

COMMENTARY

The Great Lakes Way: A Case Study of Connecting People to Natural Resources and Expanding Ecotourism

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ABSTRACT

The United States and Canada have promoted using an ecosystem approach in protecting and restoring the North American Great Lakes for over 40 years. Building on this foundation, the Community Foundation for Southeast Michigan and partners have applied a similar approach in creating a 240-km interwoven set of water trails and greenways in metropolitan Detroit, Michigan, USA called the Great Lakes Way. Five-year accomplishments identified in this case-based reflection include: a Great Lakes Way Advisory Committee serving as a boundary organization, a consensus vision map, signed collaboration agreements with 45 communities/trail stakeholders, an increase in the total number of usable and funded greenways from 167 km in 2020 to 199 km in 2024, a Memorandum of Understanding between U.S. and Canadian trail organizations to foster transboundary trail tourism, and estimated annual economic benefits of \$3.75–5 billion USD. Key case study insights that have helped advance this trail initiative include: 1) facilitating stakeholder agreement on a compelling vision; 2) building capacity; 3) empowering a boundary organization to collaborate on a common goal; 4) co-generating of knowledge and solutions; and 5) practicing adaptive resource management. Remaining challenges include sustaining meaningful community engagement, ensuring long-term funding, monitoring user attitudes/behaviors, and supporting research that strengthens and sustains this boundary organization and science-policy-management linkages.

Keywords: Ecosystem Approach; Greenways; the Great Lakes Way; Boundary Organization

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1. Introduction

Between 1800 and 2020, human connection with the natural world has declined by more than 60%, driven by urbanization, concomitant loss of nature experiences, and environmental degradation^[1]. Greenways help connect people with nature^[2–4], but also increase transportation options, encourage outdoor recreation and healthy lifestyles, catalyse economic revitalization, increase adjacent land values, celebrate culture, honor history, nurture conservation and environmental literacy, expand ecotourism, increase cultural tourism, strengthen an outdoor recreational economy, and improve quality of life^[5–7]. Improving access to nature can, in turn, help develop an ecosystem stewardship ethic^[8–11].

Metropolitan Detroit, Michigan, USA, is considered

the “automobile capital of the United States” with a population of approximately 4.8 million people. It is centrally located in the North American Great Lakes, which represent 21% of the world’s surface freshwater. Its international waters (shared with Canada) stretch from the beginning of the St. Clair River, where Lake Huron empties into it, through the St. Clair River, Lake St. Clair, and the Detroit River, and discharge into western Lake Erie (**Figure 1**). This water corridor also receives water input from seven major tributaries on the U.S. side, including the Black, Pine, Belle, Clinton, Rouge, and Huron rivers, as well as the River Raisin. The entirety of the upper Great Lakes waters, including Lakes Superior, Michigan, and Huron, flow through this water corridor and empty into the lower Great Lakes (i.e., Lakes Erie and Ontario).

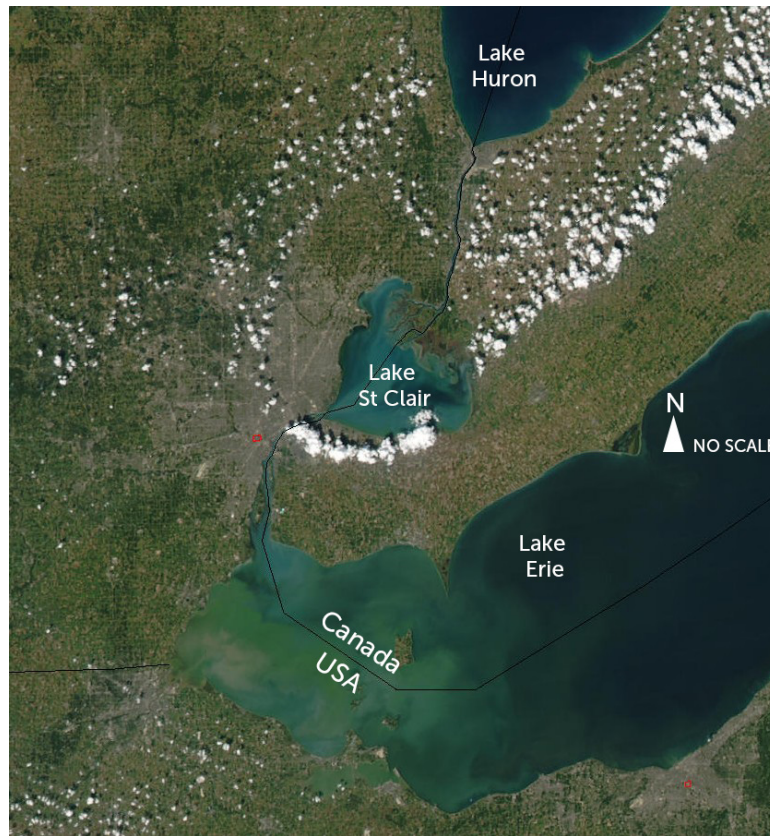


Figure 1. A satellite map of the geographic extent of the study area stretching from southern Lake Huron to western Lake Erie.

Source: NASA.

These waters supply potable water to millions of people, support agricultural and industrial operations, facilitate shipping (e.g., this corridor is an integral part of the 3,700-km Great Lakes-St. Lawrence Seaway System that supported

\$36 billion USD in economic activity in 2022^[12]), offer year-round outdoor recreation, and enrich the quality of life for denizens. **Table 1** presents selected examples of this corridor’s exceptional water resource features.

Table 1. Examples of exceptional water resource features within the study area stretching from southern Lake Huron through western Lake Erie.

