

The Hog Island and Newton Creek Ecological Restoration Master Plan  
*Template for Restoration in a Lake Superior  
Area of Concern*

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Keith Bowers, Principal

Ivette Bolender, Great Lake Bioregion Team Leader

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**Presentation outline:**

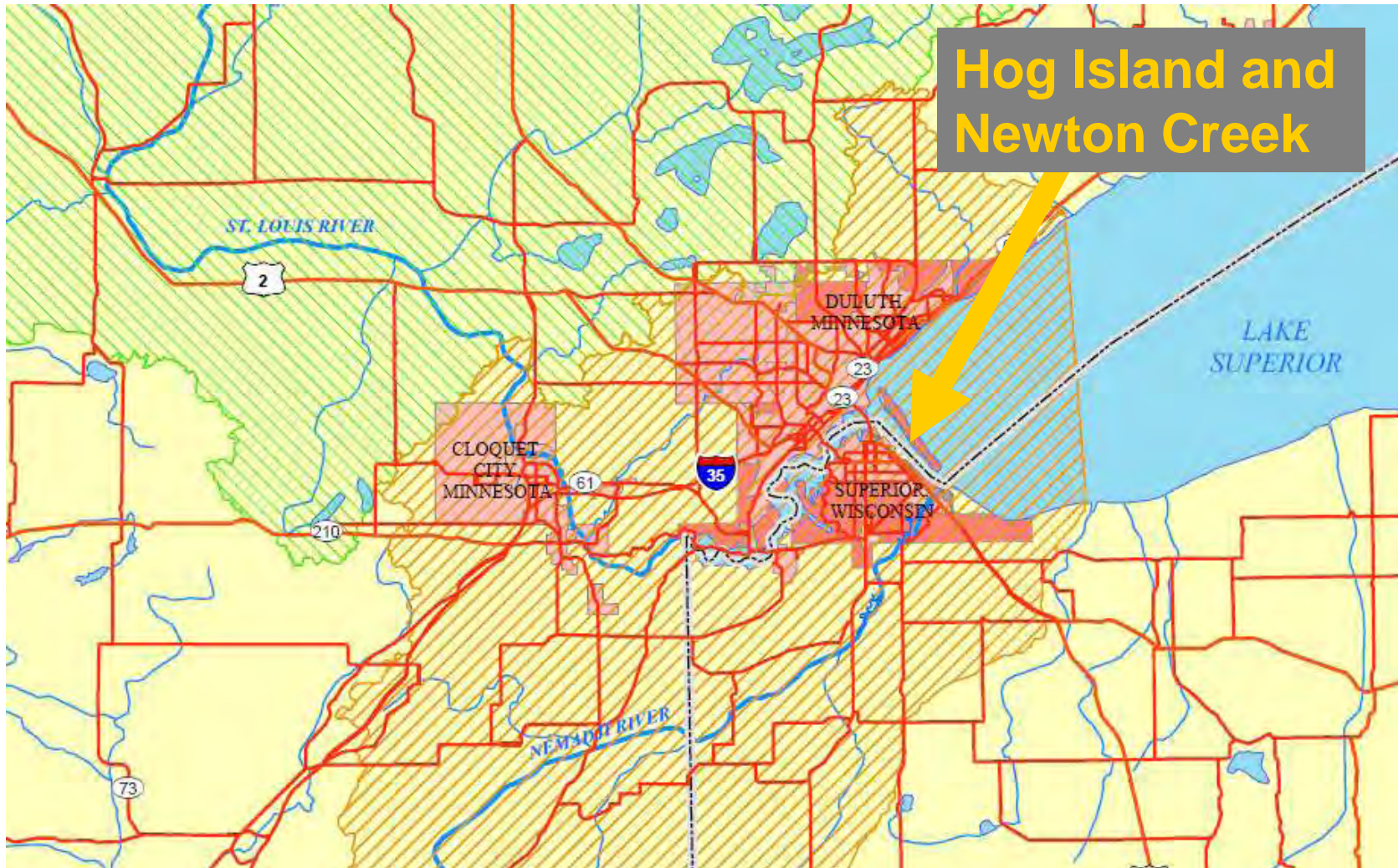
Project background

Master planning process

Habitat restoration approach

Lessons learned

The Hog Island and Newton Creek Ecological Restoration Master Plan  
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**Hog Island and  
Newton Creek**

The Hog Island and Newton Creek Ecological Restoration Master Plan  
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## PROJECT BACKGROUND

Hog Island is an artificial island in Superior Harbor made from dredge materials.

- Newton Creek is a 1.5 mile long creek that flows from Murphy Oil refinery into Superior Harbor near Hog Island.
- Site is part of the St Louis River AOC.
- Suite of habitat related Beneficial Use Impairments.
- Site recognized by the RAP as being degraded and in need of remediation.
- Great Lakes Legacy Act sediment clean up finished in 2005.



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# Newton Creek/Hog Island Inlet Sediment Remediation Project

This project is jointly funded by the Great Lakes Legacy Act of 2002 and Wisconsin Department of Natural Resources Environmental Fund



United States Environmental  
Protection Agency  
Great Lakes National  
Program Office

## Contractors

**Earth Tech, Inc.**  
3121 Butterfield Road  
Oak Brook, IL 60523  
Contractor to the U.S. EPA



## Short Elliott Hendrickson Inc.

421 Frenette Drive  
Chippewa Falls, WI 54729  
Contractor to the WI DNR

City of Superior

Douglas County

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## PROJECT BACKGROUND

Site remediated, but can the habitat-related BUIs be de-listed?



