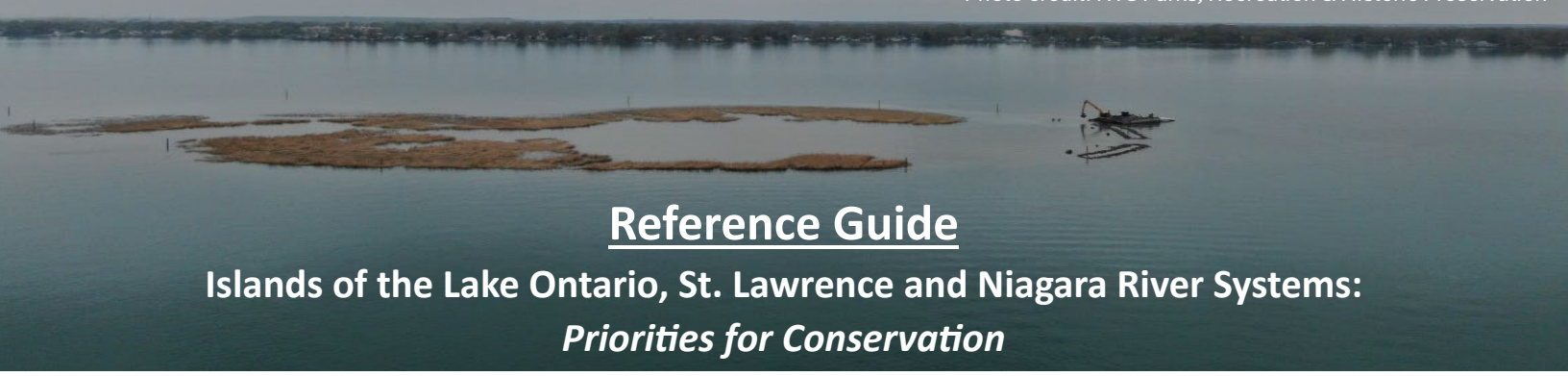


Reference Guide

Islands of the Lake Ontario, St. Lawrence and Niagara River Systems: *Priorities for Conservation*

Background

The Laurentian Great Lakes are home to the largest collection of freshwater islands in the world with approximately 32,000 islands.[1] These places hold significant environmental, economic, cultural, and historic significance. Ecologically, islands contain an important diversity of terrestrial and aquatic habitats, both on their interior, coastal fringes, and nearshore, which serve as key sites for reproduction, nursery/rookery, overwintering and other life stages. They serve as stepping-stones for some migratory species. As mainland areas face a deluge of developmental and climate stressors, islands may provide a refuge. Despite the importance of these features, islands tend to be overlooked in conservation discussions. There are few resources to guide conservation actions for Great Lakes islands and they often do not fit neatly within standard practices and processes. In response, the Great Lakes Coastal Assembly formed an Islands Conservation Workgroup in 2022. Among its first tasks, the Workgroup set forth to create five reference guides, one for each Great Lake. This is the reference guide for Lake Ontario and it includes the St. Lawrence River and Niagara River systems.

Purpose of this Document

To identify a **short list of priority islands** within the region to support protection, restoration, and/or conservation measures, including monitoring, research, habitat restoration and property protection (e.g., acquisition or landowner agreements). We hope this document will help **guide priority-setting** and **project identification** by agencies and organizations. It can serve as a **resource** to help support grant applications. Overall, we seek to **improve awareness** about sheer number, diversity, uniqueness, and importance of islands throughout the Great Lakes.

Main Duck Island. Photo credit: Terry Sprague, Queen's University.

Definitions[1]

Island: any land mass (natural or anthropogenic) within the Great Lakes or connecting channels that is surrounded by an aquatic ecosystem. Therefore, a particular island can be periodically connected to the mainland or part of a reef depending on water levels. Rock, shoals, shallow reefs and breakwaters can all be considered islands in this report.

Island Complex: a group of islands that function as a larger collective entity because of their proximity; each island in an island complex has island-specific biodiversity values, however groups of islands are linked to each other by ecological functions or species movements.

Prepared by the Great Lakes Coastal Assembly

www.greatlakescoastalassembly.org

The Region

The Lake Ontario system is defined as the lake proper plus its major inlets (Niagara River and Welland Canal) and outlet (St. Lawrence River). The St. Lawrence River portion includes the renowned Thousand Islands Region. Overall, there are an estimated 2,699 islands (Table 1) within this full geographic area.[1] Unfortunately, less than a quarter have enough compiled data for adequate assessment and comparison, so our recommendations are limited to islands where data exist.