Resource	Description
Water	- Corridor water resources are part of the Traditional Territory of the Three Fires Confederacy, which comprises the Ojibway, Odawa, and Potawatomi Peoples, as well as many other First Peoples (the Anishinaabe, Haudenosaunee, Lunaapee, and Huron/Wendat Peoples). 63-km St. Clair River* is a connecting water body between southern Lake Huron* and Lake St. Clair*, and has three major tributaries (i.e., 130-km Black River, 64-km Pine River, and the 119-km Belle River). 111,369-ha Lake St. Clair receives water from the St. Clair River and other tributaries and empties into the Detroit River*, and the 134-km Clinton River is its major tributary. 51-km Detroit River is a connecting water body between Lake St. Clair and Lake Erie*, and has the 203-km Rouge River as its major tributary. - Lake Erie is part of the fourth largest of the Great Lakes by surface area, and the shallowest, warmest, and most biologically productive of the five Great Lakes, and its western basin has two major Michigan tributaries—the 209-km Huron River and the 224-km River Raisin.
Biological-Ecological	- Detroit Bird Alliance has identified over 350 species of birds in the corridor^[13] - This corridor is situated at the nexus where the Atlantic and Mississippi Flyways, with 30 species of waterfowl utilizing it and more than 300,000 diving ducks stopping over during winter migration to feed on wild celery (<i>Vallisneria americana</i>)^[13]. - St. Clair Flats is recognized as one of the most expansive freshwater deltas in the world, offering vital stopover habitats for migratory birds. - National Audubon Society has identified four Important Bird Areas in the corridor. - Scientists have identified 113 species of fish using the corridor^[13]. - Detroit River wetlands play a crucial role in supporting the fish community, providing spawning areas for 26% of Great Lakes fishes^[13]. - The continentally significant biodiversity of the Detroit River and western Lake Erie is recognized in: the North American Waterfowl Management Plan as a waterfowl habitat area of major concern; the United Nations Convention on Biological Diversity; the Western Hemispheric Shorebird Reserve Network as a Regional Shorebird Reserve; and as a U.S.-Canada Biodiversity Investment Area^[13]. - This corridor has a plethora of species at risk, including 12 mollusks, 25 fishes, 26 insects, 4 amphibians, 15 reptiles, 37 birds, 6 mammals, and 172 plants^[14]. - St. Clair Flats on the Ontario side of the St. Clair River*, Point Pelee National Park on Ontario's portion of western Lake Erie, and Humbug Marsh on the Michigan side of the lower Detroit River are designated as "Wetlands of International Importance" under the international Ramsar Convention. - The Detroit River and western Lake Erie are part of the Detroit River International Wildlife Refuge, which has the distinction of being the continent's only international refuge and one of 14 priority urban national wildlife refuges in the United States charged with expanding nature experiences in everyday city life^[13].
Recreational	- The lower Detroit River is nationally recognized for its raptor migrations, including 23 species; as many as 100,000 of these birds of prey have been counted by citizen scientists in a single fall day^[13]. - According to Ducks Unlimited, metropolitan Detroit, including the lower Detroit River and western Lake Erie, is one of the top ten metropolitan areas in the United States for waterfowl hunting. 27 southeast Michigan and southwest Ontario sites along Lake St. Clair, Detroit River, and western Lake Erie have been identified as exceptional birding locations in a ByWays to FlyWays Bird Driving Tour Map^[13]. - The St. Clair River is well-known for its world-class lake sturgeon (<i>Acipenser fulvescens</i>) fishery. - Lake St. Clair offers world-class muskellunge (<i>Esox masquinongy</i>) fishing because of its warm, shallow waters, abundant prey fishes, and ideal habitats. - Lake St. Clair is the focus of a regional Blue Economy initiative led by Macomb County and many partners to boost economic development, tourism, and quality of life through sustainable use and stewardship of its water resources. - The Detroit River has an internationally acclaimed sport fishery, supported by the annual spring migration of an estimated 10 million walleye (<i>Sander vitreus</i>) from Lake Erie into the Detroit River to spawn^[13]. - Detroit River and Lake Erie are recognized as the "Walleye Capital of the World," offering annual international fishing tournaments that award up to \$1 million USD in prize money^[13]. - Lake Erie yellow perch (<i>Perca flavescens</i>) and walleye fisheries have received Marine Stewardship Council certification for sustainable practices, helping sustain the prized sport fishery. - The Detroit River holds the distinction of being the only North American river to receive both American and Canadian Heritage River designations.

Note: * Shared water resources with Canada.

In response to the growing public interest in non-motorized transportation, the Community Foundation for Southeast Michigan launched its GreenWays Initiative in 2001 to help create a connected system of public green spaces^[15]. This initiative was the first such undertaking of its kind in the United States to raise money from the foundation and private sectors to help municipalities plan, design, finance, and build a connected system of public green spaces across southeast Michigan^[16].

Building on the GreenWays Initiative's success, the Community Foundation wanted to expand the collaborative work within the public, private, foundation, and nongovernmental sectors to connect more people to these natural resources. In response, the Community Foundation and many partners established the Great Lakes Way in 2019—an interconnected set of water trails and greenways stretching from Port Huron, Michigan, on southern Lake Huron to Toledo, Ohio on western Lake Erie. This commentary presents a case-based reflection on applying an ecosystem approach in developing the Great Lakes Way, drawing on institutional data, surveys, and reports. It also distills program insights and highlights remaining challenges.

2. Ecosystem Approach Framework

For more than four decades, an ecosystem approach has been a fundamental principle and cornerstone of U.S. and Canadian efforts to restore and protect the physical, chemical, and biological integrity of the Great Lakes^[17, 18]. It is a widely accepted holistic management framework that integrates ecological, economic, and social factors in managing human activities within ecosystems, prioritizing sustainability, conservation, and equitable use of resources for present and future generations^[19]. Further, it is consistent with a socioecological system approach that analyses the interactions between humans and nature, and recognizes the importance of local community involvement and local knowledge consideration^[20].

At the outset of its use in the Great Lakes basin, it was considered a paradigm shift where humans were no longer viewed as disconnected from the environment, but an integral part of the ecosystems within which they live^[21]. Further, in contrast to historical environmental management that practiced centralized, autocratic decision-making, an ecosys-

tem approach championed democratic decision-making and co-generating knowledge and solutions for restoring and sustaining ecosystem integrity and health^[22]. In the Great Lakes basin, an ecosystem approach has evolved from a concept model and aspirational goal of environmental and resource managers to an actionable science-based management framework that brings stakeholders and rightsholders together, builds or strengthens capacity, co-generates knowledge and solutions, and practices adaptive resource management – a structured approach of assessing resource status, setting management priorities, and implementing management actions in an iterative process for continuous improvement^[22].

Under the auspices of the Canada-U.S. Great Lakes Water Quality Agreement and the International Joint Commission, the Great Lakes Water Quality Board identified priority pollution hotspots called Areas of Concern, and the federal, state, and provincial governments agreed to develop and implement comprehensive remedial action plans to restore all impaired beneficial uses following a community-based ecosystem approach^[23]. Over the course of 35 years, starting in 1985, a total of \$22.78 billion USD was spent on restoring all 43 Areas of Concern^[22].

Factors deemed important in the use of an ecosystem approach in restoring these Areas of Concern include:

- Reaching stakeholder agreement on a vision for the desired future state of the ecosystem;
- Establishing a multi-stakeholder process that ensures collaborative learning;
- Building capacity, including skills, abilities, processes, and resources;
- Ensuring strong collaboration among monitoring, research, and management programs;
- Practicing adaptive resource management; and
- Performing periodic ecosystem health assessments and celebrating progress, including ecosystem, community, and economic benefits^[22].

Experience through 40 years of restoring Great Lakes Areas of Concern has shown that there was no universal way of applying an ecosystem approach; rather, 43 locally designed approaches were developed, which helped bring stakeholders together around a common goal, foster collaborative learning, participate in science-based decision-making, and ensure local ownership of the remedial action plans^[24].

It must be recognized that the Great Lakes Way was built on this more than four-decade foundation of operationalizing an ecosystem approach in Great Lakes management.

3. Great Lakes Way Collaboration and Progress

Detroit has a long history of cycling, dating back to the late 1800s, when bicycling was an important mode of transportation (**Table 2**). With the expanded development of automobiles, bicycling interest and funding stagnated^[25]. Then, starting in the 1970s, interest in non-motorized transportation began growing again.

For more than three decades, Metropolitan Detroit communities were unable to meet the monetary match requirements for federal and state greenway grants. Parks, recreation, and greenways ranked low in city priorities, and, as a result, local governments could not fulfill federal and state match funding requirements for greenway grants. The Community Foundation addressed this issue by securing \$30 million from the private and foundation sectors for its GreenWays Initiative, which enabled the construction of additional trails and the realization of their numerous benefits. Over the course of this initiative, funds raised grew to \$35 million, which leveraged an additional \$150 million to construct more than 160 km of greenways^[16].

Table 2. History of greenway trails in metropolitan Detroit, Michigan (modified from Scott and Gell^[25]).