## PROJECT BACKGROUND

*REMEDIATION TO RESTORATION*



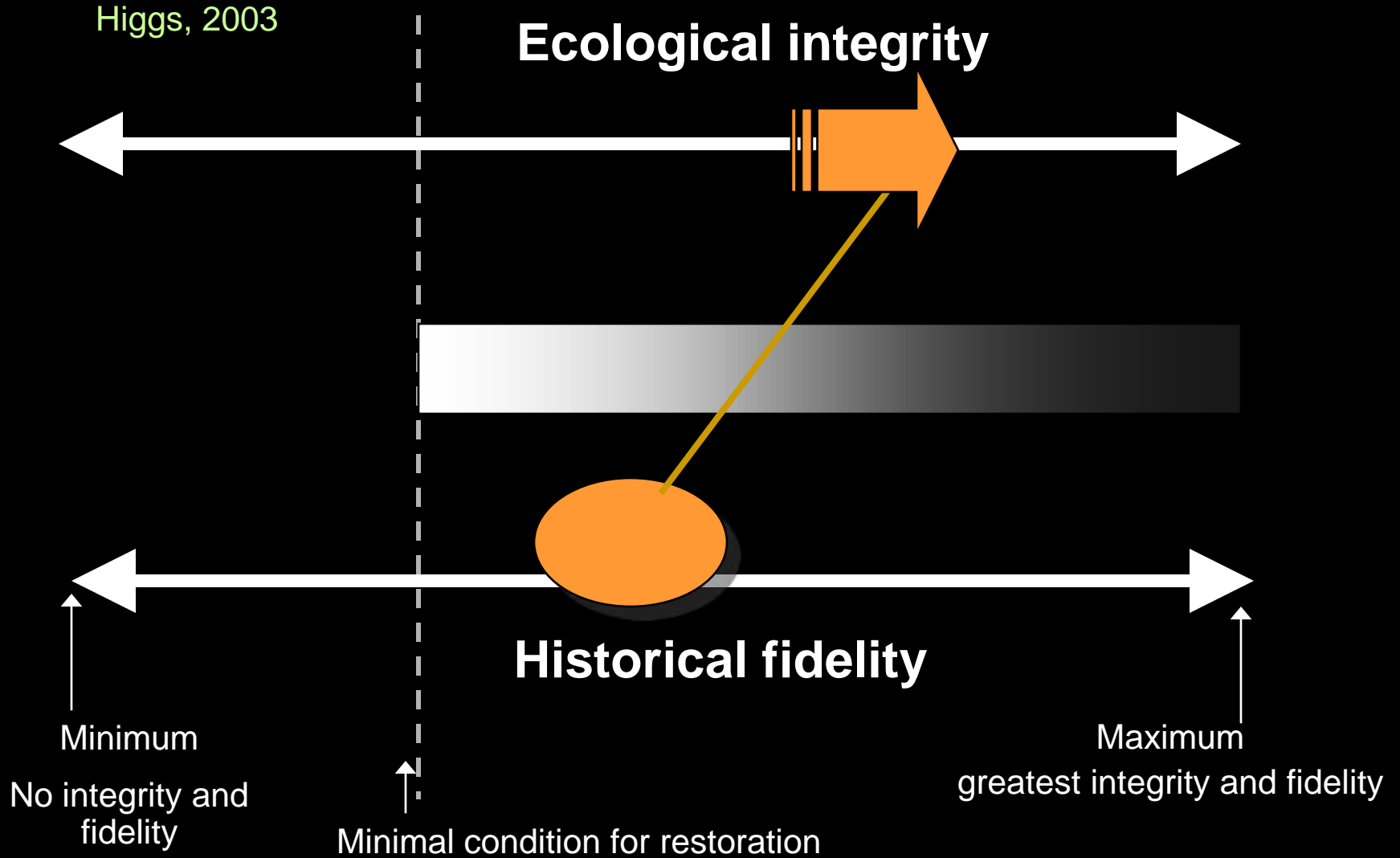
## MASTER PLANNING PROCESS

...what is meant by “recovery” in ecological restoration?

“An ecosystem has recovered – and is restored- when it contains sufficient biotic and abiotic resources to continue its development without further assistance or subsidy.”



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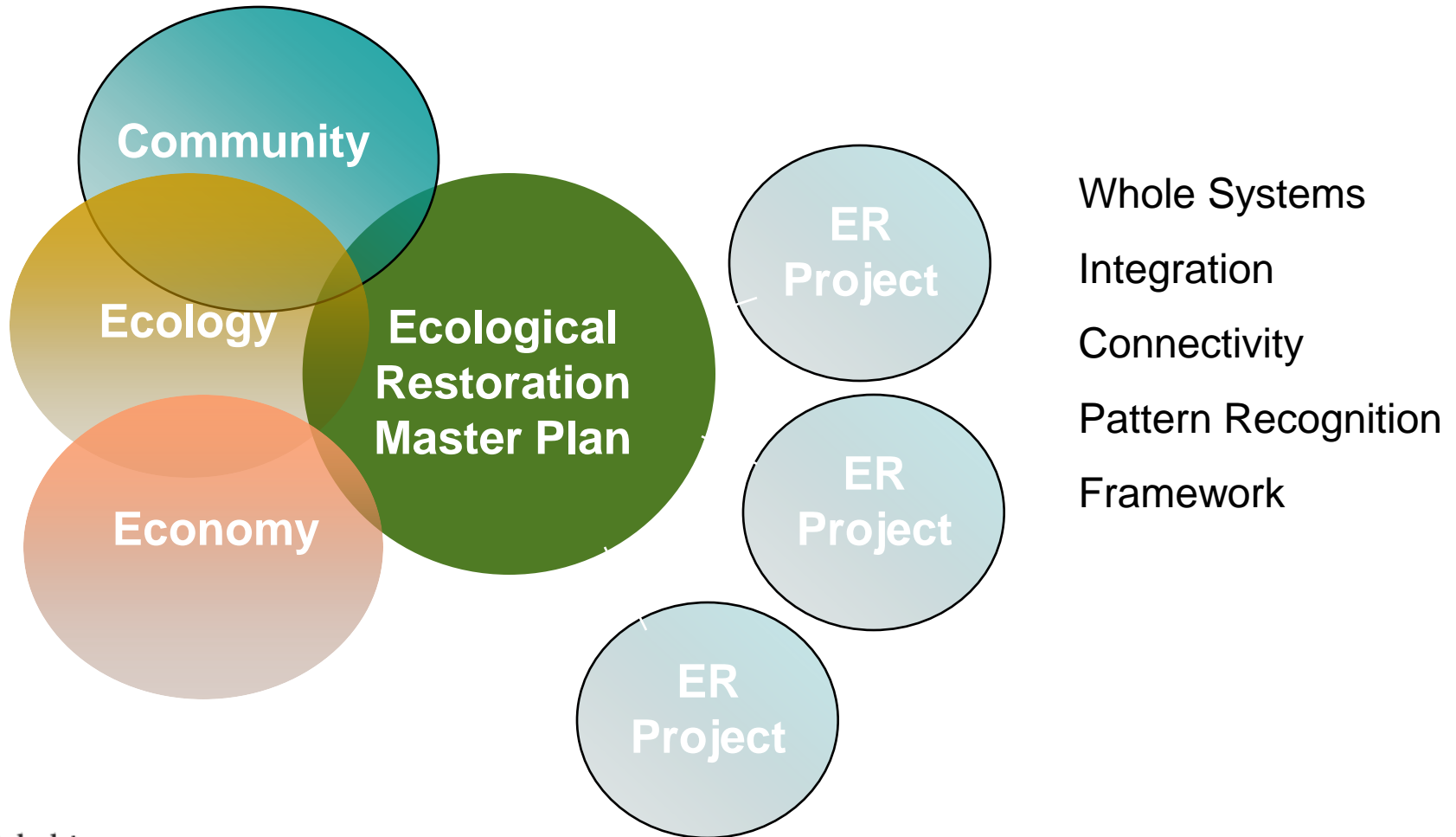
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## MASTER PLANNING PROCESS

