



Waterfront reconnection: linking ecosystem restoration to community revitalization *in the St. Louis River estuary of Lake Superior*

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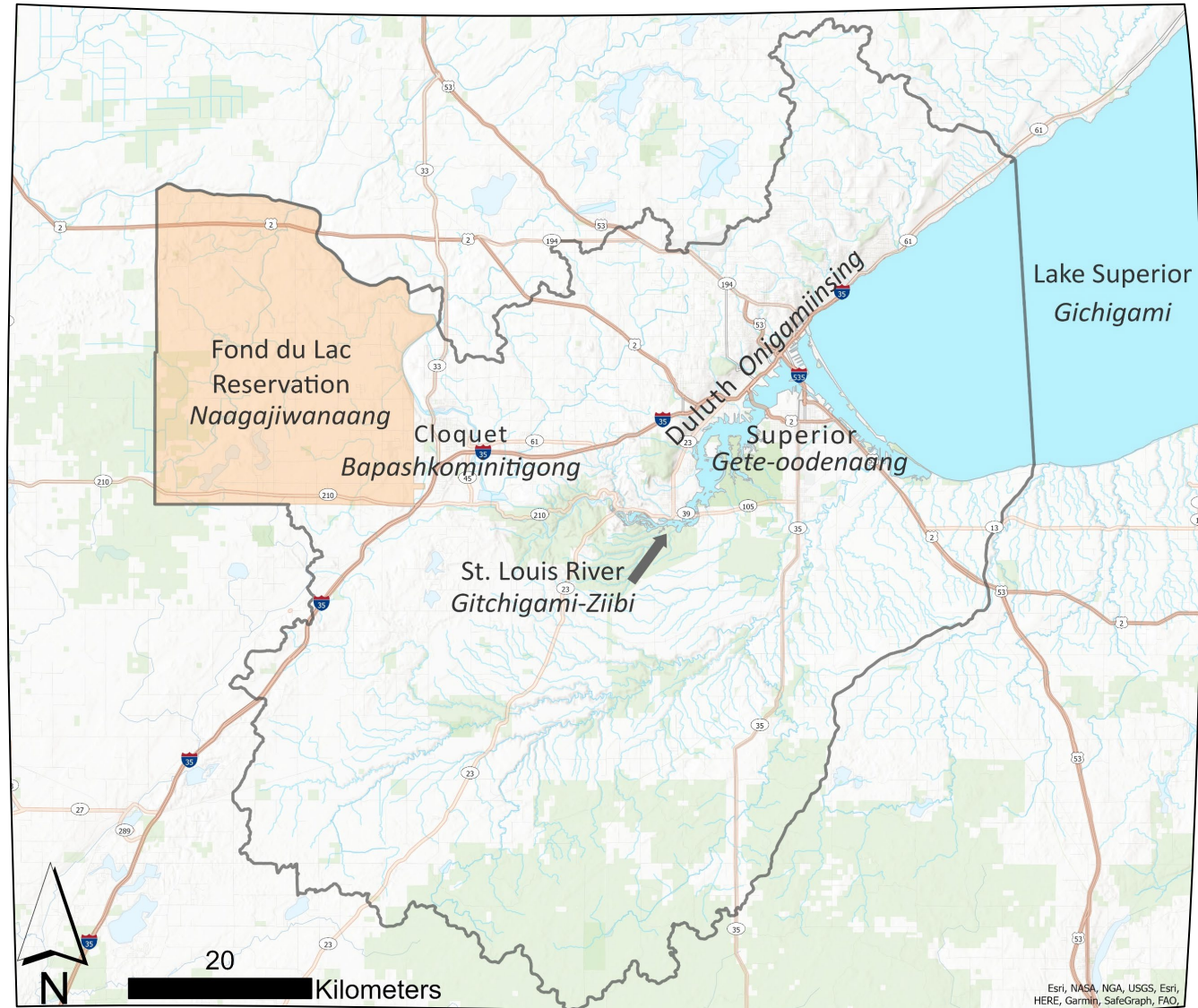
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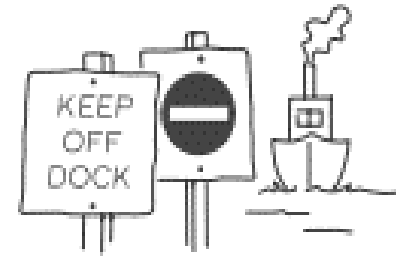