Keewaydin State Park in the Thousand Islands Region, St. Lawrence River. Photo credit: Parks.NY.Gov

Table 1: Islands within the Lake Ontario, St. Lawrence River and Niagara River systems (Henson et al., 2010).

Subregion	Total # Islands	Total # Islands with Sufficient Data	Cumulative Area	
			Hectares	Acres
Niagara River/ Welland Canal	37	18	6,790	16,778
Lake Ontario	1,810	327	34,638	85,592
St. Lawrence River*	852	190	8,545	21,115
TOTAL	2,699	536	49,973	123,485

*Downstream extent: provincial border between Ontario and Quebec, Canada

Aerial photo of the Thousand Islands Bridge, St. Lawrence River. Photo credit: Anvilclous Photography/Flickr

Islands and Indigenous Peoples

Many islands throughout this region are the traditional, ancestral, and contemporary homelands or treaty lands of many diverse First Nations, Tribal Nations, Sovereign Nations, and Indigenous peoples who call this land home. Since time immemorial, Indigenous peoples have had their own levels of interest, place-based knowledge, and histories with the islands of the Lake Ontario and St. Lawrence River system. Indigenous peoples are owners and stewards of several islands in this region, and maintain the right to hunt, fish and gather on others. We acknowledge First Nations, Tribal Nations, Sovereign Nations, and Indigenous peoples as original and current stewards of the land and waters.

Prioritization Methodology

Though over a decade old, *Islands of Life: A Biodiversity and Conservation Atlas of the Great Lakes Islands*[1] remains the best compendium of information on Great Lakes islands. The study and its underlying source data were used as our baseline for priority island identification. As part of their process, the authors assembled data sets from across the region and scored individual islands for biodiversity and threat. The scored lists from *Islands of Life* are shown in Tables 2 and 3 and most are depicted geographically in Map 1 (below). Asterisks denote islands appearing in both lists. Experts familiar with the region from Canadian and U.S. federal governments, state and provincial agencies, Tribal Nations, First Nations, universities, non-profit organizations, and others were invited to review these lists, identify additional islands to highlight, and help identify conservation needs.

Disclaimer: These reproduced lists are intended as general guidance and are not absolute or exclusive. This does not imply unlisted islands are without value. Data availability generally favors larger islands with public lands. This document is not an official statement of any government or organization and does not obligate action.

Table 2: Top 10 Islands for High Biodiversity Value in Canada & United States (Henson et al. 2010)

