Area, Quality and Protection of Special Lakeshore Communities - Islands

Extent, Condition and Conservation Management of Great Lakes Islands
Indicator #8129

Overall Assessment
Status: **Mixed**
Trend: **Undetermined**
Rationale: **This project established baseline information that will be used to assess future trends. Results reflect detailed analyses from Canadian islands and preliminary results from U.S. islands.**

Lake-by-Lake Assessment

Lake Superior
Status: Good
Trend: Undetermined
Rationale: Detailed analysis for Canada only. A preliminary analysis of Lake Superior islands in the United States is nearly complete.

Lake Michigan
Status: Mixed
Trend: Undetermined
Rationale: A preliminary analysis of Lake Michigan islands in the United States is nearly complete.

Lake Huron
Status: Mixed
Trend: Undetermined
Rationale: Detailed analysis for Canada only. A preliminary analysis of Lake Huron Islands in the United States is nearly complete.

Lake Erie
Status: Mixed
Trend: Undetermined
Rationale: Detailed analysis for Canada only. Preliminary analyses have been completed for Lake Erie islands in the United States.

Lake Ontario
Status: Mixed
Trend: Undetermined
Rationale: Detailed analysis for Canada only. Preliminary analyses have been completed for Lake Ontario islands in the United States.

Purpose
- To assess the status of Great Lakes islands, one of the 12 special lakeshore communities identified within the nearshore terrestrial area
- To assess changes in area and quality of Great Lakes islands individually, within lake units, and as an

ecologically important system

- To assess amount and suitability of island habitat for focal species and communities in the Great Lakes ecosystem
- To infer success of management activities
- To focus future conservation efforts toward the most ecologically significant island habitats in the Great Lakes that face threats and are not adequately protected

Ecosystem Objective

The long-term objective is to ensure the conservation, protection, and preservation of the islands of the Great Lakes, including their unique landforms, plants, animals, cultural history, and globally important biological diversity.

State of the Ecosystem

Background

This project created the first binational database and detailed mapping of the islands[1] of the Great Lakes (Figure 1). This effort identified 31,407 island polygons[2] with a total coastline of 15,623 km (9,708 miles). The islands range in size from no bigger than a large boulder to the world's largest freshwater island, Manitoulin. They often form chains of islands known as archipelagos. Though this is not well known, the Great Lakes contain the world's largest freshwater island system, and the islands are globally significant in terms of their biological diversity. Despite this, the state of our knowledge about islands as a collection is very limited.

Due to their 360-degree exposure to coastal processes, islands are vulnerable and sensitive to change. They are exposed to forces of erosion and accretion as water levels rise and fall, and to weather events. Although very few subspecies, species, or communities are restricted to Great Lakes islands, some endemic (found exclusively in one ecoregion) or limited-range (found primarily in one ecoregion, but extending to one or two other ecoregions) species and communities occur disproportionately on islands. Because of their isolation, many offshore islands have assemblages of plants and animals that do not occur on the mainland as well as unique predator-prey relationships and low densities of herbivores.

Some Great Lakes islands represent the most remote wilderness areas in the Great Lakes ecoregion. These wilderness islands provide refuge for unique biological resources. Islands need to be considered a single irreplaceable resource and protected in their entirety if the high value of this natural heritage is to be maintained. Islands play a particularly important role in the "storehouse" of Great Lakes coastal biodiversity, and their value is enhanced when islands are protected in the context of the whole. For example, in Ontario, over 320 provincially rare species, including 27 globally rare species, occur on islands. In 1999 Soule reported that the state of Michigan's 600 Great Lakes islands contain one-eleventh of the state's threatened, endangered, or rare species while representing only one-hundredth of the land area. All of Michigan's threatened, endangered, or rare coastal species occur at least in part on its islands. The natural features of particular importance on Great Lakes islands are colonial waterbirds, nearctic-neotropical migrant songbirds, endemic plants, arctic disjuncts, endangered species, fish spawning and nursery use of associated shoals and reefs and other aquatic habitat, marshes, alvars, coastal barrier systems, sheltered embayments, nearshore bedrock mosaic, and sand dunes. New research indicates that nearshore island

1 We define island as any land mass, natural or artificial, within the Great Lakes and connecting channels that is surrounded by an aquatic environment.

2 Island polygons are based on remote mapping information and small islands in close proximity may be mapped as a single unit. As a result, 31,407 is a conservative estimate. Additionally, the shape and number of islands can change depending on water levels.

areas in the Ontario waters of Lake Huron account for 58 percent of the fish spawning and nursery habitat in this Lake and thus are critically important to the Great Lakes fishery. Many of Ontario's provincially rare species and vegetation communities can be found on islands in the Great Lakes.