Time Period	Highlights of Greenway Activities
1970s	• Detroit studied non-motorized transportation and advocated for riverfront parks connected by greenways.
1980s	• A national Rails-to-Trails Conservancy was set up in 1986 to transform abandoned rail lines into multi-use trails across the country. • Michigan Rails-to-Trails Field Office established in 1989.
1990s	• Southeast Michigan Greenways Initiative established in 1990 to build a regional trail network. • St. Clair County's Bridge to Bay Trail originated in the early 1990s. • The City of Detroit's 1994 land use plan included greenways as one of five key elements critical for city redevelopment. • Rails-to-Trails Conservancy and National Park Service released <i>A Vision for Southeast Michigan Greenways</i> in 1998. • Greater Detroit American Heritage River Initiative was established by Presidential Executive Order in 1998, championing linked riverfront greenways as one of its five priorities. • Southwest Detroit Riverfront Greenway Project published <i>Detroit's New Front Porch</i> in 1999. • Downriver Linked Greenways Initiative was founded to create a more than 160-km network of greenways traversing 21 Downriver communities in 1999.
2000s	• The Community Foundation launched its GreenWays Initiative to build a regional network of greenway trails in 2001. • The City of Detroit created a new riverfront vision in 2002. • Detroit Riverfront Conservancy was established to create a world-class waterfront gathering place for all called the Detroit Riverwalk in 2003. • Detroit Greenways Coalition formed in 2007.
2010s	• River Raisin Heritage Trail established in 2011. • Iron-Belle Trail announced in 2012. • Dequindre Cut opened in 2016. • Detroit Greenways Coalition developed a 50-year greenway vision in 2016. • Huron Waterloo Pathways Initiative established in 2016. • Detroit's Joe Louis Greenway announced in 2017. • Ralph C. Wilson, Jr. Foundation's Parks and Trails Initiative launched in 2018 with a \$200 million commitment that has grown to more than \$350 million, resulting in over \$1 billion in completed and in-progress parks and trails projects in southeast Michigan and western New York. • Monroe Area Loop Trail established in 2019. • The Community Foundation for Southeast Michigan, along with many partners, launched the Great Lakes Way in 2019.
2020s	• Monroe County Cornerstone Bike Route established in 2021.

Table 2. *Cont.*

Time Period	Highlights of Greenway Activities
2020s	• The Trans Canada Trail, the Waterfront Regeneration Trust (representing the Great Lakes Waterfront Trail in Canada), the State of Michigan (representing the Iron-Belle Trail), and the Community Foundation (representing the Great Lakes Way) signed a memorandum of understanding for collaboration on transboundary trail experiences in 2022. • The \$80 million USD Ralph C. Wilson, Jr. Centennial Park opened along Detroit Riverwalk in 2025. • Gordie Howe International Bridge will open in 2026, uniting Windsor and Detroit's trail systems through a multi-use path on the bridge.

Building upon the foundation of the GreenWays Initiative, the Community Foundation established a Great Lakes Way Advisory Committee to serve as a boundary organization (i.e., an entity that acts as a bridge between different groups, facilitating communication and collaboration by translating knowledge and perspectives between them, allowing them to work more effectively on shared goals) in 2019. This advisory committee was made up of major trail stakeholder groups in the region, including representatives of the City of Detroit, the Community Foundation, Detroit Greenways Coalition, Detroit Riverfront Conservancy, Downriver Linked Greenways, Friends of the Detroit River, Huron Clinton Metropolitan Authority, International Wildlife Refuge Alliance, Macomb County, Michigan Department of Natural Resources, Michigan Trails and Greenways Alliance, Monroe County, National Park Service, Motor Cities National Heritage Area, National Wildlife Federation, PEA Group, Ralph C. Wilson, Jr. Foundation, St. Clair County, Southeast Michigan Council of Governments, Wayne County Parks, and the Wyandot of Anderdon Nation.

The advisory committee's charge was to inventory existing greenways and water trails along the corridor, identify gaps and missing trail segments, prepare brief descriptions of each greenway or water trail, work with initiative staff and committee members to prepare a vision map, and identify potential strategies for working with city, state, and federal governments, the philanthropic sector, nongovernmental organizations, and the private sector to fill trail gaps and achieve long-term trail sustainability. Through this initiative, priority was intentionally placed on:

- Acknowledging the important work of local trail organizations, articulating the benefits from being part of a larger trail system, and ensuring they did not lose their sense of local identity;

- Building on the foundation of existing assets and programs;
- Ensuring equitable trail access; and
- Raising public awareness of the Great Lakes Way.

This advisory committee developed a consensus vision that states "all residents and visitors of southeast Michigan are connected to and benefit from world-class freshwater, wildlife, recreation, and heritage right in our backyard through a Great Lakes Way" and a vision map to help illustrate the vision and extent of the Great Lakes Way^[16] (**Figure 2**).

To promote the Great Lakes Way, a vigorous outreach and marketing effort was put in place at the commencement of this initiative. Branding was promoted via the creation of a logo, marketing materials, infographics, a website, and social media platforms. In addition, an interactive trail map (maps.semcog.org/GreatLakesWay/) with local historical, cultural, and ecological points of interest was developed and is hosted by the Southeast Michigan Council of Governments—a regional planning partnership (i.e., federally-mandated and state-recognized Metropolitan Planning Organization) of local governments, serving 4.8 million people in the seven-county metropolitan Detroit region.

To ensure acceptance of the Great Lakes Way by citizens in the many communities along the route, focus group sessions were set up in each county. Critical suggestions, feedback, and overwhelming support resulted from these sessions. In addition, 45 communities and other stakeholder groups signed a collaboration agreement pledging support for the Great Lakes Way, demonstrating capacity building. Further, this initiative has served as a crucible for learning about how greenway and water trail stakeholders can work together to promote reconnecting people with natural resources and reaping its many benefits.

