effective communication between Indigenous Peoples and MPA management |
| | | Mistrust | Past history, mistrust, tensions between Indiginous Peoples and Federal Agencies |
| | Local Communities | Mistrust | Hesitancy to work with governmental agencies, lack of trust |
| | | Participation | Which members of local communities participate in MPA management or decisions, and how do those people participate; development of local ambassadors for the MPA |
| | | Community needs | What local communities need from federal agencies or MPA managers; is information from committees flowing down to citizens? Do federal priorities reflect community priorities? |
| | Data | Non-Traditional Data | Representation through incorporation of non-traditional data sources from the community and tribal nations (e.g., TEK, Charter fish catches, etc.) |
| **MPA Designation** | Designation Communication | Internal | Challenges or successes for communicating the purpose and functions of MPAs within the agency (i.e., agency have clear priorities/goals) |
| | | External | Challenges or successes for communicating and educating to the public the purpose and functions of MPAs |
| | Timing | Designation Timeline | Troubles with parties moving at different speeds or working with different political timelines |
| | | False Starts | Instances of MPAs being established/designated only to not move to management; MPAs supposedly moving to management, but not. |
| | Role of Academia | Academia | How MPAs can be supported by or support academic institutions during the designation phase |
| | Role of NGOs | NGOs | How MPAs can be supported by or support NGOs during the designation phase |

# Appendix E - Global Biodiversity Framework Target 3 (30x30) Criteria

**Table E1.** Derived from (Secretariat of the CBD, n.d.).

| GBF Target 3 Criteria | Description |
|---|---|
| 1. At least 30 percent of terrestrial and inland water areas, and of marine and coastal areas | This quantitative element of the target specifies that, globally, at least 30 percent of terrestrial and inland water areas, and at least 30 percent of marine and coastal areas should be conserved or protected by 2030. |
| 2. Areas of particular importance for biodiversity and ecosystem functions and services | Areas particularly important for biodiversity include areas high in species richness or threatened species, threatened biomes and habitats, areas with particularly important habitats and areas that are important for the continued provision of ecosystem functions and services. The protection of such areas should be prioritized in reaching this target. |
| 3. Effectively conserved and managed | Protected areas and OECMs must be managed with the primary objective of achieving positive outcomes for biodiversity. Effective management and sustained positive outcomes for biodiversity conservation requires the adoption of appropriate management objectives and processes, governance systems, adequate and appropriate resourcing and consistent monitoring. |
| 4. Ecologically representative | Protected areas and OECMs should contain adequate samples of the full range of existing ecosystems, ecological processes and regions. |
| 5. Well-connected | In order for protected areas and OECMs to be effective, they should be connected through corridors as well as integrated into wider landscapes, seascapes and the ocean. This is an essential element of creating effective systems or networks of protected and conserved areas that can meet sustained in situ conservation outcomes and cope with stresses and disturbances, including from the impacts of climate change. |
| 6. Equitably governed | A key element of the equitable governance of protected areas and OECMs is ensuring that relevant actors are involved and able to fully participate in their establishment, management and governance and that the costs and benefits of establishing and managing such areas are shared fairly. It also includes effective participation in decision-making, transparent procedures, access to justice in conflicting situations, and the recognition of the rights and diversity of the people that will be affected by the establishment and management of protected areas and OECMs. |
| 7. Sustainable use consistent with conservation objectives | Some types of protected areas and OECMs allow for limited types of non-industrial, traditional, cultural activities to occur within their boundaries. Examples could include hunting, fishing, gathering and tourism. Where these activities are permitted within protected areas and OECMs, they should be sustainable and consistent with conservation objectives. |

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| 8. The rights of Indigenous peoples and local communities | All activities carried out under this target must be done so recognizing and respecting the rights of Indigenous peoples and local communities, including over their traditional territories. This includes, as specified in Section C of the Kunming-Montreal Global Biodiversity Framework that rights, knowledge, including traditional knowledge associated with biodiversity, innovations, worldviews, values and practices of Indigenous peoples and local communities are respected, and documented and preserved with their free, prior and informed consent, including through their full and effective participation in decision-making, in accordance with relevant national legislation, international instruments, including the United Nations Declaration on the Rights of Indigenous Peoples. |