Methods

Table 1 provides a summary of the number of islands and island groups (complexes) within each coastal environment in Ontario, including the mean and range for the biodiversity and threat score. These scores provide a summary of relative biodiversity significance and relative threats for islands in each coastal environment. Islands and island complexes were assigned scores based on three categories: 1) biodiversity values, 2) potential threats, and 3) existing conservation progress. The criteria from Ewert *et al* (2004) were modified and used as a basis to build an enhanced scoring method that could use an automatic approach to assess the biodiversity of islands. Biodiversity criteria used included biological diversity, physical diversity, size and distinctiveness. The analysis of threats considered direct potential threats such as boat launches, anchorages, residences, cottages, building density, invasive species, pits, quarries, and lighthouses. Indirect potential threats included distance to mining claims, road density, and percent of island occupied by cropland. Conservation progress was also assessed for each island and island complex by measuring the amount of protected areas. For Ontario islands parks, protected areas, conservation lands, and existing recognition of biodiversity values were assigned into four categories to reflect the general type of associated conservation. Protected areas on U.S. islands are currently being identified and assigned categories. Existing conservation progress scores did not directly contribute to biodiversity or threat scores, but the proportion of these conservation lands on each island and island complex were assessed to provide further insight into island values and identify potential conservation gaps and needs.

Summary of Islands by Lake

Lake Superior

A total (Canada and U.S.) of 2,591 island polygons were identified. St. Marys River has 630 island polygons. Canadian islands in Lake Superior have the lowest threats score in the basin. A high proportion of these islands are within protected areas and conservation lands. Overall condition is good. These islands include a high number of disjunct (separated geographically) plant species.

Lake Huron

A total (Canada and U.S.) of 23,719 island polygons (including Georgian Bay) were identified. Canadian islands tend to be more threatened in the south compared to the north. In the U.S., many islands along Michigan's Lower Peninsula are partially or completely protected along with a number of islands off the Upper Peninsula. A large number of protected areas and conservation lands occur in the northern region. Southern regions are more developed and under increasing pressures from development and invasive species. These islands include a high number of globally rare species and vegetation communities.

Lake Michigan

A total (U.S.) of 329 island polygons were identified. Only preliminary analyses have been completed. Although many islands are quite isolated and have little or no threats, others are near shore, have permanent human populations, and are threatened by several factors.

Lake Erie

A total (Canada and U.S.) of 1,724 island polygons were identified. Other nearby island polygons include those in Lake St. Clair and the St. Clair River (339), Detroit River (61), and Niagara River (36). These islands include a mix of protected areas and private islands. Islands in the western Lake Erie basin have some of the highest biodiversity

values of all Great Lakes islands.

Lake Ontario
A total (Canada and U.S.) of 2,591 island polygons (including upper St. Lawrence River) were identified. Many of these islands have high threat index scores and long histories of recreational use (Table 1). One of the highest building point counts occurs for these islands. Few areas have been protected.

Pressures
By their very nature, islands are more sensitive to human influence than the mainland and need special protection to conserve their natural values. Proposals to develop islands are increasing. This is occurring before we have sufficient scientific information about sustainable use to evaluate, prioritize, and make appropriate natural-resource decisions on islands. Island stressors include habitat loss and fragmentation, invasive species, toxic substances, overharvest, and global climate change.

Management Implications
Based on the results of assessments of island values, biological significance, categorization, and ranking, the Binational Collaborative for the Conservation of Great Lakes Islands will soon recommend management strategies on Great Lakes islands to preserve the unique ecological features that make islands so important. The *Framework for Binational Conservation of Great Lakes Islands* will be completed in 2009. In addition, based on a threat assessment, the Collaborative will recommend management strategies to reduce the pressures on a set of Priority Island Conservation Areas (PICAs)—those island areas with high biodiversity values that face threats and are not yet adequately protected and thus will be the focus of conservation efforts.

Comments from the authors
The Great Lakes islands provide a unique opportunity to protect a resource of global importance because many islands still remain intact. The first gathering of Great Lakes island experts was in 1996 and led to publication of the first evaluation of island conservation value (Vigmostad 1999). The U.S. Fish and Wildlife Service's Great Lakes Basin Ecosystem Team (GLBET) provided leadership to coordinate and improve the protection and management of the islands of the Great Lakes. The GLBET island initiative includes the coordination and compilation of island geospatial data and information, developing standardized survey/monitoring protocols, holding an island workshop in the fall of 2002 to incorporate input from partners for addressing the Great Lakes Island indicator needs, and completion of a Great Lakes Island Conservation Strategic Plan.