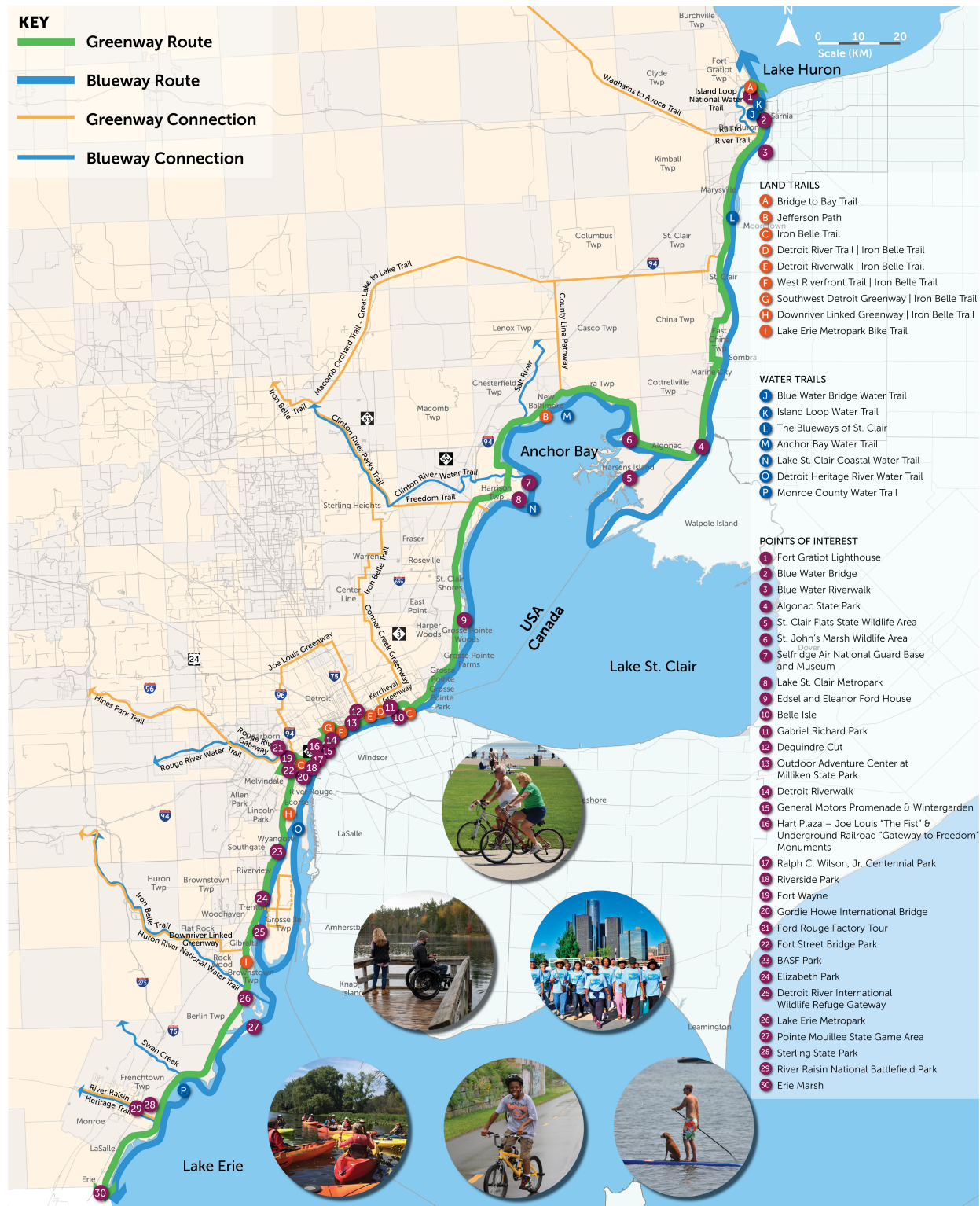


Figure 2. The Great Lakes Way vision map developed by the Great Lakes Way Advisory Committee.

Source: Community Foundation for Southeast Michigan.

At the outset of the planning effort in 2020, local counties, townships, cities, and non-profit trail organizations were engaged to compile an initial inventory identifying existing

greenways and water trails^[16]. The most accurate data available were utilized to establish existing routes, desired trail alignments, and any significant route gaps.

These Geographical Information System (GIS) data were compiled from the Southeast Michigan Council of Governments (which serves as the Metropolitan Planning Organization for transportation in Southeast Michigan) to create preliminary trail maps. Finally, the project team verified all of the greenway routes and gaps through field visits^[16].

Utilizing the data collected through site research, GIS data, and community non-motorized plans, one overall route was developed. The final alignment was broken down into four categories: existing routes that are safe and comfortable for the majority of users, partial connections that provide either completed code-compliant pedestrian or bicycle connections, but not both, planned routes that had not been constructed yet, and trail gaps.

In the spirit of adaptive management, this survey was again repeated in 2024 to identify more efficient routes, measure progress, and make any necessary mid-course corrections or changes since the initial survey. As a result:

- The water trail is now complete, with additional kayak

launch points identified for future construction.

- The total length of the greenway trail increased from 257 km in 2020 to 268 km in 2024 (**Table 3**), resulting from work with the stakeholder groups and communities that identified more efficient routes.

A comparison of these data from the two greenway surveys revealed that 65% of the trails were usable (i.e., existing routes that are safe and comfortable for the majority of users plus partial connections that provide either completed code-compliant pedestrian or bicycle connections, but not both) in both 2020 and 2024 (**Table 3**). However, the total trail kilometers completed (i.e., existing routes that are safe and comfortable for most users) increased from 98 in 2020 to 130 in 2024. The survey also identified an additional 13 km of trails that received funding for construction by 2024. Therefore, the total number of usable and funded greenways (including alternate routes) increased from 167 km in 2020 (65%) to 199 km in 2024 (74%), demonstrating considerable progress in completing the Great Lakes Way (**Figure 3**).

Table 3. A comparison of greenway trail development for the Great Lakes Way, 2020 and 2024.

Greenway Trail Category	Trail Status in 2020	Trail Status in 2024
Existing routes that are safe and comfortable for the majority of users	98 km	130 km
Partial connections that provide either completed code-compliant pedestrian or bicycle connections, but not both	69 km	45 km
Trail gap, but planned	63 km	51 km
Trail gap, planned and funded	0	13 km
Trail gap with no plan or funding	27 km	18 km
Alternate trail routes	0	11 km
Total	257 km	268 km

In addition, progress has also been made in extending greenways inland from the Great Lakes Way through Monroe County's Cornerstone Bicycle Route, Downriver Linked Greenways, the Joe Louis Greenway, the Southwest Greenway of the Detroit Riverfront Conservancy, and more. The total investment in greenways during 2019–2024 was not available. However, for projects reporting cost data, more than \$136 million USD was raised for greenway projects over the five years, with the majority by the Detroit Riverfront Conservancy for the Detroit Riverwalk (\$100 million USD). Many of these projects have been supported by the Ralph C. Wilson, Jr. Foundation's Parks & Trails Initiative.

Research has shown that several potential social and environmental risks are associated with increased ecotourism

and recreational use (e.g., equity of access, user conflicts, localized ecological pressures)^[26]. From the outset, this initiative has promoted equitable access. Meaningful community engagement, followed by acting on stakeholder recommendations, is critical to achieving equity. For example, in designing the Detroit Riverwalk, hundreds of community stakeholder meetings, surveys, and interactive workshops were held to ensure the Riverwalk reflected the needs and desires of residents. Residents were able to see, first-hand, how their input was reflected in the final construction. As a result, stakeholder satisfaction is high, culminating in USA Today naming the Detroit Riverwalk the No. 1 riverwalk in the United States in 2021–2023. This approach is being promoted throughout the entire extent of the Great Lakes Way.