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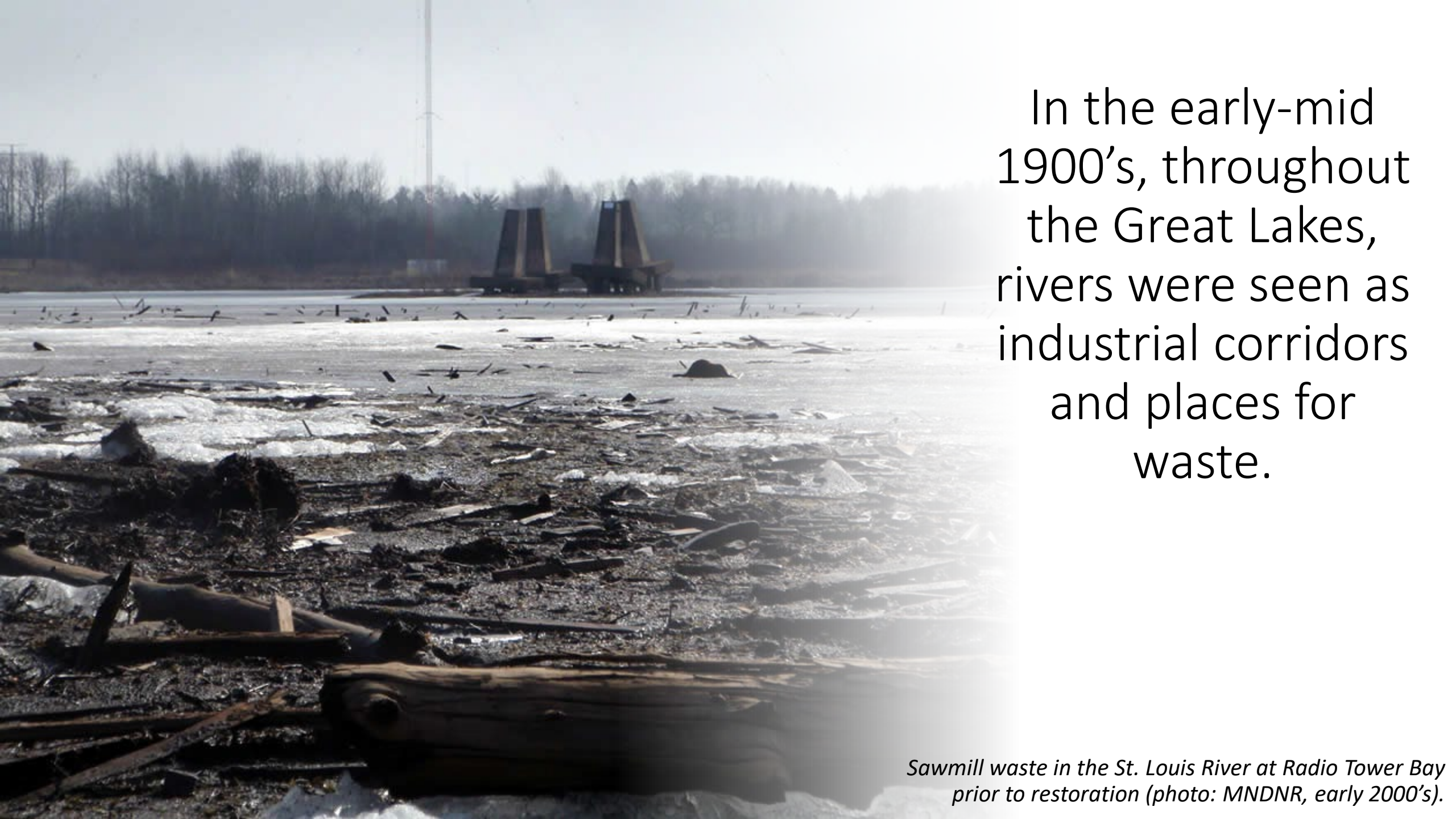
Photo: Deanna Erickson, Lake Superior NERR

In a case study in the St. Louis River estuary, we explored **cultural ecosystem services**: the human well-being benefits from aquatic ecosystems.