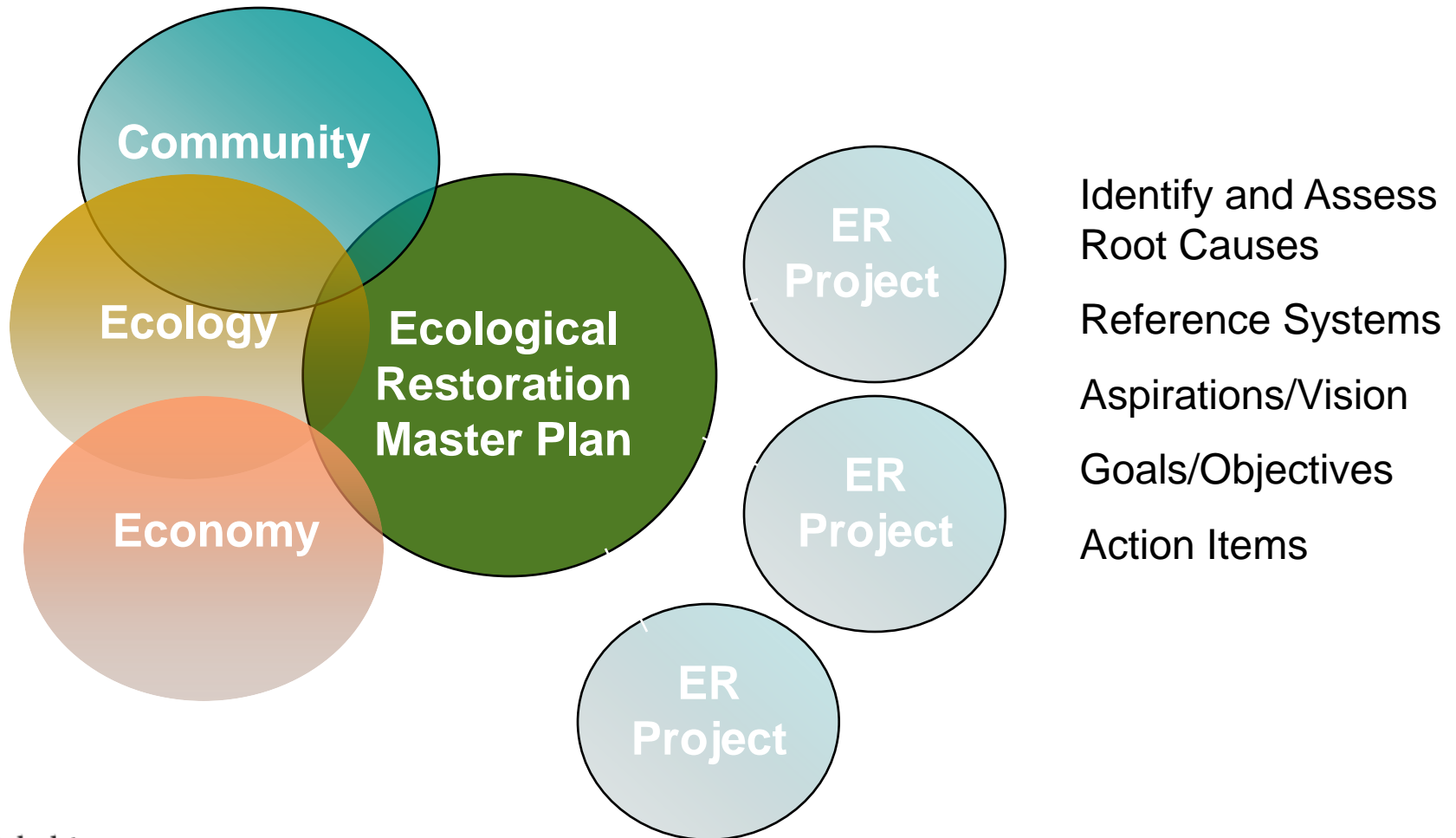
### Ecological Restoration Master Plan



## MASTER PLANNING PROCESS



## MASTER PLANNING PROCESS

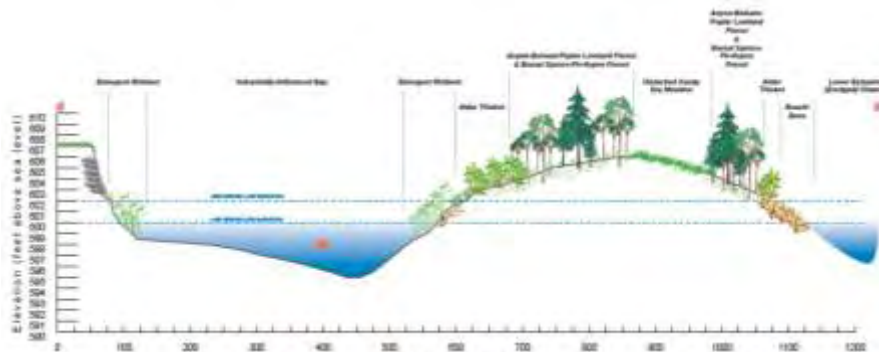
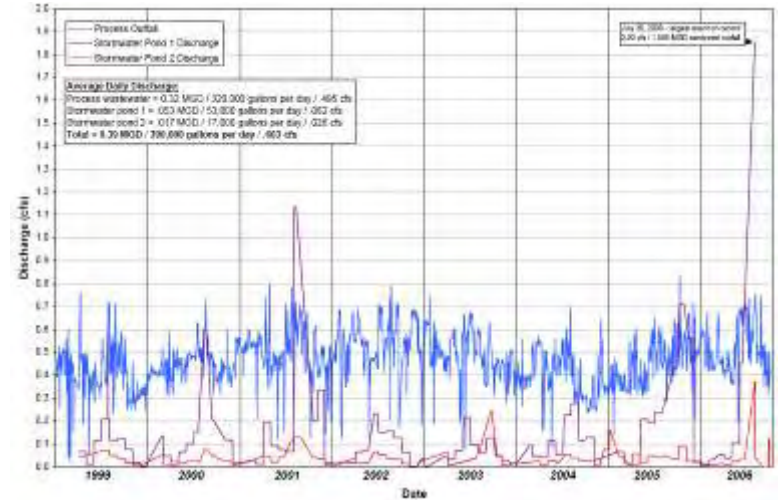