A subset of the GLBET formed the binational Collaborative for the Conservation of Great Lakes Islands. Recently, the Collaborative received a habitat grant from the U.S. Environmental Protection Agency's Great Lakes National Program Office (GLNPO) to develop a framework for the binational conservation of Great Lakes islands. With this funding, the team developed:

- An island biodiversity assessment and ranking system (based on a subset of biodiversity parameters) that will provide a foundation to prioritize island conservation
- A freshwater island classification system
- A suite of indicators that can be monitored to assess change, threats, and progress towards conservation of Great Lakes islands biodiversity

To date, the Collaborative has proposed ten state, five pressure, and two response indicators. The suite of island indicators is still being evaluated, but will be reported on in future years. The information conveyed by a science-based suite of island indicators will help to focus attention and management efforts to best conserve these unique

and globally significant Great Lakes resources. The Collaborative is currently drafting the *Framework for the Binational Conservation of Great Lakes Islands*, which is expected to be released in 2009.

Assessing Data Quality

Insert "x" under the statement that best corresponds with each data characteristic

Data Characteristics	Strongly Agree	Agree	Neutral or Unknown	Disagree	Strongly Disagree	Not Applicable
1. Data are documented, validated, or quality-assured by a recognized agency or organization	X					
2. Data are traceable to original sources	X					
3. The source of the data is a known, reliable and respected generator of data	X					
4. Geographic coverage and scale of data are appropriate to the Great Lakes basin	X					
5. Data obtained from sources within the U.S. are comparable to those from Canada	X					
6. Uncertainty and variability in the data are documented and within acceptable limits for this indicator report	X					
Clarifying Notes:						

Acknowledgments

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Sources

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Ewert, D.N., M. DePhilip, D. Kraus, M. Harkness, and A. Froehlich. 2004. Biological ranking criteria for conservation of islands in the Laurentian Great Lakes. Final report to the U.S. Fish and Wildlife Service. The Nature Conservancy, Great Lakes Program, Chicago, Illinois. 32 p. & app.

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Additional Resources

U.S. Fish and Wildlife Service's Great Lakes Basin Ecosystem Team island website: http://www.fws.gov/midwest/greatlakes/gli.htm

Future Great Lakes Islands Collaborative website (in early stages of development): www.greatlakesislands.org

List of Tables

* Islands were grouped according to their Great Lakes coastal environment (Owens 1979). Coastal environments are based on relief, geology, fetch, wave exposure, ice conditions, and availability and transport of sediment. This report splits some larger islands (e.g., Manitoulin) into different zones to reflect distinctive coastal characteristics. The Great Lakes shoreline on the Canadian side was divided into 33 coastal environments. A similar method will be used to designate coastal environments for the U.S. islands.
Source: Nature Conservancy of Canada, Ontario Region

List of Figures

Figure 1. The first combined map of Canadian and United States islands of the Great Lakes.
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Last Updated

State of the Lakes Ecosystem Conference (SOLEC) 2008

Costal Environment	No. Individual Islands	No. Islands/ Complexes	Biodiversity Score		Threat Score	
			Mean	Range	Mean	Range
Georgian Bay 1	3992	595	85.2	0-345	1.3	0-65
Georgian Bay 2	17615	848	90.2	0-290	11.8	0-52
Georgian Bay 3	38	22	93.9	57-244	8.2	1-46
Georgian Bay 4	36	18	95.8	47-195	5.7	1-33
Georgian Bay 5	290	90	103.6	39-300	4.0	1-44
Georgian Bay 6	225	119	92.8	46-401	9.7	1-581
Lake Erie 1	0	0	0	0	0	0
Lake Erie 2	15	15	151.7	87-388	11.2	1-88
Lake Erie 3	2	2	92.5	91-94	1.0	1
Lake Erie 4	66	13	198.9	154-340	4.8	1-32
Lake Erie 5	2	2	90.5	87-94	2.0	1-3
Lake Erie 6	1461	30	203.4	81-333	9.7	1-41
Lake Erie 7	21	18	88.4	57-143	7.7	1-42
Lake Erie 8	17	4	144.5	96-164	2.3	1-6
Lake Huron 1	887	173	103.4	39-490	8.2	1-179
Lake Huron 2	31	19	85.0	57-137	3.4	1-22
Lake Huron 3	8	5	127.0	114-145	2.8	1-4
Lake Ontario 1	0	0	0	0	0	0
Lake Ontario 2	9	7	108.6	90-148	2.3	1-5
Lake Ontario 3	34	13	127.0	86-190	7.0	1-27
Lake Ontario 4	74	32	131.5	83-231	3.3	1-22
Lake Ontario 5	603	171	114.1	44-302	3.7	1-143
Lake Superior 1	167	117	84.6	39-290	2.2	1-25
Lake Superior 2	1228	459	81.2	37-288	2.0	1-40
Lake Superior 3	495	160	71.7	40-195	2.4	1-28
Lake Superior 4	77	28	97.2	57-253	3.3	1-26
Lake Superior 5	246	45	93.6	49-275	8.8	1-138
St. Clair 1	21	11	119.7	84-187	22.1	1-46
St. Clair 2	234	25	162.2	92-336	9.2	1-68
St. Clair 3	53	11	160.3	102-239	6.0	1-36
St. Clair 4	1	1	116	116	2	2
St. Clair 5	41	14	162.1	79-231	11.5	1-36
St. Lawrence 1	337	111	92.4	44-211	19.5	1-81