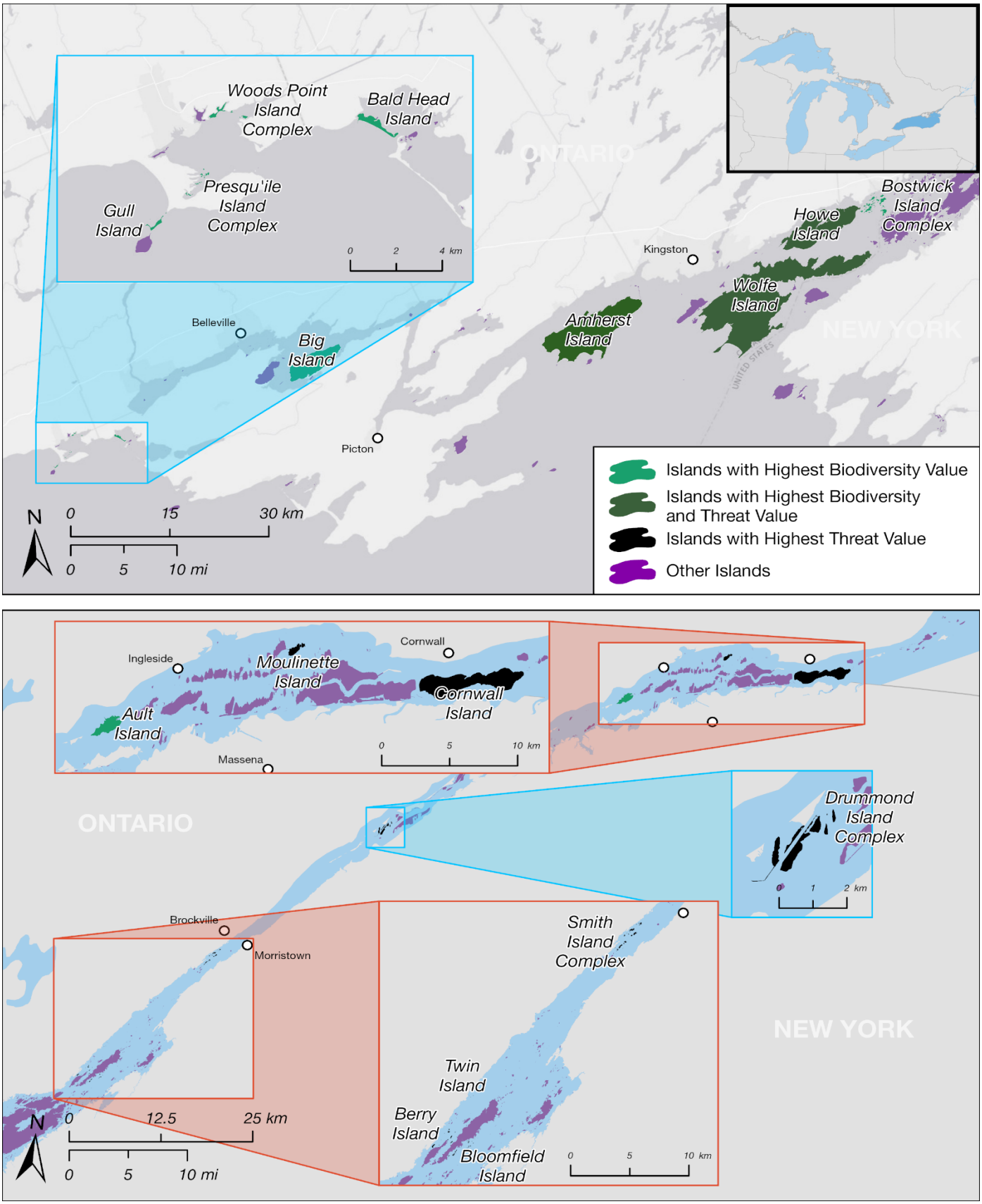
CANADA (Province of Ontario)	UNITED STATES (State of New York)
• Amherst Island*	• Barnhart Island*
• Ault Island	• Fox Island
• Bald Head Island	• Galloo Island*
• Big Island	• Grindstone Island*
• Bostwick Island Complex	• Hoveys Island*
• Gull Island	• Long Sault Island
• Howe Island*	• Murray Island
• Presqu'ile Island Complex	• Stony Island*
• Wolfe Island*	• Upper Niagara Islands Complex, incl. Grand Island*
• Woods Point Island Complex	• Wellesley Island*

The biodiversity score was a composite of 40 unique attributes related to species presence, diversity and distinctiveness (e.g., island size and isolation, rare species, habitat diversity, geology, shoreline diversity, etc.). Islands with high total biodiversity scores contain the greatest number and diversity of features (though this does not necessarily reflect condition). These islands may be good targets for protection activities.

The threat assessment included six unique attributes including buildings, invasive species, pits and quarries, proximity to mining claims, road density, and cropland. Province of Ontario islands received additional scores related to presence of beaches, boat launches, residential sites, invasive species, and more. Islands shown here have the highest total threat score (this does not necessarily reflect biodiversity value or condition). These islands may be good starting points for restoration activities.

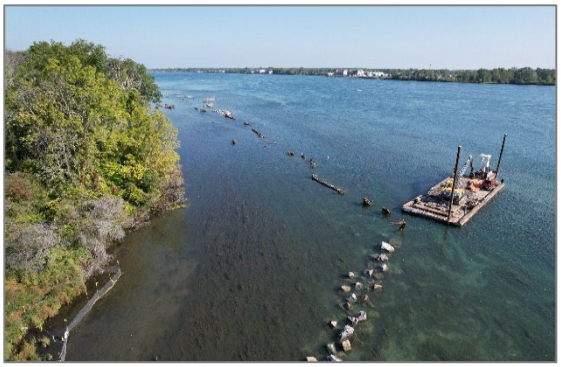
Table 3: Top 10 Most Threatened Islands in Canada & United States (Henson et al. 2010)

CANADA (Province of Ontario)	UNITED STATES (State of New York)
• Amherst Island*	• Barnhart Island*
• Berry Island	• Carlton Island
• Bloomfield Island	• Cayuga Island
• Cornwall Island	• Galloo Island*
• Drummond Island Complex	• Grenadier Island
• Howe Island*	• Grindstone Island*
• Moulinette Island	• Hoveys Island*
• Smith Island Complex	• Stony Island*
• Twin Island	• Upper Niagara Islands Complex, incl. Grand Island*
• Wolfe Island*	• Wellesley Island*



Map 1. Priority islands for conservation. Top Image: Islands of northeast Lake Ontario and the entry to the St. Lawrence River. Bottom Image: Islands in a portion of the St. Lawrence River. Maps courtesy of Ontario Nature. Not shown: upper Niagara River.