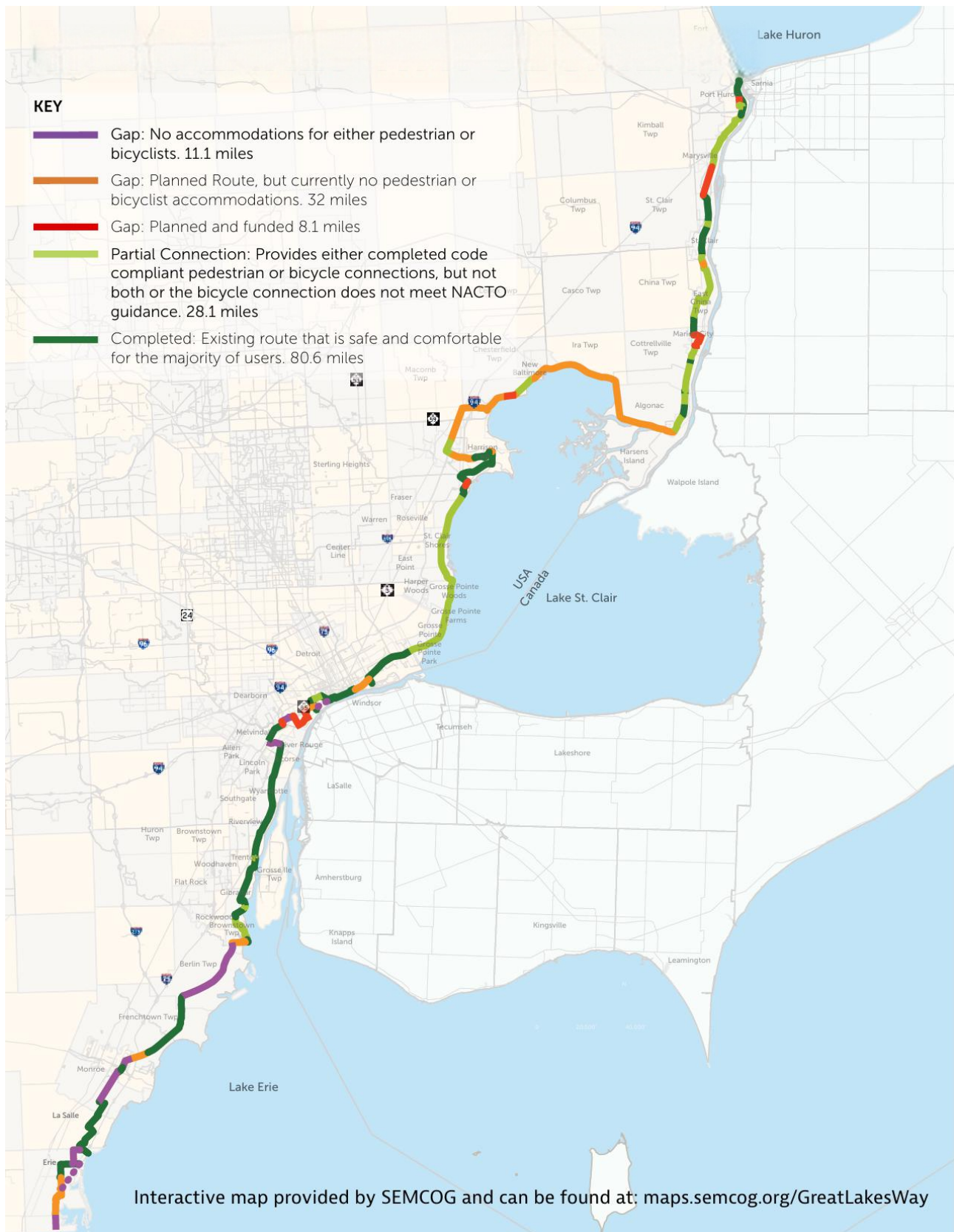


Figure 3. Status of completion of greenways of the Great Lakes Way, 2024.

Source: Community Foundation for Southeast Michigan.

User conflicts can also be a major problem on trails^[27]. This initiative has worked to involve users early in the process, understand user needs, identify sources of conflict, work with affected users to address them, facilitate positive interaction among different users, and perform routine monitoring of effectiveness.

To address potential ecological pressures, the trail route was specifically designed to help protect sensitive wetlands and threatened and endangered species. Further, the Great Lakes Ways has promoted: involving natural resource management agencies early in trail design discussions to advocate for habitat and biota; establishing quantitative ecosystem targets (e.g., soft shoreline, green infrastructure, habitat patches like pollinator gardens and stop over habitats for birds), incorporating citizen science opportunities to promote stewardship of natural resources, and ensuring long-term monitoring to track progress toward ecosystem targets, including trail indicators.

4. Other Initiative Projects and the Future

Under the Great Lakes Way initiative, several complementary and reinforcing projects were undertaken to advance and extend this trail system.

4.1. Memorandum of Understanding on Transboundary Trail Tourism

Urban ecotourism and transboundary routes have become increasingly popular worldwide. However, Stoffelen has identified a mismatch between the potential of tourism routes for cross-border development and region-building, and limited evidence of cases where this potential is realized^[28].

The Gordie Howe International Bridge is a new 2.5-km cable-stayed bridge over the Detroit River, connecting the border cities of Windsor and Detroit. It has been under construction by the Windsor-Detroit Bridge Authority since 2018 and will open in 2026. It will accommodate two-way pedestrian and cyclist traffic via a multi-use path, and there will be no toll for bicyclists and pedestrians. Although this transboundary trail route is early in development, it has the potential to enhance cross-border ecotourism and cultural tourism because of the plethora of transboundary themes/ex-

periences and the long history of binational cooperation^[29].

To prepare for the bridge opening, two Canadian and two U.S. trail organizations have partnered on exploring transboundary cooperation on trail experiences:

- The Waterfront Regeneration Trust, which coordinates the 3,600-km Great Lakes Waterfront Trail for more than three decades, extending from the Ontario-Quebec border on the St. Lawrence River to Sault Ste. Marie, Ontario (waterfronttrail.org);
- The Trans Canada Trail, which stewards the over 28,200-km trail that stretches from the Atlantic to the Pacific to the Arctic oceans (tctrail.ca);
- The Community Foundation, which champions the Great Lakes Way (cfsem.org/initiative/greatlakesway); and
- The Michigan Department of Natural Resources, which manages the Iron-Belle Trail that stretches more than 3,200 km from Ironwood in Michigan's Upper Peninsula to Belle Isle State Park in Detroit (michigan.gov/dnr/places/state-trails/iron-belle).

This partnership was codified in a 2022 Memorandum of Understanding. Initial areas of collaboration include: identifying and developing transboundary trail destination experiences; undertaking joint promotion and marketing; and exploring the use of emerging trail technologies designed to enhance the user experience (e.g., digital trail mirroring of the trail route).

4.2. State of the Strait Conference That Focused on Cross-Border Trail Tourism

The State of the Strait is a Canada–United States partnership that convenes a biennial conference to investigate locally identified ecosystem problems. Each conference is organized by a steering committee of local experts. An important consideration is identifying and securing commitments from the organizations/individuals to serve as conference chairpersons, conveners of meetings, and facilitators of discussions.

These conferences bring together key stakeholders and rightsholders to co-generate knowledge and make recommendations for problem resolution, consistent with ecosystem-based management. Examples of themes addressed in these conferences include habitat loss and degradation, ecosystem

health assessment, urban bird conservation, remote sensing for management, and contaminated sediment remediation.

The most recent conference was held in 2024 and focused on cross-border trail tourism because of the imminent opening of the Gordie Howe International Bridge and its multi-use path^[29]. The Great Lakes Way was a key sponsor. This conference concluded that both border cities have extensive and expanding trail systems with many compelling historical, cultural, and natural resource destinations. However, one area of improvement is institutionalizing collaboration on cross-border trail tourism through a boundary organization. Such an organization could be built on the foundation of the Memorandum of Understanding partners identified above and expanded with key tourism and other nongovernmental trail organizations. This boundary organization should be charged with addressing current challenges like helping businesses become cycle-friendly, sustaining meaningful community engagement that builds relationships and shares power to co-generate solutions, delivering effective binational wayfinding signage and storytelling, and developing and expanding compelling afternoon, daytrip, and long-haul itineraries^[29].

4.3. Economic Benefits Study

The Great Lakes Way is a key component of a growing Great Lakes “blue economy” that promotes the sustainable use of the Great Lakes, while enhancing human well-being and protecting the health of these freshwater ecosystems^[30]. In 2022, the Community Foundation commissioned an economic impact study of the Great Lakes Way that estimated the range of economic benefits from unique elements that make up this trail network. The elements included greenways and water trails, national, state, and local parks, conservation areas, waterfront reclamation projects, connections to Canada, and historical and heritage sites. In addition, other methods were used to help quantify economic impact, including increases in housing values, enhanced outdoor recreational opportunities and the industry that supports them, health improvements, and user satisfaction benefits. This study estimated the total economic impact of these elements at \$3.75–\$5 billion annually^[30]. Such economic impact studies play an important role in making a business case for sustained funding to complete or maintain such expansive trail networks^[31].