Table 1. Biodiversity and Threat Scores for Great Lakes Islands (Canada only), by coastal environment.

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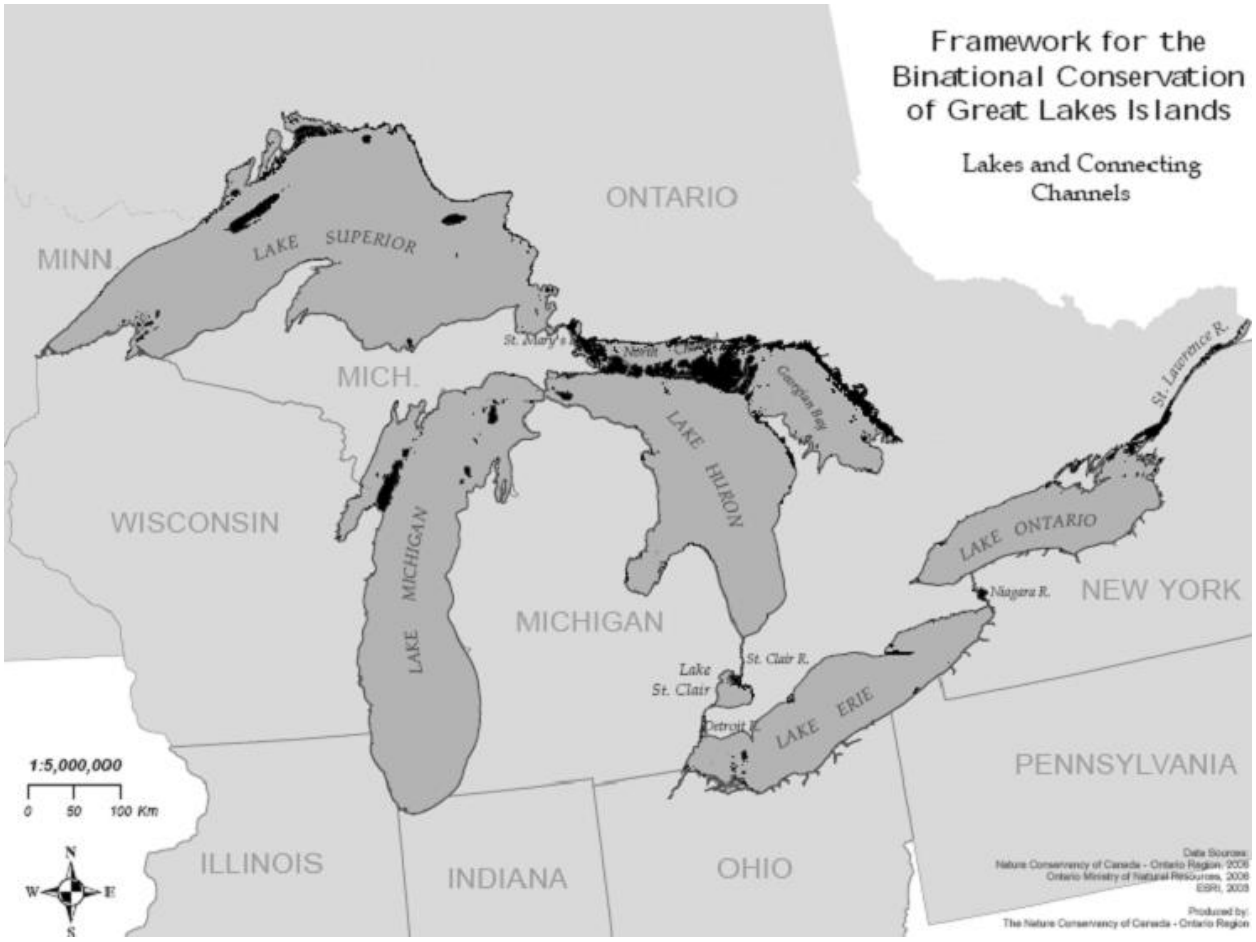

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