# Appendix F - America the Beautiful Elements

**Table F1.** Derived from (US Department of the Interior, 2021).

| Principles of America the Beautiful | Description |
|---|---|
| 1. Pursue a Collaborative and Inclusive Approach to Conservation | The spirit of collaboration and shared purpose should animate all aspects of America's nature conservation and restoration efforts over the next decade. The US should seek to build upon the myriad examples where collaboration and consensus-building have led to significant conservation outcomes. |
| 2. Conserve America's Lands and Waters for the Benefit of All People | The conservation and restoration of natural places in America should yield meaningful benefits in the lives of all Americans, and these benefits should be equitably distributed. The conservation value of a particular place should not be measured solely in biological terms, but also by its ability to help America prepare for and respond to the impacts of climate change, or to unlock access for outdoor recreation, hunting, angling, and beyond. |
| 3. Support Locally Led and Locally Designed Conservation Efforts | Every community in the United States has its own relationship with nearby lands and waters, and every community is working in some way to conserve the places that matter the most to it. The Federal Government should do all it can to help local communities achieve their own conservation priorities and vision. Locally and regionally designed approaches can play a key role in conserving resources and be tailored to meet the priorities and needs of local communities and the nation. Conservation and restoration efforts should also be regionally balanced. Marine conservation efforts should reflect regional priorities and seek to achieve balanced stewardship across US ocean areas. |
| 4. Honor Tribal Sovereignty and Support the Priorities of Tribal Nations | Tribal Nations have sovereign authority over their lands and waters, possess long-standing treaty hunting and fishing rights on and off reservations, and have many cultural, natural, and sacred sites on national public lands and the ocean. Efforts to conserve and restore America's lands and waters must involve regular, meaningful, and robust consultation with Tribal Nations. These efforts must respect and honor Tribal sovereignty, treaty and subsistence rights, and freedom of religious practices. Federal agencies should seek to support and help advance the priorities of Indigenous Peoples, including those related to sustainable land management and the conservation of natural, cultural, and historical resources. |
| 5. Pursue Conservation and Restoration Approaches that Create Jobs and Support Healthy Communities | Conserving and restoring the nation's lands and waters can yield immense economic benefits. A healthy ocean, for example, supports productive fisheries and vibrant working waterfronts. Locally driven, nationally scaled conservation campaigns over the next decade can help lift America's economy, address environmental justice, and improve quality of life. |
| 6. Honor Private Property Rights and Support the Voluntary Stewardship | There is a strong stewardship ethic among America's fishers, farmers, ranchers, forest owners, and other private landowners. US working lands and waters give our nation food and fiber and keep rural and coastal |

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| Efforts of Private Landowners and Fishers | communities healthy and prosperous. They are also integral to conserving functioning habitats and connecting lands and waters across the country. Efforts to conserve and restore America's lands and waters must respect the rights of private property owners. Such efforts must also build trust among all communities and stakeholders, including by recognizing and rewarding the voluntary conservation efforts of private landowners and the science-based approaches of fishery managers. |
| 7. Use Science as a Guide | Scientists have made remarkable gains in understanding the complicated natural systems that support human communities, particularly in the face of climate change. Studies of the carbon sequestration potential of lands and the ocean; of biodiversity loss, ecosystem services, and the movement and migration of wildlife; and of air and water pollution are part of a large and growing body of scientific information that can help guide decisions about how the nation should manage, connect, and conserve its lands and waters. Conservation efforts are more successful and effective when rooted in the best available science and informed by the recommendations of top scientists and subject matter experts. Transparent and accessible information will increase shared understanding and help build trust among stakeholders and the public. The use of Indigenous and Traditional Ecological Knowledge can complement and integrate these efforts |
| 8. Build on Existing Tools and Strategies with an Emphasis on Flexibility and Adaptive Approaches | The US has long been a global innovator in natural resource conservation and stewardship, from inventing the idea of national parks to forging market-based strategies for slowing the loss of the nation's essential wetlands. Though President Biden's national conservation goal is ambitious, it can be achieved using the wide array of existing tools and strategies that Tribal Nations, territories, State and local governments, private landowners, non-profit organizations, fishing communities, Congress, and Federal agencies have already developed and deployed effectively. These tools range from grant programs for local parks and coastal restoration projects, to conservation programs on working lands, to the designation of locally crafted recreation and conservation areas on public lands and waters, to using the stakeholder-driven processes for marine fisheries management and sanctuary designations, among other examples. Agencies should support the flexible application of tools, innovation in designing new approaches, and, where appropriate, the use of adaptive management to help adjust to a changing climate, shifting pressures, and new science. |

# Appendix G - Evaluation Criteria Comparison Summary

Global Conservation Frameworks: These frameworks included

- IUCN Green List;
- GBF Target 3; and
- Guide to Inclusive, Equitable and Effective Implementation of Target 3.