Case Study: Not Making Waves on Grand Island The New York State Department of Environmental Conservation manages Spicer Creek Wildlife Management Area, on the east shoreline of Grand Island, in the Niagara River. Historically, this area's coastal wetland and nearshore waters provided shelter, foraging, and spawning habitat for native fish and wildlife species. Loss and degradation of habitat was driven, in part, by persistent wave forces from boat wakes, which prevented habitat re-establishment through natural ecological processes. To restore island habitat, offshore stone berms were constructed to attenuate waves while allowing river flow into the area. Large logs were secured within the nearshore area to provide underwater and surface-level habitat. Aquatic vegetation has increased, and the Spicer Creek WMA shoreline and nearshore waters are supporting a vibrant, diverse community of native plants, fish, and wildlife, including Osprey, Common Tern, Muskellunge, and more.



Grand Island shoreline wave attenuation project.

Grand Island. Photo credits: New York State Department of Environmental Conservation (above right), Veronica Davies (bottom).

Discussion

Islands throughout this region are known to contain a range of aquatic, transitional, and terrestrial plant communities, including some containing plant and animal species that are locally, regionally, or globally imperiled or on the edge of their natural ranges. Islands are known to have a disproportionate number of rare species relative to their small size. Some contain disjunct populations. Islands are particularly important for colonial waterbirds, migratory neotropical birds, freshwater mussels, fish, bats and other mammals, herpetofauna (amphibians, turtles and snakes), and insect pollinators including native bees and monarch butterflies.

Rocky summit grasslands, a rare community type, on Wellesley Island, NY. Photo credit: New York Natural Heritage Program.

Many islands serve as 'stepping-stones' for fauna crossing the water either locally or at the Algonquin to Adirondacks regional scale.[2] As climate change is expected to alter everything from mainland habitat quality to winter ice cover, the importance of these islands as refugia and migratory stepping-stones may increase proportionally.

The coastal fringe and shallow nearshore aquatic zone around islands include important wetland, reef, and other habitats which provide shelter and foraging to fish, amphibian, and reptiles at crucial reproductive stages. Even artificial (man-made) islands have been shown to provide ecosystem functions and value, sometimes sheltering different species assemblages than natural islands or mainland areas.[3]

Amherst Island. Photo credit: Ducks Unlimited Canada.

Though many offshore islands appear untouched, they are not without threat. Invasive species can find their way to even the most remote island.

Several islands appear on both the Table 1 (biodiversity) and 2 (threatened) lists. These are often inhabited islands, which face a balancing act of moderating development and protecting biodiversity. Amherst Island, for example, is a place of rich biodiversity, but also rising land prices and development pressure. These islands are of the utmost importance because they contain valuable attributes which warrant conservation but also face loss or diminished quality of those attributes.

Case Study: Building landscape resiliency on Wolfe Island

Wolfe Island, south of Kingston, Ontario, is the largest of the Thousand Islands and marks the point where Lake Ontario ends, and the St. Lawrence River begins. Conservation partners are working to establish and then expand nodes of conservation land to connect natural areas, enhance landscape resiliency, and prevent development from impacting natural heritage features on Wolf Island. Known for its rural landscape – now punctuated by a network of wind turbines – the island has rich biodiversity, much of it unprotected. Big Sandy Bay is its most notable natural area, with close to 1,000 acres protected over the years through a variety of partners, including Ducks Unlimited Canada, the Ontario Provincial Government and the Nature Conservancy of Canada (NCC). Acquisition funding came in part via the Eastern Habitat Joint Venture of the North American Waterfowl Management Plan. A landscape of beaches, wetlands and dunes, this secluded habitat and popular day-use area was once over-run and damaged by trespassing all-terrain vehicles. NCC is working with partners to invest time and resources in conservation efforts on the island, with a recent successful acquisition just north of Big Sandy Bay. Staley Point is an 82-acre nature reserve featuring meadows, woodlands and wild coastline. NCC staff and volunteers are committed to managing the property as an exemplary natural area, including invasive Phragmites control and future field restoration. Recent conservation efforts aim to connect Big Sandy Bay with Button Bay – located next to the international ferry to Cape Vincent, New York, to build connectivity and resiliency.

Photo credits: Nature Conservancy Canada.

There are additional islands which are now known to be critically important for certain species but do not appear in the earlier tables, due to the methodology and outdated data used in *Islands of Life*[1] over a decade ago. For example, recent restoration activities on the islands in the Lakeview Wildlife Management Area (along the eastern shore of Lake Ontario in New York State) will benefit a wide range of species including northern pike, American eel, black tern, and piping plover.