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## MASTER PLANNING PROCESS

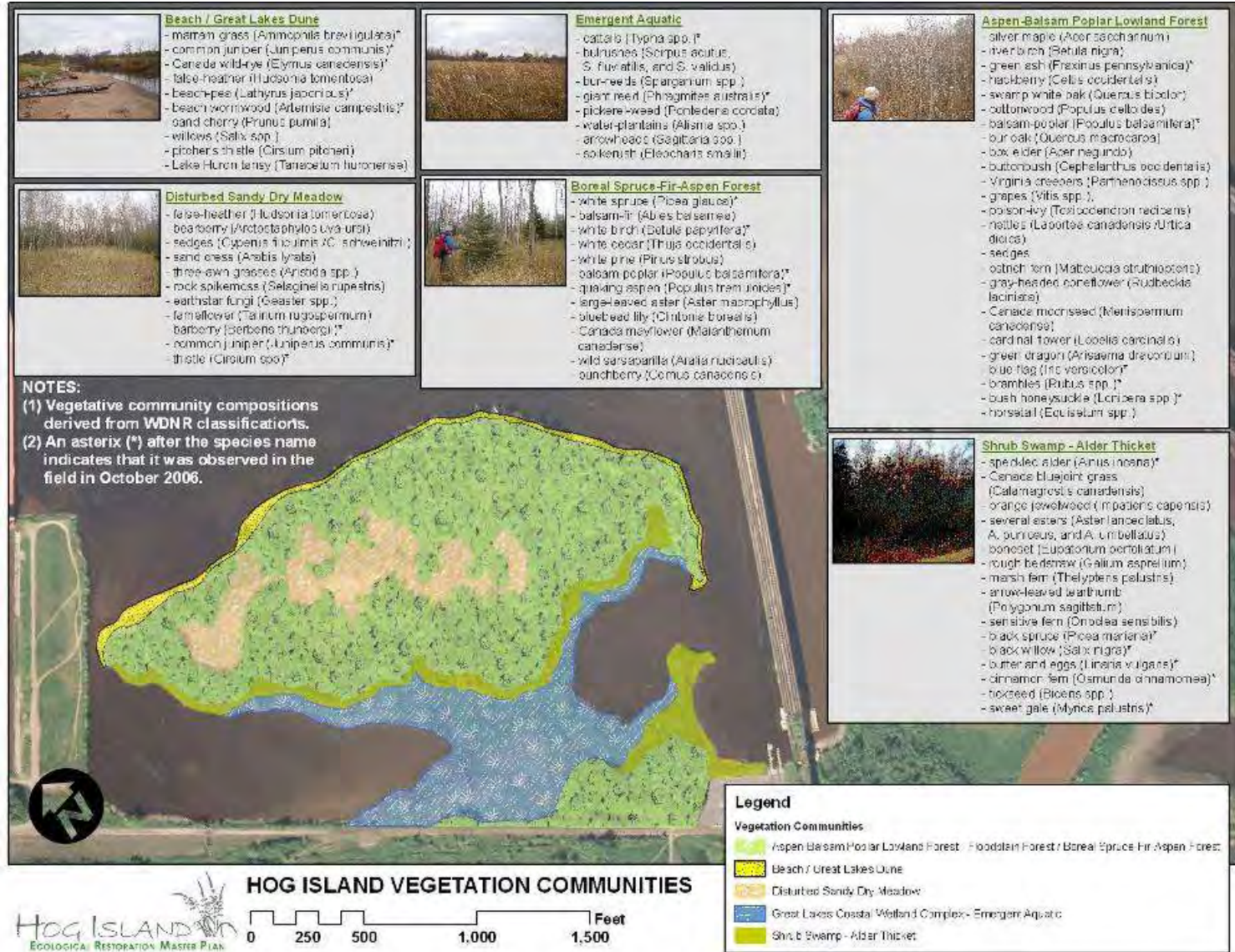
### Science driven process

- Utilizes best current scientific information:
  - WDNR, MDNR datasets
  - St Louis River Habitat Plan
  - Geospatial datasets
  - Field observations and data collection
  - Local ecological reference conditions



# The Hog Island and Newton Creek Ecological Restoration Master Plan

## Template for Restoration in a Lake Superior Area of Concern



# The Hog Island and Newton Creek Ecological Restoration Master Plan

## Template for Restoration in a Lake Superior Area of Concern

### Species of Probable or Confirmed Breeding Status - Quad 4609261 Block CE (Which Contains Hog Island and Newton Creek):

Alder Flycatcher  
 American Black Duck  
 American Crow  
 American Goldfinch  
 American Kestrel  
 American Redstart  
 American Robin  
 Baltimore Oriole  
 Barn Swallow  
 Belted Kingfisher  
 Black-and-white Warbler  
 Black-billed Cuckoo  
 Black-capped Chickadee  
 Blue Jay  
 Blue-winged Teal  
 Broad-winged Hawk  
 Brown Thrasher  
 Brown-headed Cowbird  
 Canada Goose  
 Canada Warbler  
 Chestnut-sided Warbler  
 Chimney Swift  
 Chipping Sparrow  
 Clay-colored Sparrow  
 Cliff Swallow  
 Common Grackle  
 Common Nighthawk  
 Common Tern  
 Common Yellowthroat  
 Downy Woodpecker  
 Eastern Bluebird  
 Eastern Kingbird  
 Eastern Phoebe  
 Eastern Wood-Pewee  
 European Starling  
 Golden-winged Warbler  
 Gray Catbird  
 Great Blue Heron  
 Great Crested Flycatcher  
 Great Horned Owl  
 Hairy Woodpecker  
 Herring Gull  
 House Finch  
 House Sparrow  
 House Wren  
 Indigo Bunting  
 Killdeer  
 Least Flycatcher  
 Mallard  
 Merlin  
 Mourning Dove  
 Mourning Warbler  
 Nashville Warbler  
 Northern Flicker  
 Ovenbird  
 Pine Siskin  
 Purple Finch  
 Red-breasted Nuthatch  
 Red-eyed Vireo  
 Red-winged Blackbird  
 Ring-billed Gull  
 Ring-necked Pheasant  
 Rock Pigeon  
 Rose-breasted Grosbeak  
 Ruby-throated Hummingbird  
 Savannah Sparrow  
 Sedge Wren  
 Sharp-shinned Hawk  
 Song Sparrow  
 Spotted Sandpiper  
 Swamp Sparrow  
 Tree Swallow  
 Warbling Vireo  
 White-breasted Nuthatch  
 White-throated Sparrow  
 Wilson's Snipe  
 Yellow Thrush  
 Yellow Warbler  
 Yellow-bellied Sapsucker  
 Yellow-billed Cuckoo  
 Yellow-rumped Warbler



\*Nearby Wisconsin Point is an approved Important Bird Area (IBA) as defined by Bird Life International and the Audubon Society

\*Hog Island and Newton Creek offer a diverse combination of desirable bird habitats, including open water, beaches, and a wide variety of wetland and forest communities in close proximity to each other.



\*Many bird migrants avoid flying over large bodies of water and when confronted with the western coast of Superior follow the shoreline to the inviting habitats of the Lower St. Louis River and estuary. Wetlands in particular provide the migrants and resident bird populations with food in the form of tubers, seeds and other plant parts as well as fish and invertebrates.



\*Colonial nesting birds such as gulls, terns, plovers, and herons comprise the most abundant, and sensitive, breeding birds that inhabit the harbor area



\*Declining populations of piping plover and, to a lesser extent common tern, have made these two species individual conservation targets of the Lower St. Louis River Habitat Plan. The piping plover and the common tern share similar habitat needs and the two species have demonstrated a willingness to share nesting habitat. Habitat creation for these two species on the edges of Hog Island may be possible.