As presented in Box 1, Target 3 of the GBF contained the broadest yet most limited criteria of the global conservation frameworks. The IUCN Green List largely addressed the Target 3 criteria and also more comprehensively and specifically defined goals for governance and MPA design. While the WWF and IUCN Guide to Inclusive, Equitable and Effective Implementation of Target 3 offered a clear set of actions MPA administrators should implement to achieve the goals of Target 3, the guide did not define end states or outcomes we could use to compare the existing Great Lakes MPAs against. Given these comparisons, the IUCN Green List criteria offered the most comprehensive baseline to measure MPA performance against. Additionally, the Protected Planet database for protected areas, which tracks protected area coverage and effectiveness across the globe, has incorporated the Green List into its reporting outputs.

MPA or MPA Network Criteria: Documents containing MPA-focused criteria included:

- Blue Park Criteria;
- MPA Guide;
- Marine Connectivity Conservation ‘Rules of Thumb’ for MPA and MPA Network Design, and
- Scientific Guidelines for Designing Resilient MPA Networks in a Changing Climate.

The MPA Guide provided five primary criteria specific to MPAs, and two of the MPA Guide criteria (Level of Protection and Stage of Establishment) added specificity to the IUCN Green List. Although the other three MPA Guide criteria repeated components of the IUCN Green List, the MPA Guide identified several important enabling conditions not expressly covered by the other frameworks, including sustainable financing, conflict resolution mechanisms, and education and outreach initiatives. The Marine Connectivity Conservation ‘Rules of Thumb’ for MPA and MPA Network Design Version 1.0 presented detailed criteria for assessing MPA connectivity that none of the other frameworks considered. Neither the Blue Park Criteria nor the Scientific Guidelines for Designing Resilient MPA Networks in a Changing Climate added criteria that other frameworks did not already address.

Past North American MPA Program Evaluations: The past MPA program evaluations included:

- Assessing Canada's Marine Protected Areas
- External Review of the NMS System

CPAWS’ Assessing Canada's Marine Protected Areas report used the MPA Guide as its evaluation criteria, so this report did not add any new criteria for our comparison. The External Review of the NMS System shared recommendations that mostly aligned with the IUCN Green List criteria. Any specificity offered by the NMS Review recommendations did not add significantly new

criteria that would help us achieve our evaluation goals, and the recommendations were also specific to the NMS system.

# Appendix H - Evaluation Criteria Definitions

In this appendix, we provide definitions for the categories and criteria included in our synthesized evaluation framework presented in Section 2.3.

The Good Governance category comprises criteria that address how equitable, effective, transparent, accountable, and adaptive the institution governing an MPA is.

1. **Guarantee Legitimacy and Voice**: The governing institution has established a "legitimate, equitable, and functional" structure that represents and addresses the interests of rights holders and stakeholders (IUCN, 2017). For Great Lakes MPAs, do federal statutes and regulations allow NOAA and Parks Canada to govern their MPAs equitably and functionally, and do these agencies incorporate the perspectives of shoreline communities and Indigenous and First nations into governance decisions?
2. **Achieve Transparency and Accountability**: The governing institution has developed a decision making process that provides clear justifications and is accessible to all stakeholders, and the institution has expressly defined responsibilities for program implementation (IUCN, 2017). Do NOAA and Parks Canada have accessible processes for stakeholder and rights holder consultation in decision making, and have the agencies clearly defined staff responsibilities for managing their MPAs and interacting with local communities and rights holders?
    a. **Conflict Resolution Mechanisms**: The governing institution has established an understandable process for stakeholders and rights holders to voice concerns and for resolving disputes among stakeholders, rights holders, and MPA managers (IUCN, 2017; Grorud-Colvert et al., 2017).
3. **Enable Governance Viability and Capacity to Respond Adaptively**: The governance structure provides for institution staff to adaptively designate and manage the MPA, through incorporating the "best available" social and ecological knowledge (IUCN, 2017). Adaptive management involves learning from and responding to changing conditions and new information. Do NOAA and Parks Canada have the authority to adjust their MPA management plans and practices, and do the agencies have adequate staffing and resources to make adaptive changes?
    a. **Stage of Establishment**: The stages include Proposed or Committed, Designated, Implemented, and Actively Managed, and each stage includes an increasing level of governance authority to establish and enforce regulations (Grorud-Colvert et al., 2017). The stage sets the boundaries for exercising authority for active management of an MPA.