We also explored barriers to cultural ecosystem services.



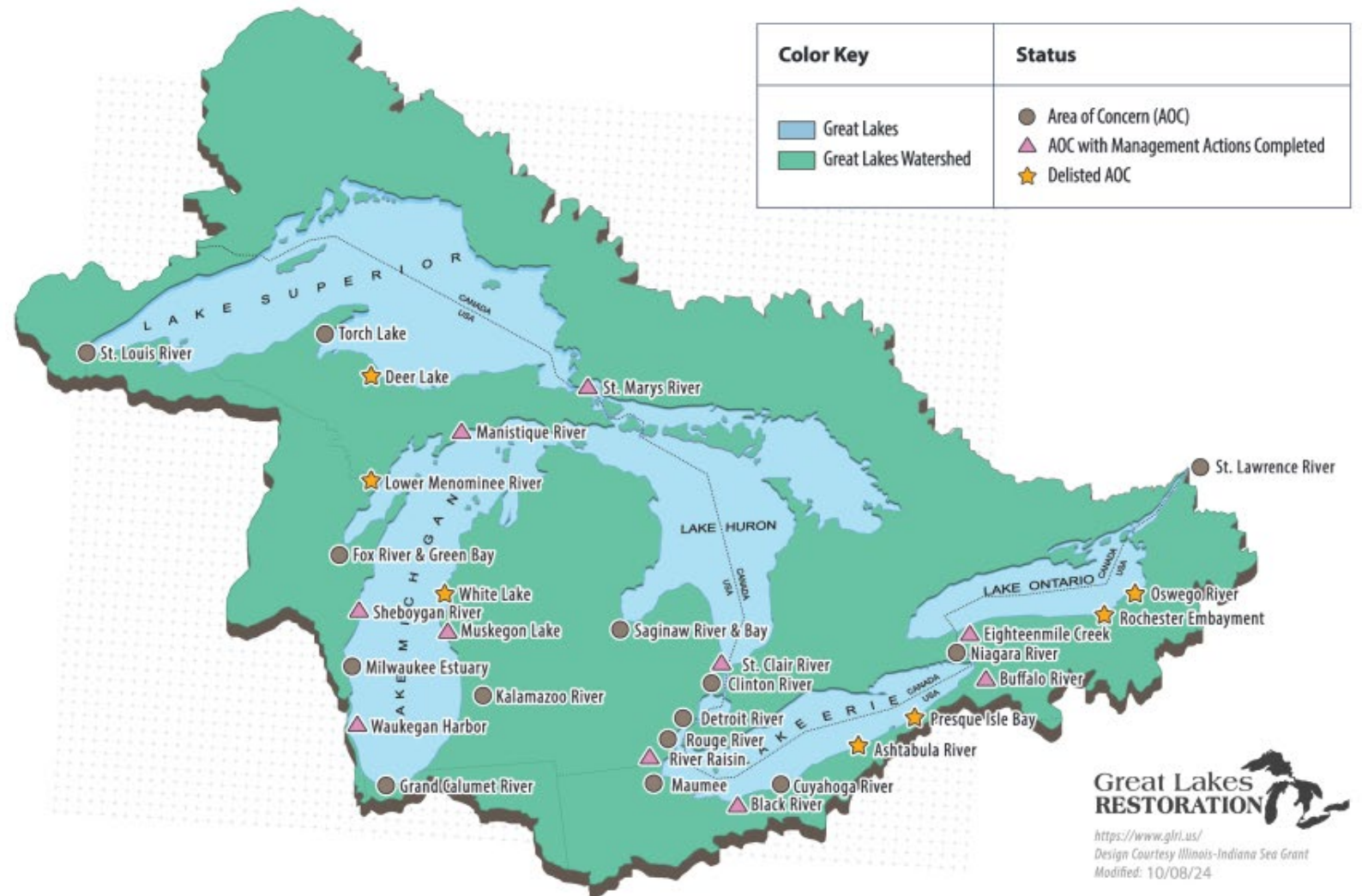


In the early-mid 1900's, throughout the Great Lakes, rivers were seen as industrial corridors and places for waste.