4.4. Potential U.S. Great Lakes Waterfront Trail

Under the leadership of the Council of State Governments, Midwestern Office, and in cooperation with the Great Lakes Way, the eight states bordering the Great Lakes are investigating creating a U.S. Great Lakes Waterfront Trail that would be a counterpart to Canada’s Great Lakes Waterfront Trail (**Figure 4**). The goal is to better connect residents and visitors to the Great Lakes and, in turn, expand outdoor recreation and ecotourism economies, promote conservation and sustainability, encourage healthful living, and enhance quality of life. This trail initiative is a collaboration among non-motorized trail programs of the eight Great Lakes states. It would build on the foundation of existing and planned trails and work in and through local governments and trail organizations to fill trail gaps over time. A priority is to encourage as many non-motorized uses as possible, thereby reaping the many benefits of outdoor recreation and nature appreciation. Over time, this initiative will also work with Canadian partners to increase and improve transboundary trail crossings.

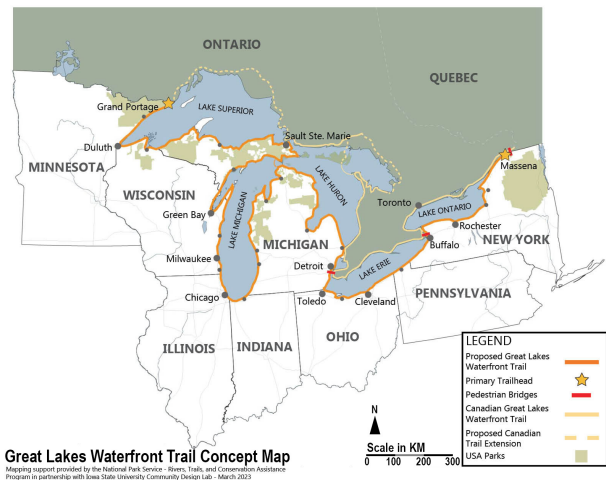


Figure 4. Vision map showing the extent of a Canada–U.S. Great Lakes Waterfront Trail, including some of the existing border crossings for cyclists and pedestrians.

Source: National Park Service’s Rivers, Trails, and Conservation Assistance Program and Iowa State University’s Community Design Lab.

The National Park Service’s Rivers, Trails, and Conservation Assistance program (RTCA) works with community partners to achieve a local conservation and outdoor recreation vision. RTCA staff are providing value-added support to the Council of State Governments by mapping the best, currently available trail route, based on data and input from

the eight Great Lakes state non-motorized transportation programs. A first iteration of a U.S. Great Lakes Waterfront Trail route is projected to be completed by spring 2026.

5. Conclusions

Key elements of ecosystem-based resource management include establishing and empowering boundary organizations, promoting cooperative learning, and building or strengthening capacity for boundary spanning^[24]. This study found that the Great Lakes Way Advisory Committee was a practical real-world example of a boundary organization working beyond political boundaries by spanning four counties and 28 communities and passing through or along 15 state parks or state game/wildlife areas, two metro parks, 90 county and city parks, one national park (i.e., River Raisin National Battlefield Park), and one international wildlife refuge (i.e., Detroit River International Wildlife Refuge).

Notable examples of working beyond disciplinary and programmatic boundaries along the Great Lakes Way include:

- Protecting Humbug Marsh on the lower Detroit River as a “Wetland of International Importance” under the Ramsar Convention, cleaning up an adjacent industrial brownfield to serve as a riparian buffer zone to the marsh and to house the Detroit River International Wildlife Refuge visitor center, and improving public access through responsible greenway trail development^[32];
- Remediating contaminated sediment at both Detroit’s former Uniroyal site and Ralph C. Wilson, Jr. Centennial Park that led to shoreline habitat rehabilitation and the eventual construction of two sections of the Detroit RiverWalk—voted the number one riverwalk in the United States three years in a row by USA Today^[33];
- Cleaning up the River Raisin Area of Concern that led to revitalization of Monroe, Michigan, including creation of the Monroe Loop Trail^[34]; and
- Restoring 1.3 km of shoreline, 0.3 ha of fish spawning habitat, and 0.9 ha of riparian nursery habitat in 2014 along Port Huron’s Blue Water Riverwalk, which is part of the Bridge to Bay Trail in St. Clair County^[35].

Creating regional greenway systems requires collaboration among communities and other organizations, often with conflicting priorities and different ways of doing busi-

ness. Five key context-dependent insights from applying an ecosystem approach in the creation of the Great Lakes Way are presented below.

5.1. Insight 1: Bringing Stakeholders Together and Developing a Compelling Vision

Successful trail initiatives have strong buy-in from the majority of stakeholders, which takes meaningful and sustained stakeholder engagement. This case study evaluation determined that the Great Lakes Way Advisory Committee and partners like the Detroit Riverfront Conservancy, the Joe Louis Greenway Partnership, and Downriver Linked Greenways are good examples of boundary organizations that have built trust, demonstrated meaningful community engagement, and developed effective and lasting partnerships. Critical to such multi-stakeholder efforts is developing a clear and compelling vision that resonates with community partners and attracts new supporters. Such a vision is often described as a picture so clear and convincing that it can be embraced by all stakeholders^[36]. This evaluation found that the Great Lakes Way vision was broadly supported by all four counties, all waterfront communities, the state and federal resource management agencies, and many nongovernmental organizations and local businesses.

5.2. Insight 2: Building and Strengthening Capacity

The United Nations defines capacity-building as “the process of developing and strengthening the skills, instincts, abilities, processes, and resources that organizations and communities need to survive, adapt, and thrive in a fast-changing world”^[37]. Capacity building was essential in the creation of the Great Lakes Way. Good capacity-building examples from this case study include:

- Raising approximately \$2 million USD from the foundation and private sectors by the Community Foundation to undertake the necessary planning, support cooperative learning, carry out necessary studies (e.g., economic benefits), foster stakeholder engagement, and more.
- Securing the services of a landscape architecture firm (i.e., PEA Group) to build the capacity for mapping greenway routes, developing a vision map, translating architecture and engineering drawings and documents

for trail stakeholders, facilitating multi-stakeholder meetings, etc.

- Forming a partnership with the Southeast Michigan Council of Governments to create and maintain a publicly accessible interactive map of the Great Lakes Way (maps.semcog.org/GreatLakesWay).
- Obtaining technical assistance and advice from the National Park Service's River, Trails, and Conservation Assistance program for strategic community engagement.
- Securing signed collaboration agreements from 45 different communities, businesses, and nongovernmental organizations.

5.3. Insight 3: Identifying and Empowering a Boundary Organization

A boundary organization is a formal body that connects science and policy to promote collaboration for achieving common goals^[38]. It plays an important role in applying an ecosystem approach and achieving integrative resource management^[39]. This case study evaluation concluded that the Great Lakes Way Advisory Committee serves as an effective boundary organization, promoting cooperative learning among members and bringing all up to a common level of understanding for informed decision-making. Further, it serves as a facilitator, knowledge broker, trust builder, and champion of strengthening science-policy-management linkages.

Indeed, boundary organizations are important institutional arrangements that foster interdisciplinary relationships and cross-functional teams that help catalyze the exchange of ideas and thinking, build trust, and ultimately implement better science-based policy and management actions. Sattler and Schroeter have shown that the boundary organization concept provides a useful lens for institutional analysis and can be valuable in understanding and evaluating the science-policy interface^[40]. Research on a Geneva, Switzerland case study identified five characteristics of an effective boundary organization: projects proposing relevant and innovative solutions to real-world problems; senior management support for applied transdisciplinary research; provision of a "safe" forum to express ideas, build trust, and foster collaborative working relationships; availability of essential data at the appropriate scale, and the capacity to analyse, interpret, and translate these data for decision-makers; and sufficient resources to facilitate communication^[41].