\*A bald eagle nest has been identified on the site, and an eagle was spotted on the island during field reconnaissance in October, 2005.

\*The Bong Bridge over the harbor is listed on the Minnesota Natural Heritage Database as a nesting area for peregrine falcon

- \*Milestones for Birds (LSLRHP):
- Populations of the common tern and the piping plover (threatened and endangered species), great blue herons, and mallards are not declining due to alteration, loss of physical habitat or exposure to contaminants.
  - A breeding population of piping plover is re-established in the estuary.
  - Public lands within the AOC are managed to ensure that appropriate habitat exists for at least one great blue heron rookery.
  - The breeding population of common terns in the Lower St. Louis River is maintained at its current (2004) level.
  - No common tern chicks with cross-bills are found at Interstate Island.

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## MASTER PLANNING PROCESS

Stakeholder driven process



## MASTER PLANNING PROCESS

### Defining the Project Vision:

- A statement of a desired future condition
- Basis for restoration actions



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NATURE, TRAILS, Fish  
AT  
HOG ISLAND

There's more to our shore  
HOG ISLAND AREA  
PRISTINE NATURE IN AN URBAN  
SETTING

Hog Island -  
An Island As Nature would Like it.

WILD RICE IS NICE  
PROUD HOME OF SHELTERED BAYS

Hog Island -  
Urbanization in Harmony with Nature

FUNCTIONAL BENEFITS FOR  
EVERYONE - EQUAL OPPORTUNITY  
NATURE! HOG ISLAND, WI.

Hog Island

Voted Best Stopover for Migratory  
Birds

Bong Museum Hog Island  
SAFE LANDINGS

BIRDS ARE HOG WILD  
FOR HOG ISLAND



WETLAND PROTECTION ALONG BIRD MIGRATION ROUTES WORKS!