Sawmill waste in the St. Louis River at Radio Tower Bay prior to restoration (photo: MNDNR, early 2000's).

U.S. Great Lakes Areas of Concern

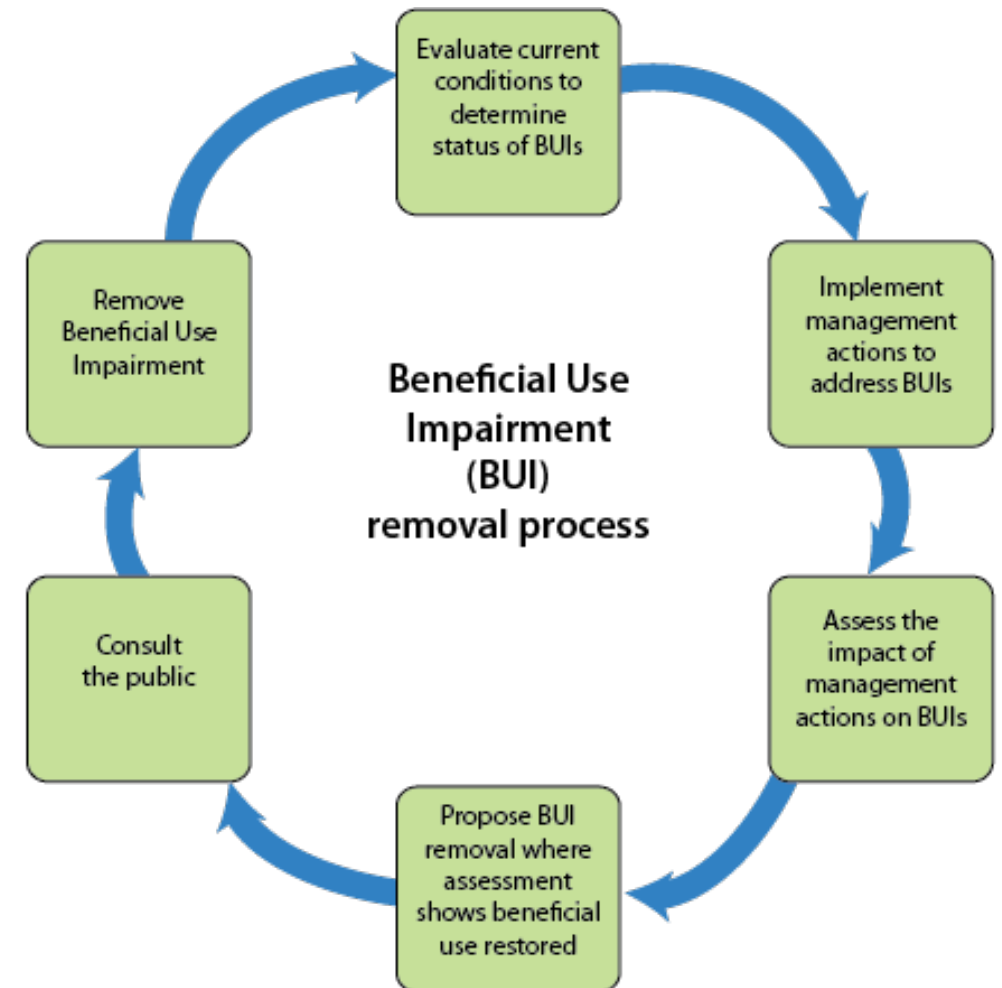
In 1987 Great Lakes Water Quality Agreement established 43 Areas of Concern due to their history of degradation and pollution and loss of beneficial uses.