Gull Island in Presqu'ile Provincial Park.
Photo credit: Chris Grooms, Queen's University

Similarly, small islands and shoals, including those that shrink, expand or even disappear with fluctuating Great Lakes water levels, are often data-limited and lack a diversity of habitat types, thus not scoring high in typical biodiversity metrics. Some appear on maps but are not officially named. Island complexes, or clusters of small islands occurring in proximity, may cumulatively offer unique benefits for population expansion and species movement. Maintaining these small pockets of habitat - even those ephemeral islands that "blink on and off" over time - is an important consideration for conservation. These sites also provide aesthetic and other benefits, and thus deserve additional attention and recognition in conservation decision-making.[4]

Some islands provide a variety of uses and values. Not unlike locations on the mainland, property owners, managers or users may prescribe different, even conflicting, values for islands. As an example, Little Galloo Island is valued by birders as a critical site for terns, gulls, and other colonial nesting waterbirds; it consistently supports one of the largest nesting colonies in the entire Great Lakes. However, certain species, such as double-crested cormorants, have been viewed as a nuisance by some users, when in abundance. Managers must sometimes make trade-offs when determining how to manage islands.

Future Needs/Call to Action

Islands in this region are of variable size and condition. They are distant, geographically scattered and often ephemeral, changing with their surrounding environment. The unique nature of islands necessitates a different approach. Islands in this region would benefit from the following:

- **Data** - Additional monitoring is needed to better characterize all islands (both biodiversity condition and threat level) and to observe trends over time. Most islands lack even rudimentary data. Where island data do exist, it is typically limited or outdated. More information on private islands is needed.
- **Differentiation of island types** - Islands come in different shapes/sizes and serve different functions. Classification of islands by geomorphic type or other attribute(s), e.g., shoals, rookery islands, forested islands, could lead to better prioritization and comparison.
- **Protected status** - The *Islands of Life* study[1] sought to estimate the percentage of islands under some form of protection (e.g., parks, preserves, easements). However, the multiple data layers used in this study led to unprecise estimates. Refining this process to identify gaps in protected areas may be useful for acquisition or other protection activities.
- **Funding/resources** - Work on islands is often costlier compared to the mainland, however the return on investment can be high.
- **Consideration of contaminants** - Islands are not immune to the impacts of toxic chemicals including both legacy and emerging contaminants. Past and present sources include spills, permitted releases, and natural chemical loads from throughout the Lake Ontario watershed. Conservation and research efforts

associated with Lake Ontario islands should consider contaminants as part of site selection and remediation prioritization.

- **Outreach and education** - Awareness about islands is poor among mainland decision-makers and the public. Island citizens tend to be more aware of their unique homes, however the diverse mix of year-round residents, seasonal cottagers and transient visitors requires special messaging.
- **Coordination** - Management at the Great Lakes scale necessarily involves broad biogeographical, cross-jurisdictional considerations. There is always the need for improved collaboration and alignment among governments (at all levels) and organizations working on this shared, interconnected resource. Additionally, Indigenous peoples and local citizens often have a close connection to islands and should be an integral part of decision-making processes.

For More Information

There are governments at multiple levels within the United States, Canada, and the Sovereign Indigenous Nations with direct interests in islands. There are also land conservancies and other nongovernmental organizations, universities, and others who can provide more localized information on specific islands. Many of these groups have their own plans and strategies for prioritizing conservation, restoration, or protection work. Key large-scale planning initiatives include the programs under the Great Lakes Water Quality Agreement[5] (including the Lake Ontario Lakewide Action and Management Plan); Key Biodiversity Areas of Canada[6]; and the Lake Ontario Biodiversity Conservation Strategy[7]. Some islands are part of special designations like national parks, marine sanctuaries, or biosphere reserves. Consult with the entities in your area to learn more about how you can support island conservation in the Lake Ontario–St. Lawrence River system.

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[3] Maynard, D., Boston, C.M. & J.D. Midwood. 2022. Fish community structure varies by location and presence of artificial islands: a case study in Hamilton Harbour, Lake Ontario. Environ Biol Fish 105, 1557–1573. https://doi.org/10.1007/s10641-022-01348-z

[4] Knutson, M.G., Leopold, D.J. & Smardon, R.C. Selecting islands and shoals for conservation based on biological and aesthetic criteria. Environmental Management 17, 199–210 (1993). https://doi.org/10.1007/BF02394690

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[6] See https://kbacanada.org

[7] See https://www.epa.gov/greatlakes/lake-ontario

Citation Information

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St. Lawrence River Thousand Islands. Photo credit: visit1000islands.com