Hog Is. - A Superior Landmark & Site

AMAZING MIGRATORY BIRD VIEWING  
HOG ISLAND, SUPERIOR WI

LAHTI'S LOON LANDING

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NUMBER OF TIMES MENTIONED



Nature

Wildlife habitat

Birds

Fish

Wild rice

Wetlands

Shallow / sheltered bay

Corridor / connections

Function

Value

Water quality

Ecological flows

City of Superior

Human use

Publicly owned

Safety

Public access

Fishing

Trails

Bird viewing

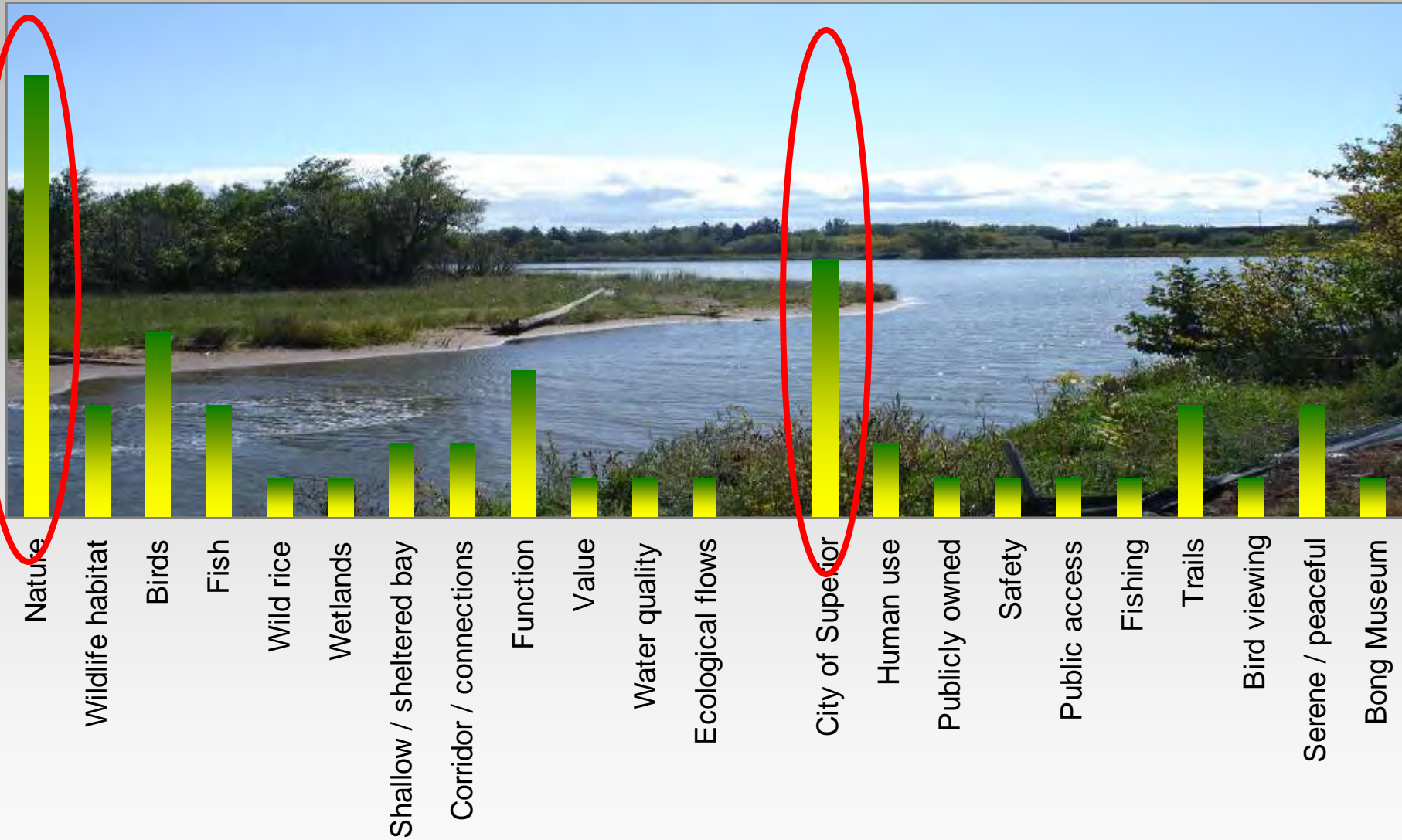
Serene / peaceful

Bong Museum

ATTRIBUTES MENTIONED IN VISIONING EXERCISE

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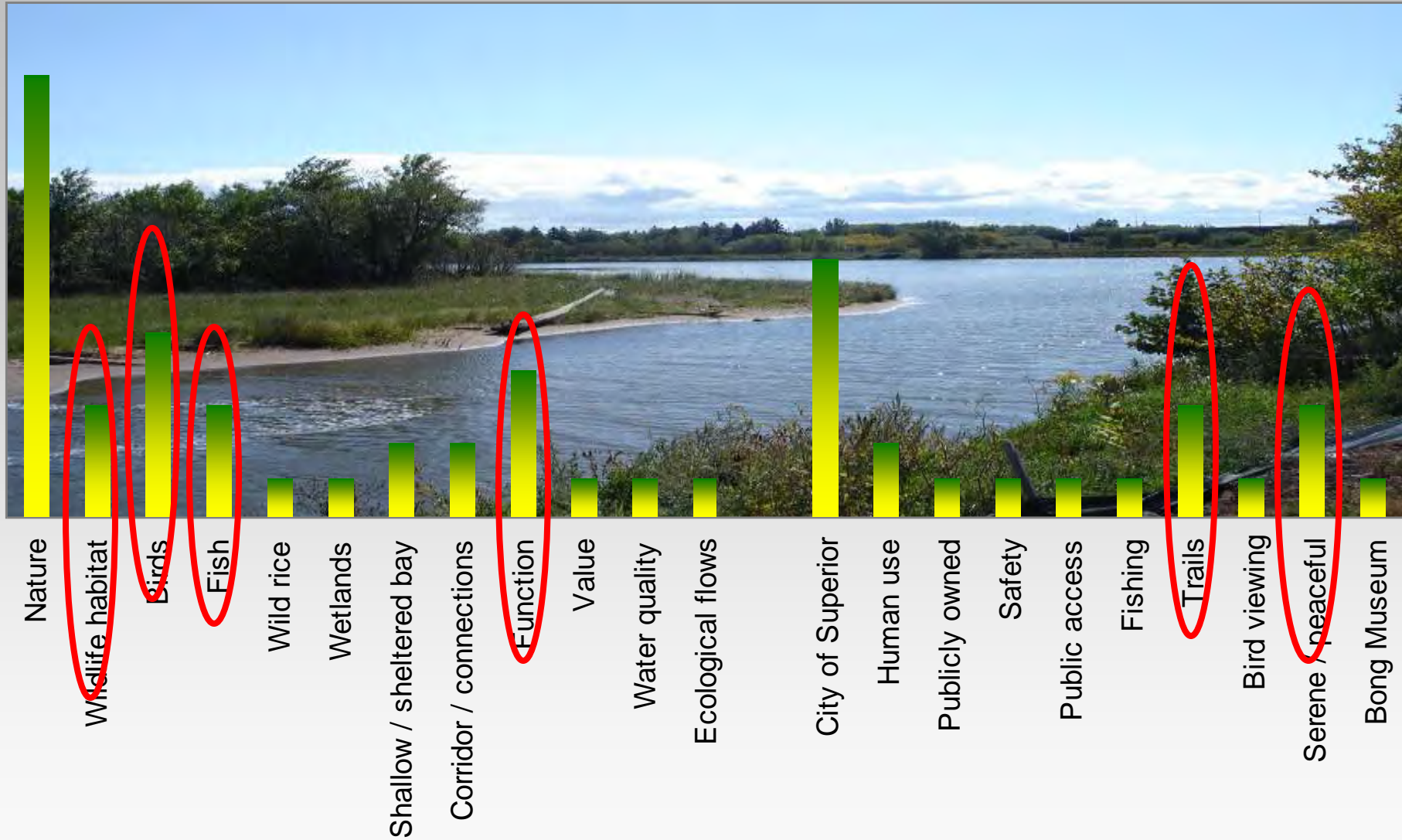
NUMBER OF TIMES MENTIONED



ATTRIBUTES MENTIONED IN VISIONING EXERCISE

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NUMBER OF TIMES MENTIONED



ATTRIBUTES MENTIONED IN VISIONING EXERCISE

## MASTER PLANNING PROCESS

### Project Vision

*“Restore natural, diverse, and self-sustaining ecosystems in Hog Island, the Hog Island inlet, and the Newton Creek watershed.”*

*“Make this project a leading example for Great Lakes ecosystem restoration efforts, and provide serene, safe natural areas for the residents of the City of Superior and Douglas County.”*



## MASTER PLANNING PROCESS

### Ecological restoration guiding principles

- Provides attributes for restored ecological systems.
- Used to help determine goals, objective, and actions.
- Provides ecological benchmarks – “how do we know when we have succeeded?”



## *Template for Restoration in a Lake Superior Area of Concern*

“Hog Island and Newton Creek should be self-sustaining to the same degree as the reference ecosystem, and have the potential to persist indefinitely under existing environmental conditions. As in any intact ecosystem, the species composition and other attributes of a restored ecosystem may evolve as environmental conditions change.”



“Newton Creek should be restored to its original, pre-development morphology.”



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**Template for Restoration in a Lake Superior Area of Concern**

Restoration Attribute	<i>I strongly disagree</i>	<i>I mostly disagree</i>	<i>I'm not sure</i>	<i>I mostly agree</i>	<i>I strongly agree</i>	
Integrated into a larger ecological matrix or landscape	0	0	2	6	7	
Maximize diversity of habitat	0	1	1	4	5	
Watershed-wide strategies	0	0	1	5	13	
Maximize the use of volunteers, and provide educational opportunities	0	0	4	2	10	
Restrict human uses which compromise long-term ecological sustainability	0	3	1	7	8	
Indigenous species present	0	4	1	5	7	
Integrate the goals of the Lower St Louis River Habitat Plan	0	0	5	4	12	
Functional groups present	0	3	2	6	1	
Reproducing populations present	0	2	1	9	6	
Characteristic assemblages of species that occur in a reference ecosystem	0	0	4	10	6	
Self-sustaining	1	2	3	8	5	
Permanent protection through direct acquisition, conservation easement, or other conservation methods	0	0	4	14	2	
Planning and design process should remain flexible, to allow for the integration of new information and stakeholder interests	0	0	3	10	6	
Potential threats should be eliminated or reduced	0	2	3	7	4	
Resilient to endure normal periodic stress	0	0	1	8	6	
Signs of ecological or physical dysfunction should be absent	0	7	4	4	0	
No active restoration initiatives need to be performed	2	6	6	1	0	
Recreation and human access to Hog Island and Newton Creek should be maximized	4	7	6	3	0	
Level of maintenance or human intervention should be controlled to limit the natural succession of the site	3	5	2	1	0	
Should be restored to its original, pre-development morphology	9	7	3	1	0	
We should take a 'wait and see' attitude"	6	5	4	2	0	
	<b>1 year</b>	<b>10 years</b>	<b>20 years</b>	<b>30 years</b>	<b>40 years</b>	<b>50 years+</b>
Timeframe for the realization of the VISION	2	3	5	3	1	0

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**GUIDING PRINCIPLES:**

- Functional groups are present, or they have the ability to successfully colonize.
- Reproducing populations of target species are present.
- Characteristic assemblages of species / communities as in reference ecosystems are present.
- Indigenous species are present.
- Self-sustaining natural communities are present.
- Potential ecosystem threats are eliminated or reduced.
- Ecosystems are resilient to normal ranges of ecological stress.
- The restoration site is integrated into a larger ecological landscape.
- Habitat diversity is maximized.
- The goals of the LSLRHP are integrated.
- Sensitive ecological areas are placed under permanent protection.
- Restoration and resources management occurs according to watershed-planning principles.
- Educational and volunteering opportunities are integrated.
- Human uses which compromise long-term ecological sustainability are restricted.
- The plan is flexible, allowing integration of new ideas and stakeholders.