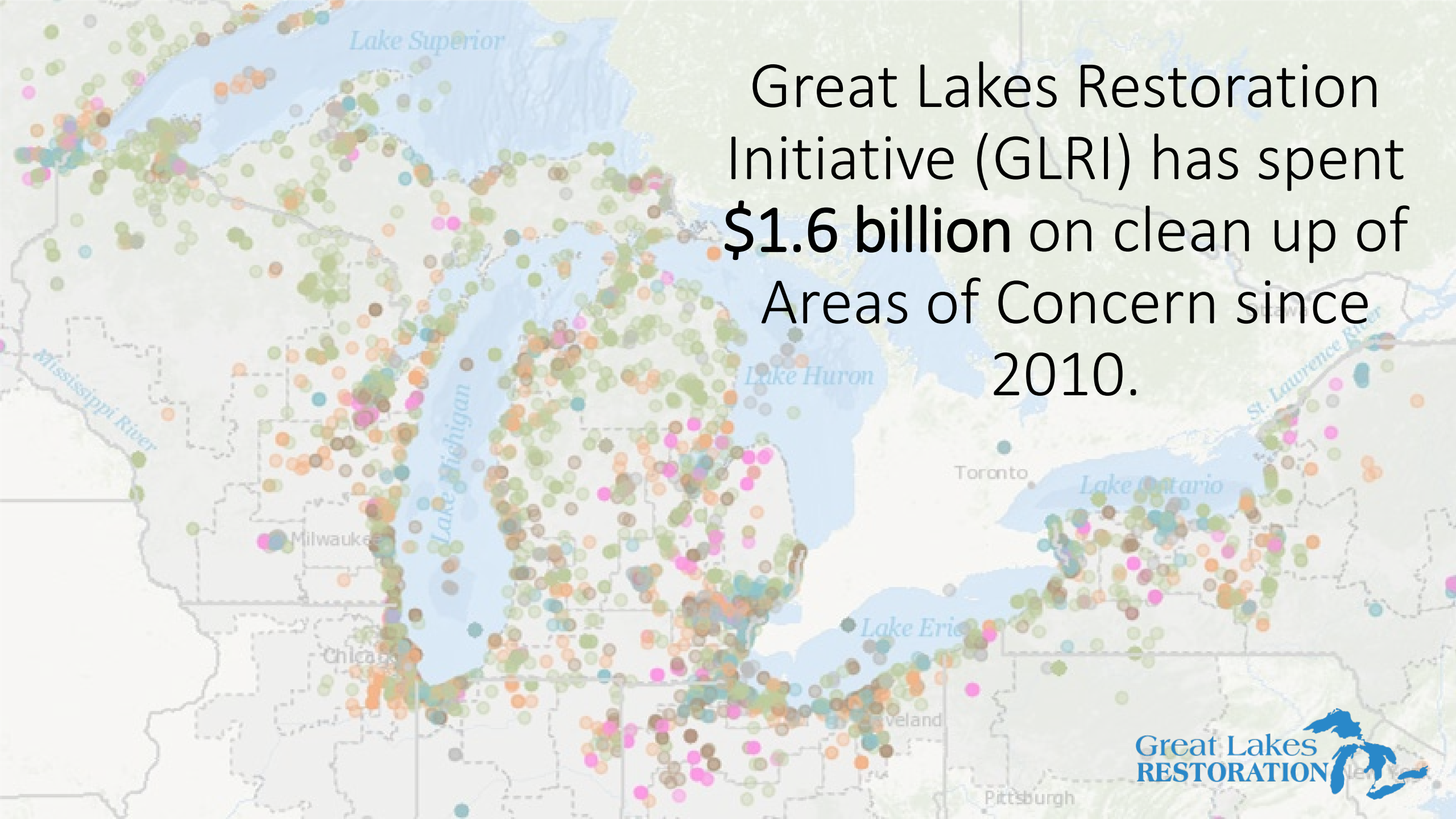
Each Area of Concern identified their “beneficial use impairments” (BUI)