Institutional arrangements and governance models are typically locally designed and led^[24]. The Great Lakes Way governance structure is not likely to be directly transferable to other regions. However, the framework and its key elements (i.e., reaching stakeholder agreement on a vision, establishing a multi-stakeholder process that ensures collaborative learning, building capacity, ensuring strong collaboration among monitoring, research, and management programs, practicing adaptive resource management, and performing periodic ecosystem assessments) can be adapted to other urban and transboundary contexts throughout the world. The Great Lakes Way offers a practical example of how multiple jurisdictions can work together through a boundary organization to achieve a shared trail vision, and how trails can bring together people and organizations that might otherwise not have a reason to collaborate.

5.4. Insight 4: Co-Generating Knowledge and Solutions

Actionable science is recognized as investigations and research that are designed for direct use by decision-makers to solve real-world problems^[42, 43]. A key component of actionable science is the co-generation of knowledge and solutions among stakeholders, including experts, managers, planners, and other affected community members.

This case study found that the Great Lakes Way Advisory Committee was an effective forum for collaborative production of knowledge and solutions. Two good case study examples of co-generated knowledge were: 1) performing the initial 2020 survey with local trail groups that identified the extent of trail completion and gaps, and 2) undertaking a study of the economic benefits of the trail. Two good case study examples of co-generated solutions were: 1) working with local trail partners to identify more efficient trail routes based on the 2024 trail survey, and 2) working with local trail partners to identify the most compelling trail routes for Canadians exiting the new Gordie Howe International Bridge's multi-use path.

5.5. Insight 5: Practicing Adaptive Resource Management

Adaptive management is well recognized as a fundamental tenet of incorporating an ecosystem approach in nat-

ural resource management^[44, 45]. Two case study examples of the practice of adaptive resource management include: 1) identifying trail gaps based on an initial 2020 survey and working with local trail partners to prioritize filling gaps, and then performing a follow-up trail survey in 2024 that showed that the total length of serviceable and funded greenways increased from 167 km in 2020 to 199 km in 2024 (i.e., sum of trail segment complete, partial connection of trail segment, trail gap planned and funded, and alternate trail routes in **Table 3**), and 2) making mid-course corrections in trail routes that were more efficient based on the 2024 trail survey.

Monitoring user behavior, visitor impacts, and sustainability outcomes is a critical component of trail management^[46]. Marasinghe et al.^[47] have shown that understanding visitor satisfaction is vital for ensuring the long-term sustainability of nature-based tourism experiences in a Ramsar Wetland of International Importance in Sri Lanka. Thus far, trail management organizations responsible for certain segments of the Great Lakes Way are performing periodic user surveys and trail impact assessments (e.g., use patterns, preferences, and perceptions), but no comprehensive approach has been implemented. In the future, such a comprehensive indicator assessment is being planned every five years, which will include measuring progress toward a broad range of recreational, social, and environmental goals.

Along the Detroit Riverwalk, the University of Michigan is using human activity recognition tools on the video obtained from the security cameras and the data collected by other remote sensing devices to distinguish between different activities that people engage in along the riverwalk. By understanding how areas of the riverwalk are used, these researchers are able to make recommendations to the Detroit Riverfront Conservancy about where to add amenities like benches and lights, and to provide access. When changes are implemented, they can then test, in real time, the effectiveness of these changes.

5.6. Remaining Challenges

This case study analysis found that although there has been measurable progress in the Great Lakes Way over the first five years (e.g., a 32-km increase in the length of usable and funded greenways between 2020 and 2024), many challenges remain. These include: sustaining boundary-spanning funding for the Great Lakes Way Advisory Committee (fund-

ing over the first five years came from foundations and corporations), securing necessary funding to fill greenway gaps and maintain existing trails in a time of federal government funding uncertainty, monitoring user attitudes and behaviors, sustaining meaningful community engagement, and supporting research that strengthens science-policy-management linkages.

Author Contributions

Conceptualization, J.H.H., L.W. and B.J.; methods, J.H.H., L.W. and B.J.; data collection, L.W.; writing—original draft preparation, J.H.H.; writing—review and editing, L.W. and B.J.; supervision, J.H.H., L.W., and B.J. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

Not applicable.

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Not applicable.

Data Availability Statement

The raw data for this case study will be made available by the authors on request.

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Conflicts of Interest

The authors declare no conflict of interest.

References

- [1] Richardson, M., 2025. Modelling Nature Connectedness within Environmental Systems: Human–Nature Relationships from 1800 to 2020 and Beyond. *Earth*. 6(3), 82. DOI: <https://doi.org/10.3390/earth6030082>
- [2] Chai, D., Liu, K., 2025. The Network–Place Effect of Urban Greenways on Residents' Pro-Nature Behaviors: A Systematic Review. *Sustainability*. 17(24), 11117. DOI: <https://doi.org/10.3390/su172411117>
- [3] Gobster, P.H., Westphal, L.M., 2004. The Human Dimensions of Urban Greenways: Planning for Recreation and Related Experiences. *Landscape and Urban Planning*. 68(2–3), 147–165.
- [4] Little, C.E., 1990. *Greenways for America*. John Hopkins University Press: Baltimore, MD, USA.
- [5] Arendt, R., 2011. Putting Greenways First. *Planning*. 77(7), 28–33.
- [6] Coutts, C., 2008. Greenway Accessibility and Physical Activity Behavior. *Environment and Planning B: Planning and Design*. 35(3), 552–563.
- [7] Fabos, J.G., 1995. Introduction and Overview: The Greenway Movement, Uses and Potentials of Greenways. *Landscape and Urban Planning*. 33(1–3), 1–13.
- [8] Hutson, G., Baird, J., Ives, C.D., et al., 2024. Outdoor Adventure Education as a Platform for Developing Environmental Leadership. *People and Nature*. 6(5), 1974–1986. DOI: <https://doi.org/10.1002/pan3.10699>
- [9] Hartig, J.H., 2019. *Waterfront Porch: Reclaiming Detroit's Industrial Waterfront as a Gathering Place for All*. Michigan State University Press: East Lansing, MI, USA.
- [10] Mumaw, L., 2017. Transforming Urban Gardeners into Land Stewards. *Journal of Environmental Psychology*. 52, 92–103.
- [11] Hartig, J.H., Scott, T., Gell, G., et al., 2022. Reconnecting People to the Detroit River—A Transboundary Effort. *Aquatic Ecosystem Health and Management*. 25(1), 27–38.
- [12] Martin Associates, 2023. *Economic Impacts of Maritime Shipping in the Great Lakes–St. Lawrence Region*. Martin Associates: Lancaster, PA, USA.
- [13] Hartig, J.H., 2014. *Bringing Conservation to Cities: Lessons from the Detroit River International Wildlife Refuge*. Aquatic Ecosystem Health and Management Society: Burlington, ON, Canada.
- [14] Appel, L.M., Craves, J.A., Smith, M.K., et al., 2002. *Explore Our Natural World: A Biodiversity Atlas of the Lake Huron to Lake Erie Corridor*. U.S. Environmental Protection Agency: Chicago, IL, USA.
- [15] Dempsey, D., 2019. *The Heart of the Great Lakes: Freshwater in the Past, Present, and Future of Southeast Michigan*. Michigan State University Press: East Lansing, MI, USA.
- [16] Community Foundation for Southeast Michigan, 2024. *Reports on the Great Lakes Way*. Available from: <https://cfsem.org/initiative/greatlakesway/reports/> (cited 31 January 2025).
- [17] Great Lakes Science Advisory Board, 1978. *Ecosystem Approach: Scope and Implications of an Ecosystem Approach to Transboundary Problems in the Great Lakes Basin*. International Joint Commission: Windsor, ON, Canada.
- [18] Canada and the United States, 1978. *Great Lakes Water Quality Agreement*. International Joint Commission: Windsor, ON, Canada.
- [19] Convention on Biological Diversity, 2019. *The Ecosystem Approach: Advanced User Guide*. Convention on Biological Diversity: Montreal, QC, Canada.
- [20] Vigna, I., Besana, A., Comino, E., et al., 2021. Application of the Socio-Ecological System Framework to Forest Fire Risk Management: A Systematic Literature Review. *Sustainability*. 13(4), 2121. DOI: <https://doi.org/10.3390/su13042121>
- [21] Vallentyne, J.R., Beeton, A.M., 1988. The Ecosystem Approach to Managing Human Uses and Abuses of Natural Resources in the Great Lakes Basin. *Environmental Conservation*. 15(1), 58–62.
- [22] Hartig, J.H., Krantzberg, G., Alsip, P., 2020. Thirty-Five Years of Restoring Great Lakes Areas of Concern: Gradual Progress, Hopeful Future. *Journal of Great Lakes Research*. 46(3), 429–442.
- [23] Great Lakes Water Quality Board, 1985. *Report on Great Lakes Water Quality*. Great Lakes Water Quality Board: Windsor, ON, Canada.
- [24] Alsip, P., Hartig, J.H., Krantzberg, G., et al., 2021. Evolving Institutional Arrangements for Use of an Ecosystem Approach in Restoring Great Lakes Areas of Concern. *Sustainability*. 13(3), 1532–1554. DOI: <https://doi.org/10.3390/su13031532>
- [25] Scott, T., Gell, G., 2020. The Legacy of Bicycles in Detroit, Michigan: A Look at Greenways through Time. In: Hartig, J.H., Francoeur, S.F., Ciborowski, J.J.H., et al. (Eds.). *Checkpoint: Assessing Ecosystem Health of the Detroit River and Western Lake Erie*. University of Windsor: Windsor, ON, Canada. pp. 451–458.
- [26] Winter, P.L., Selin, S., Cervený, L., et al., 2020. Out-