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## MASTER PLANNING PROCESS

### Ecological restoration opportunities

- Habitat enhancement / protection
- Invasive species control
- Methods for specific restoration techniques
- Minimizing pollution impacts
- Limiting human use and access
- Recreational opportunities
- Education and public awareness
- Stakeholder support
- Funding
- Monitoring



The Hog Island and Newton Creek Ecological Restoration Master Plan  
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## MASTER PLANNING PROCESS

### Goals, Objectives and Actions

- GOAL A – Improve water and sediment quality conditions in Newton Creek and the Hog Island inlet and reduce the threat of future contamination.
- GOAL B – Ecosystem conservation and protection for ecologically sensitive habitat areas
- GOAL C – Restore selected habitat components according to the Guiding Principles.
- GOAL D – In conjunction with restoration actions, create recreational, educational, and environmental stewardship activities for the City of Superior and Douglas County residents

**2.1 Restoration Goals / Objectives / and Actions**

Goal A) Improve water and sediment quality conditions in Newton Creek and the Hog Island Inlet and reduce the threat of future recontamination.
<p><b>Objective A1) Maintain flows in Newton Creek to support aquatic and riparian habitat.</b></p> <p>Action 1) Determine appropriate natural flow regime for Newton Creek.</p> <p>Action 2) Meet with Murphy Oil to coordinate ecological restoration efforts with the nitrogen release schedule.</p>
<p><b>Objective A2) Wastewater management in upper watershed to limit nutrient and contaminant input into Newton Creek and Hog Island Inlet.</b></p> <p>Action 1) Meet with City of Superior to identify potential sources of pollution into Newton Creek, and develop recommendations for appropriate wastewater treatment management practices (BMP) to be installed.</p>
<p><b>Objective A3) Manage the threat of industrial contamination to water resources and sediments.</b></p> <p>Action 1) Monitor active risk reduction strategies. Use active monitoring to evaluate effectiveness of such strategies and commissions to project stakeholders.</p>
<p><b>Objective A4) Determine if contaminated sediments present in floodplain sediments along Newton Creek, or within the Hog Island Inlet. If warranted, remediate these areas using mechanical or biological techniques, as appropriate.</b></p> <p>Action 1) Determine if contaminated sediments reside along the shoreline of Hog Island Inlet and along the Newton Creek floodplain resources.</p> <p>Action 2) Monitor additional mechanical or biological sediment remediation activities. If phytoremediation is determined to be appropriate, establish demonstration and monitor.</p>
Goal B) Ecosystem conservation and protection for ecologically sensitive habitat areas.
<p><b>Objective B1) Place publicly held open areas and sensitive habitats into permanent protection through designation, with an emphasis on primary protection sites.</b></p> <p>Action 1) Meet with the City of Superior and Douglas County to permanently protect sensitive open public lands in Hog Island and within the Newton Creek watershed, with an emphasis on primary protection sites.</p>
<p><b>Objective B2) Encourage land owners to place privately held restoration areas and sensitive habitats into permanent protection with an emphasis on protecting primary sites.</b></p> <p>Action 1) Place private lands designated as priority restoration areas into permanent land protection or conservation status, including the purchase of parcels of the Ogdenburg Park and Burlington Heritage State Park properties along the shoreline of Hog Island Inlet.</p> <p>Action 2) Permanently protect privately-held riparian, wetland, and aquatic habitats within the upper Newton Creek watershed.</p>
Goal C) Restore selected habitat components according to the restoration guiding principles.
<p><b>Objective C1) Control selected invasive plant species.</b></p> <p>Action 1) Perform a comprehensive invasive plant species inventory and mapping throughout ecologically sensitive areas.</p> <p>Action 2) Establish a vegetation management plan to control weed canopy growth along Newton Creek.</p> <p>Action 3) Establish a vegetation management plan to control Phragmites control along the Hog Island shoreline areas.</p> <p>Action 4) Actively monitor for migration of exotic invasive plants from the adjacent landscape, especially along roadsides.</p>

*‘14 objectives and 29 action items’*

## HABITAT RESTORATION APPROACH

### Water Quality Objectives:

Secure ecologically optimal flows in Newton Creek (if possible) while maintaining flood protection.

Stormwater management in the Newton Creek watershed.

Maintaining protections against future industrial contamination.



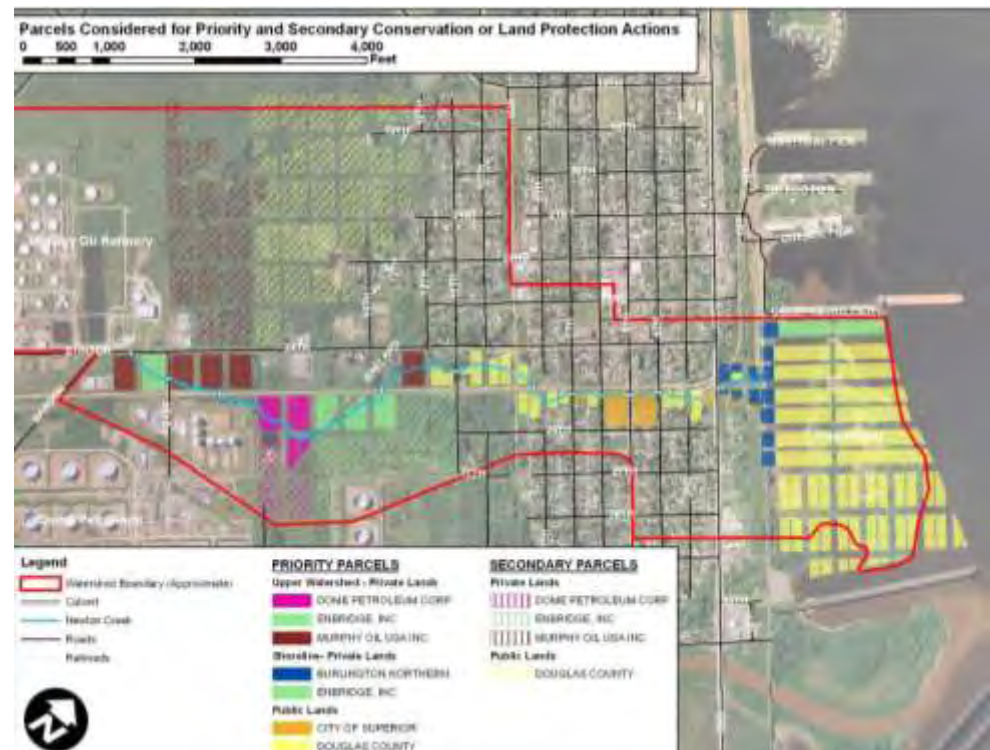
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## HABITAT RESTORATION APPROACH

### Land Protection Objectives

Place publicly-owned lands into permanent protection.