Area of Concern Beneficial Use Impairments

1. *Restrictions on Fish and Wildlife Consumption*
2. *Tainting of Fish and Wildlife Flavor*
3. *Degradation of Fish and Wildlife Populations*
4. *Fish Tumors or Other Deformities*
5. *Bird or Animal Deformities or Reproduction Problems*
6. *Degradation of Benthos*
7. *Restrictions on Dredging Activities*
8. *Eutrophication or Undesirable Algae*
9. *Restrictions on Drinking Water Consumption or Taste and Odor Problems*
10. *Beach Closings*
11. *Degradation of Aesthetics*
12. *Added Costs to Agriculture or Industry*
13. *Degradation of Phytoplankton and Zooplankton Populations*
14. *Loss of Fish and Wildlife Habitat*



Great Lakes Restoration Initiative (GLRI) has spent **\$1.6 billion** on clean up of Areas of Concern since 2010.



Area of Concern projects to address beneficial use impairments



Sediment
Remediation

Habitat
Restoration

Community
Revitalization

R2R2R

Revitalization is defined as:

- **Equitable and sustainable policies or interventions** that promote **human well-being** and **healthy ecosystems**.

(Angradi et al., 2019; Angradi et al., 2022)

- Redevelopment, or land repurposing **appropriate for the community context**, which may include new economic or recreational activity.

(Williams and Hoffman, 2021; Williams et al., 2022)



Area of Concern projects to address **beneficial use impairments**.



**Sediment
Remediation**



**Habitat
Restoration**



**Community
Revitalization**



The challenges:

1. Limited data measuring indicators of revitalization for AOC projects or sites.
2. **More broadly: Limited understanding of the range of human well-being benefits (and barriers to benefits) associated with waterfront communities in general.**

Methods

- ★ • Targeted survey in fall 2022
 - 532 participants from diverse backgrounds
 - Quantitative data on experiences in last year, sociodemographics
 - **Qualitative data on barriers to accessing water**
- Research advised by a community end-user advisory group and an Indigenous advisory group.

Barriers: What keeps residents from accessing the water?

Based on thematic analysis of short answers from survey data

Barrier: something that prevents or degrades the experience

89% of participants mentioned a barrier (N=532)

Barriers: What keeps residents from accessing the water?

Themes:

41.5%

Access to the water

Physical access, maintenance, universal access, amenities, etc.



31.2%

Environment

Pollution, litter, conservation, and protection.



29.7%

Resources

Time, gear/equipment, finances, and knowledge or skills.



19.2%

Communication/ Education

Signage, knowledge about how to access nature, and other information needs.



18.2%

Amenities

Bathrooms, seating, trails, boat launches, swimming, camping, etc.



15.2%

Health & Ability

Mental health, aging, medical conditions, illness, physical abilities, and mobility.



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14.8%

Social Barriers

Crowding or uses by other people, lack of companionship, or lack of belonging.



14.8%

Safety

Fear of violence or harassment, gender safety, dogs, safety amenities, boat or swim safety, or public health.



12.0%

Transportation

Pedestrian access, public transportation, parking, cycling infrastructure, or travel time.



19.2%

Communication/ Education

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Amenities

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Health & Ability

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8.3%

Climate & Weather

Weather or cold weather, climate change impacts.



6.8%

Programs/Events

Events and communities, and volunteer opportunities that support connection with water.



6.6%

Regulations/Governance

Enforcement of laws, opportunities for public engagement in decision-making, permit regulations.





Barriers are linked with one another

Environment & Communication

- Perceptions of **environmental health** rely on adequate **communication** of accurate environmental conditions.

(Cohen et al., 2010; Pitt et al., 2019; Roberts-Gregory and Hawthorne, 2016)

Barriers are linked to perspective

Transportation

- Reflects **personal circumstances**:
“I don't drive so it's hard to get around.”
- Reflects **services offered**:
“[We need] safe and accessible ways to commute that are not personal vehicles.”



A wooden spoon is shown pouring water into a blue liquid, creating ripples. The background is a light blue, textured surface.

Recommendations

to address barriers through interventions
in the AOC context

1. Ensure a clean healthy environment.

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2. Provide adequate access and amenities for all.

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3. Communicate and offer opportunities for engagement with the water.