- door Recreation, Nature-Based Tourism, and Sustainability. *Sustainability*. 12(1), 81. DOI: <https://doi.org/10.3390/su12010081>
- [27] Dolesh, R.J., 2004. Tough Terrain: The Conflicts Associated with Multi-Use Trails. *Parks & Recreation*. 39(10), 1–56.
- [28] Stoffelen, A., 2022. Transboundary Routes and Trails: Cooperation and Scalar Considerations. In: Timothy, D.J., Gelbman, A. (Eds.). *Routledge Handbook of Borders and Tourism*. Routledge: London, UK. pp. 379–390.
- [29] Hartig, J.H., Newton, L., Scott, T., et al., 2025. Fostering Cross-Border Trail Tourism between Windsor, Ontario, Canada and Detroit, Michigan, USA. *Green Health*. 1(3), 20. DOI: <https://doi.org/10.3390/greenhealth1030020>
- [30] Austin, J., Steinman, A., Weinstein, A., 2023. The Great Lakes Way: Enriching Life at the Heart of the Great Lakes. Community Foundation for Southeast Michigan: Detroit, MI, USA.
- [31] Chakraborty, K., 2019. Economic Benefits of Biking Trails and Greenways. *Business and Economic Research*. 9(2), 199–206. DOI: <https://doi.org/10.5296/ber.v9i2.14727>
- [32] Hartig, J.H., Wallace, M.C., 2015. Creating World-Class Gathering Places for People and Wildlife along the Detroit Riverfront, Michigan, USA. *Sustainability*. 7(11), 15073–15098. DOI: <https://doi.org/10.3390/su71115073>
- [33] Hartig, J.H., Godwin, C.M., Ellis, B., et al., 2024. Co-Production of Knowledge and Co-Innovation of Solutions for Contaminated Sediments in the Detroit and Rouge Rivers. *Journal of Great Lakes Research*. 50(2), 102304. DOI: <https://doi.org/10.1016/j.jglr.2024.102304>
- [34] Bentley, S.J., Cochran, M., Hartig, J.H., 2019. From Cleanup of the River Raisin to Revitalization of Monroe, Michigan. In: Hartig, J.H., Krantzberg, G., Austin, J.C., et al. (Eds.). *Great Lakes Revival: How Restoring Polluted Waters Leads to Rebirth of Great Lakes Communities*. International Association for Great Lakes Research: Ann Arbor, MI, USA. pp. 47–51.
- [35] Michigan Department of Environmental Quality, 2017. Recommendation Removal: Loss of Fish and Wildlife Habitat Beneficial Use Impairment, St. Clair River Area of Concern. Michigan Department of Environmental Quality: Lansing, MI, USA.
- [36] Senge, P.M., 1990. *The Fifth Discipline: The Art and Practice of the Learning Organization*. Currency Doubleday Books: New York, NY, USA.
- [37] United Nations, 2025. Capacity-Building. Available from: <https://www.un.org/en/academic-impact/capacity-building> (cited 20 December 2025).
- [38] Gray, N.J., 2016. The Role of Boundary Organizations in Co-Management: Examining the Politics of Knowledge Integration in a Marine Protected Area in Belize. *International Journal of the Commons*. 10(2), 1013–1034.
- [39] James, C.A., Francis, T.B., Baker, J.E., et al., 2022. A Boundary Spanning System Supports Large-Scale Ecosystem-Based Management. *Environmental Science & Policy*. 133, 137–145.
- [40] Sattler, C., Schröter, B., 2022. Collective Action across Boundaries: Collaborative Network Initiatives as Boundary Organizations to Improve Ecosystem Services Governance. *Ecosystem Services*. 56, 101452. DOI: <https://doi.org/10.1016/j.ecoser.2022.101452>
- [41] Honeck, E., Gallagher, L., von Arx, B., et al., 2021. Integrating Ecosystem Services into Policymaking—A Case Study on the Use of Boundary Organizations. *Ecosystem Services*. 49, 101286. DOI: <https://doi.org/10.1016/j.ecoser.2021.101286>
- [42] Beier, P., Hansen, L.J., Helbrecht, L., et al., 2017. A How-to Guide for Coproduction of Actionable Science. *Conservation Letters*. 10(3), 288–296. DOI: <https://doi.org/10.1111/conl.12300>
- [43] Palmer, M.A., 2012. Socioenvironmental Sustainability and Actionable Science. *BioScience*. 62(1), 5–6. DOI: <https://doi.org/10.1525/bio.2012.62.1.2>
- [44] Holling, C.S., 1978. Adaptive Environmental Assessment and Management. International Institute for Applied Systems Analysis: Laxenburg, Austria.
- [45] Pahl-Wostl, C., 2007. Transitions towards Adaptive Management of Water Facing Climate and Global Change. *Water Resources Management*. 21, 49–62.
- [46] Spruijt-Metz, D., Wolch, J., Jerrett, M., et al., 2010. Development, Reliability, and Validity of an Urban Trail Use Survey. *American Journal of Health Promotion*. 25(1), 2–11. DOI: <https://doi.org/10.4278/ajhp.071105119>
- [47] Marasinghe, S., Perera, P., Simpson, G.D., et al., 2021. Nature-Based Tourism Development in Coastal Wetlands of Sri Lanka: An Importance–Performance Analysis at Maduganga Mangrove Estuary. *Journal of Outdoor Recreation and Tourism*. 33, 100345. DOI: <https://doi.org/10.1016/j.jort.2020.100345>