Encourage private landowners to conserve ecologically-sensitive areas.



## HABITAT RESTORATION APPROACH

### Habitat Restoration Objectives:

Plant shoreline and riparian buffers, remove barriers to connectivity.

Control invasive plants

Inventory and mapping.

Defining sustainable control strategies.

Monitoring.



## HABITAT RESTORATION APPROACH

### Ecological Restoration Plan

# Objective C1) Control selected invasive plant species.

*Restoration Trajectory:* Restore target assemblages of native plant species on Hog Island, Hog Island Inlet, and Newton Creek, and eliminate the threat from invasive exotics through the control of invasive species.



Invasive species management is identified as a major threat to the long term habitat sustainability across a wide range of habitat types in the project area. Invasive species management includes baseline assessment, monitoring, active control, passive control, and the combination of invasive species management with other types of projects such as stream restoration, wetland restoration, and reforestation. Priority non-native invasive species for control are reed canary grass (*Phalaris arundinaceae*), which occurs in abundance along the length of Newton Creek, and common reed (*Phragmites australis*), which is present in large stands in the Hog Island Inlet and shoreline. Purple loosestrife is not confirmed to exist in the project area, but should be carefully monitored to ensure that future invasion does not occur.

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## HABITAT RESTORATION APPROACH

**Action C1:1** Perform a comprehensive invasive plant species inventory and mapping throughout ecologically sensitive areas, research appropriate management strategies, and control invasive vegetation.

### Procedure:

- Perform invasive species inventory and mapping using field surveys. Prioritize areas designated for conservation and restoration actions, including Hog Island, the Hog Island Inlet shoreline, the Newton Creek riparian corridor, and vacant uplands in the Newton Creek watershed.
- For each invasive vegetative community identified in the survey, research appropriate control strategies compatible with habitat restoration goals, and create an invasive species management plan that details the implementation of each control mechanism (see Actions C1:2 and C1:3 below).
- Synchronize control efforts with habitat restoration actions throughout the project site.

**Reference conditions:** N/A

**Affected area / size:** ~200 acres.

**Implementation timeline:**

0 1 2 3 4 5 10 15 20+

*Years from Master Plan adoption*

**Range of estimated costs:** \$50,000 - 75,000 for the inventory  
\$15,000 for the invasive species management plan  
\$5,000 / acre for control

**Total estimated cost:** \$65,000 - \$90,000 not including any control.

**Permitting requirements:** Any method of invasive vegetation treatment will likely require approval by state and federal agencies.

**Pre-implementation needs:** Existing invasive species mapping data (if available).

## HABITAT RESTORATION APPROACH

### Habitat Restoration Objectives:

Enhance wetlands and open water habitats:

- Wild rice

- “Floating bog” habitats

- SAV

- Large Woody Debris

Enhance migratory bird habitats.

Initiate post-project monitoring for restoration actions.



## Template for Restoration in a Lake Superior Area of Concern

### HABITAT RESTORATION APPROACH

Action	Loss of fish and wildlife habitat	Restrictions on fish and wildlife consumption	Eutrophication or undesirable algae	Degradation of fish and wildlife populations	Fish tumors or other deformities	Degradation of benthos	Restrictions on dredging activities	Beach closings	Degradation of aesthetics
	Beneficial Use Impairments (BUI)								
Action C3:1 - Restore sustainable, reproducing communities of wild rice in the Hog Island inlet and along the shoreline.	✓								✓
Action C3:2 - Expand areas of emergent wetland vegetation or create "floating log-bog" wetlands in the northwestern and southwestern areas of the inlet.	✓			✓					✓
Action C3:3 - Expand areas of wetland vegetation into the seiche-influenced areas of Newton Creek (below the 2nd St culvert).	✓		✓	✓		✓			✓
Action C4:1 - Use large woody debris in the open waters of Hog Island inlet to provide vertical habitat structure.	✓			✓					✓
Action C4:2 - Restore populations of SAV in the open water areas of Hog Island inlet.	✓			✓		✓			✓

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## LESSONS LEARNED

Remediation is a very necessary first step, but in itself will not lead to delisting of the habitat-related BUIs.

Stakeholders must be engaged throughout the entire process.

The more stakeholders – the better the plan

Geographic and temporal scales need to be defined upfront and incorporated throughout the planning process



## LESSONS LEARNED

Incorporating the social, political and economic context within the plan is critical to its success.

Global and landscape-wide processes need to be considered and addressed.

Habitat restoration CAN be used at the site level to effectively address habitat-related BUIs.



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**Thank You!**

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The Hog Island and Newton Creek Ecological Restoration Master Plan  
*background*  
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**Conservation Planning**



**Ecological Restoration**



**Regenerative Design**

*Envision a world where the earth's complex living systems are intricately linked and delicately balanced with their surroundings. Where your actions conserve critical habitat; where your project restores ecological processes; or where your footprint regenerates natural systems.*

## Biohabitats' Team

### ECOLOGICAL SCIENCES

aquatic ecologists  
terrestrial ecologists  
restoration ecologists  
conservation biologists  
geologists  
hydrogeologists  
fluvial geomorphologists  
foresters  
soil scientists

### ENGINEERING

ecological engineers  
civil engineers  
water resource engineers

### DESIGN

landscape architects  
natural resource planners

### SUPPORT

GIS Technicians  
CAD Technicians  
construction managers



# Template for Restoration in a Lake Superior Area of Concern

Keith Bowers, RLA, PWS

founder/principal; landscape architect/  
restoration ecologist; 25 yrs exp;  
Chair Society for Ecological Restoration  
International

Joseph Berg, PWS

senior ecologist; 24+ yrs exp.; professional  
wetland scientist

Ellen McClure

senior fluvial geomorphologist; 9 years exp.

Brendan DeTemple

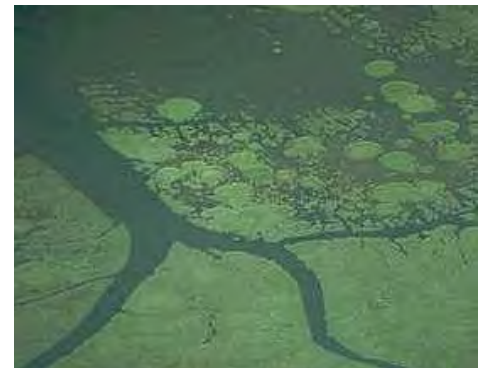
PhD candidate; specializes in hydraulics  
and sediment transport; 4 yrs exp.

Michael Lighthiser, P.E.

water resources engineer; 9 yrs exp.

Edward Morgereth

senior ecologist, 20 yrs exp.



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