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4. Support social uplift

Education, health care, public safety, housing security, social inequities

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Recommendations for environmental decision-makers

- Ensure a clean **healthy environment**.
- Provide adequate **access** and **amenities** for all.
- Communicate** and offer opportunities for **engagement** with the water.
- Support **social uplift**



Sediment Remediation

Habitat Restoration

Community Revitalization

1. Clean healthy environment.



Sediment Remediation

Habitat Restoration

Supporting Reconnection

Community Revitalization

1. Clean healthy environment

2. Access and amenities
3. Communication and engagement

4. Support social uplift



Beneficial Uses Return

Supporting Reconnection



Communities already have long-standing connections to waterfront places

Beyond the Great Lakes



Ballard Locks in Seattle (author's photo)



Thank you!

- Research participants
- Indigenous & community advisory groups
- Advisors and committee
- Lake Superior National Estuarine Research Reserve staff
- Many other colleagues who supported this work

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UNIVERSITY OF MINNESOTA DULUTH
Driven to Discover



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Back-up

How We Connect with Water

The following themes were identified based on interviews with 42 participants about their relationship with water. These themes help illustrate the many complex and interrelated benefits people experience from aquatic ecosystems.

Social & Community

Social bonds with friends and family through/over the water, engagement with community events or organizations.

Aesthetics & Senses

Beauty, sensory connections, temperature, connections with plants and wildlife

Art & Inspiration

Inspiration for various arts or crafts, varying motivations.

Time & Traditions

Memories, nostalgia, changes over time, history, traditions or rituals, future generations, intentions for future.

Attachment

Exposure to water through life, special places, reasons for living in the area, pride of the place.

Wild Food & Clean Water

Fishing, foraging, food culture, food ethics.

Health

Mental and physical health benefits.

Spirituality & Emotional Connection

Gratitude, awe, reverence, respect for the water, mindfulness, peacefulness, ties with spiritual practices or beliefs.

Work & Economics

Influence on career, economic and career benefits.

Fear & Safety

Fears of water for self or for children, negative experiences, tragedy.

Exploration & Learning

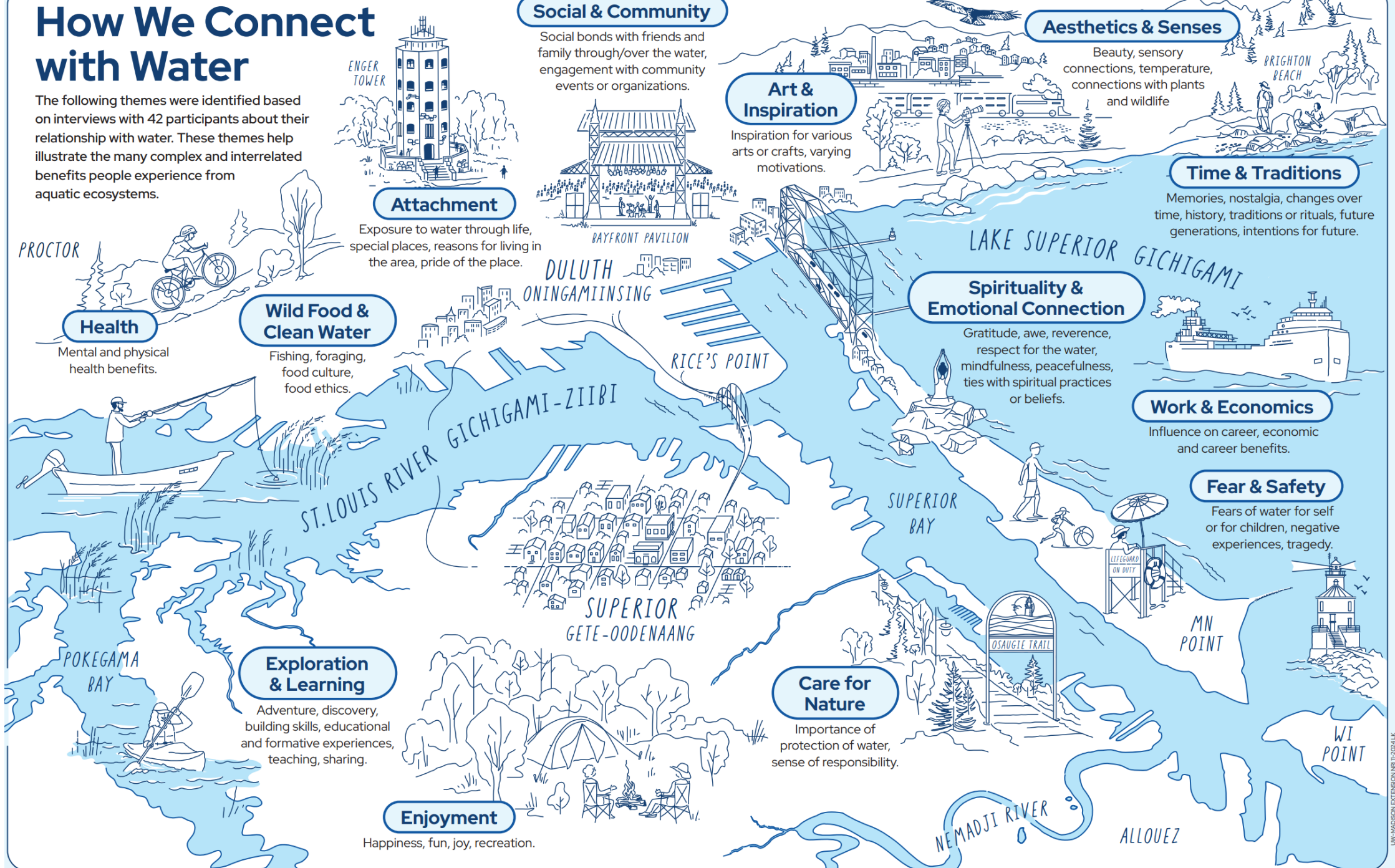
Adventure, discovery, building skills, educational and formative experiences, teaching, sharing.