The Sound Design and Planning category comprises criteria concerning the conservation goals, priorities, and objectives of an MPA and the ways that MPA design reflects those priorities and objectives.

1. **Identify and Understand Major Site Values**: The managing institution has identified, documented, understood, and agreed on which values an MPA seeks to conserve (IUCN, 2017). These values can include natural elements (e.g., important species or habitats, ecological processes, and geoheritage), ecosystems services, cultural features (e.g., archaeological sites, sacred areas, and other areas of cultural significance), or some

combination. In the Great Lakes, these values might be shipwrecks, coastal wetlands, spawning reefs, or locations where manoomin is endemic.

2. **Design for Long-Term Conservation of Major Site Values**: The managing institution has designed the MPA to support, protect, and maintain the identified site values (IUCN, 2017). One crucial design consideration for species, ecological process, and ecosystem services is connectivity. We provide several sub-criteria for assessing the connectivity in MPA design below.
    a. **Consider ecological connectivity using best available science**: Connectivity involves (1) the functional movement of individuals, populations, and genes among populations, communities, and ecosystems, and (2) the structural connections allowing for the physical movement of non-living materials (Lausche et al., 2021).
    b. **Account for role of connectivity in face of current and anticipated climate change in management strategies and plans**: MPA network design and management accounts for near and long term climate change projections (Lausche et al., 2021).
    c. **Account for aquatic and land-based processes in design and management, especially related to climate change resilience**: MPA design and management account for aquatic and land-based processes that affect connectivity for conservation values (Lausche et al., 2021).
    d. **Identify role of MPAs in supporting connectivity and barriers to connectivity**: MPA managers understand the role the MPA(s) plays in supporting connectivity or creates a barrier to connectivity beyond the MPA boundaries (Lausche et al., 2021).
    e. **Scale management units based on realistic connectivity patterns for specific species**: The incorporation of connectivity in the MPA design accounts for the best scientific understanding for connectivity patterns of target species, processes, or other conservation values (Lausche et al., 2021).
    f. **Include multiple ecosystems in MPA and network design**: MPA and MPA network design incorporates several Great Lakes ecosystems (e.g., that can support different species' life stages) (Lausche et al., 2021).
    g. **Employ a multi-management approach across realms (e.g., land-sea) for species that use different habitats during lifecycle**: MPA design accounts for connectivity between aquatic and terrestrial habitats, especially for species that rely on both aquatic and terrestrial ecosystems and that face land-based and aquatic threats (Lausche et al., 2021).
    h. **Use habitat suitability modeling when spatial distribution data is limited**: If species observational data is limited, the managing institution can use habitat suitability modeling for MPA design to evaluate potential habitat linkages and support spatial management (Lausche et al., 2021).
    i. **Base network size and spacing recommendations on representative species when data limited for many species**: Representative sizing metrics might include larval dispersal, adult home ranges, and distances between nurseries and adult habitats (Lausche et al., 2021).
3. **Understand Threats and Challenges to Major Site Values**: The managing institution has identified, documented, and understood current and emerging threats to the values an

MPA seeks to conserve, and the institution has developed plans for addressing those threats (IUCN, 2017). For example, have NOAA and Parks Canada considered how changes to water temperature and quality resulting from climate change impact Great Lakes shipwrecks or the abundance of invasive mussels?

4. **Understand Social and Economic Context**: The managing institution has sought to understand the social and economic characteristics of the region within and around an MPA, assessed the social and economic impacts of designating the MPA on rights holders, stakeholders, and local communities, and addressed those impacts in MPA design and management (IUCN, 2017). In the Great Lakes region, rights holder specifically refers to Indigenous nations and groups, whereas stakeholders and local communities include tourism industries, commercial and recreational anglers, homeowners, and other local interests.

The Good Strategy Implementation category comprises criteria concerning how an MPA management agency establishes and implements management practices to achieve the goals and objectives for an MPA.