Care for Nature

Importance of protection of water, sense of responsibility.

Enjoyment

Happiness, fun, joy, recreation.



Identity and Water Experiences

- Survey and interview data showed how age, life stage, ethnicity, gender, health status, and income influence how we experience water throughout life.

Age & Life Stage

- In surveys, **younger participants** reported physically demanding and social experiences more often, and **older participants** reported slower-paced, nature-based activities more often.
- In interviews, nearly **all participants** described how their relationships with water had evolved during their life, and although patterns were not always the same, many reported that their connection to water grew deeper with time.

"I've grown more connected to it."
- Felicity (pseudonym)

Indigenous Connections to Water

- In surveys, **Ojibwe and other Indigenous participants** reported more unique types of water experiences than other race/ethnic groups.
- **Ojibwe interview participants** described unique connections with the water associated with their ethnic identities. Most expressed the importance of protecting water, some shared specific spiritual and cultural traditions, and others expressed how their family history informed their relationship with the water.

"The [wild] rice itself is medicine, it gives us life, sustenance."
- Kent (pseudonym)

Income

- Income was associated with the kinds of water experiences reported. **Higher income groups** reported more types of experiences.

Gender

- In surveys, **men** reported challenging recreational activities more often, while **women and nonbinary/gender expansive respondents** reported experiencing inspiration, art, and mindfulness associated with the water more often.
- In interviews, **women and nonbinary participants** discussed how their exposure at a young age depended on their gender and mentioned gender-related safety concerns about interacting with strangers in remote places.

"Nothing has happened to me when I've been on the water, but as women, I think that most of us have had things that have happened. So, in remote settings, that is something that I think about."
- Ravena (pseudonym)

Health Status

- In surveys, **older participants** and **those unable to work** reported fewer water experiences than **younger people able to work**, suggesting age and health limitation may limit water experiences.
- **Many interview participants** described how water experiences helped them cope with mental illnesses or the mental and emotional consequences of physical illness, while physical health also affected their ability to engage with water.

"I got diagnosed with a disorder that really affects my physical ability to do things. That's really changed my relationship with water because a lot of places around water are not very accessible."
- Marcy (pseudonym)