1. **Develop and Implement a Long Term Management Strategy**: The managing institution has developed a management plan, which defines long-term strategies that clearly describes how management staff will achieve the MPA's goals and objectives. The management plan demonstrates sufficient financial, staff, and resource capacity to implement the program described in the plan (IUCN, 2017).
2. **Manage Ecological Condition**: The managing institution demonstrates that implementation of its management plan includes strategies and activities necessary to support, protect, and maintain the ecological values of the MPA (IUCN, 2017). While NOAA and Parks Canada do not have jurisdiction over Great Lakes fisheries, the agencies might demonstrate how their management actions maintain important habitats, geoheritage sites, or unique abiotic processes.
3. **Manage within Social and Economic Context of the Area**: MPA managers recognize and effectively engage with rights holders and stakeholders, and managers acknowledge, promote, and maintain the social and economic benefits of the area within and surrounding an MPA. If maintaining the social and economic values of the region contradicts the conservation purposes of the MPA, MPA managers consult with stakeholders and rights holders before implementing any restrictions on activities in the MPA. Consultation with Indigenous rights holders abides by the principles of free, prior, and informed consent (IUCN, 2017).
4. **Manage Threats**: MPA managers demonstrate that they are actively responding to current and emerging threats to MPA site values and that these responses effectively mitigate the effects of threats on achieving MPA objectives (IUCN, 2017).
5. **Effectively and Fairly Enforce Laws and Regulations**: MPA managers communicate laws and regulations to the relevant stakeholders; MPA managers have adequate capacity to monitor, detect, and respond to violations of site regulations; and MPA managers enforce those regulations fairly without preference for any individuals or groups (IUCN, 2017).
6. **Manage Access, Resource Use, and Visitation**: Activities allowed within the MPA align with the conservation goals and objectives of the MPA, MPA managers clearly define those activities in management plans and other communications, and managers control

permitted uses and activities to minimize impact to site values (IUCN, 2017). Additionally, MPA managers have developed visitor facilities that comport with site values, meet visitor needs, and encourage access for visitors of varying ability.

a. **Level of Protection**: As part of their access management strategy, MPA managers have defined and enforce levels of protection in the MPA or zones within that MPA. These levels of protection designate what level of resource use or visitation are allowed in each zone (Grorud-Colvert et al., 2017).

As the name suggests, enabling conditions are circumstances that allow for effective MPA planning and management. These conditions are not directly related to conservation activities of the MPA, but the conditions are necessary to achieve conservation outcomes. The Key Enabling Conditions category comprises criteria concerning resources available to MPA managers, collaboration with partners in other jurisdictions, and outreach.

1. **Sustainable Financing**: MPA managers have identified reliable and sufficient sources of financing to support essential management activities, such as infrastructure development and equipment purchases.
2. **Coordination with Related Governance Institutions**: MPA managers have established informal and formal partnerships with other governance institutions (e.g., fishery managers, regional bodies, environmental regulators, the Coast Guard, etc.). MPA managers and other institutions clearly understand their roles.
3. **Collaboration Across Jurisdictions**: MPA managers have established informal and formal partnerships with other MPA management institutions within, as well as outside, the same watershed, lake, or ecoregion. Partnerships might involve data sharing, communicating lessons learned, resource augmentation, and other activities to mutually advance management goals.
4. **Sufficient and Properly Organized Staffing and Funding**: MPA managers have adequate staff to perform all management functions necessary to achieve the MPA's defined goals. Managers have sufficient funding to support their staff in fulfilling all necessary management functions.
5. **Education and Outreach Initiatives**: MPA managers have established education and outreach programs to connect with local communities and meet defined socioeconomic goals.
6. **Effective Management of Broader Seascape and External Pressures**: The seascape (or lake) external to MPA boundaries, as well as the lands that drain into the MPA, is managed in a way that mitigates threats to the resources within the MPA.

Monitoring, evaluation, and learning define the adaptive management approach that is important for effective conservation. Monitoring of resources, threats, and management activities provides information to managers, such that the managers can adjust their actions as necessary to better achieve the defined goals of the MPA.

1. **Measure Success**: MPA managers have defined and implemented monitoring programs for major MPA values, threats, and achievement of management goals and objectives. Mangers also have processes to use lessons learned from monitoring to adjust management actions to improve outcomes (IUCN, 2017).

The Conservation and Social Well-being Outcomes Achieved Category comprises criteria for demonstrating conservation performance of an MPA. Key outcomes include conservation of natural values, ecosystem services, and cultural values.

1. **Demonstrate Conservation of Major Natural Values**: MPA managers have shown that their MPA achieves or exceeds defined conservation goals for species, ecosystems, habitats, and other key biodiversity features.
2. **Demonstrate Conservation of Major Associated Ecosystem Services**: MPA managers have shown that their MPA achieves or exceeds defined conservation goals for ecosystem services (IUCN, 2017).
3. **Demonstrate Conservation of Cultural Values**: MPA managers have shown that their MPA achieves or exceeds defined conservation goals for cultural values (IUCN, 2017).