Restoration Vision for Allouez Bay

Level 2 Analysis

DRAFT FOR PARTNER REVIEW

Lake Superior Headwaters Sustainability Partnership

Prepared by

Minnesota Land Trust

September, 2022

ACKNOWLEDGEMENTS

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Thank you to the following individuals who served as members of the Lake Superior Headwaters Partnership Advisory Group:

- Reena Bowman, U.S. Fish and Wildlife Service
- Linda Cadotte, City of Superior
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- Tom Estabrooks, Minnesota Pollution Control Agency
- Dustin Haines, Lake Superior Reserve (currently University of Minnesota - Duluth)
- Cherie Hagen, Wisconsin Department of Natural Resources
- Joel Hoffman, U.S. Environmental Protection Agency - Great Lakes Toxicology and Ecology Division Laboratory
- Kate Kubiak, City of Duluth
- John Lindgren, Minnesota Department of Natural Resources
- Nancy Schuldt, Fond du Lac Band of Lake Superior Chippewa
- Melissa Sjolund, Minnesota Department of Natural Resources

This project was managed by Gini Breidenbach, PE, St. Louis River Restoration Program Manager for the Minnesota Land Trust with support from Daryl Peterson, Director of Restoration Programs, and Ruurd Schoolderman, Protection Program Manager.

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1 INTRODUCTION

The Allouez Bay geographic zone was selected to test the planning framework established for the Lake Superior Headwaters Sustainability Partnership (Headwaters Partnership) and serves as a prototype of the "Level 2 analysis". The Lower St. Louis River Landscape Conservation Design Scoping Report (Minnesota Land Trust, 2021) describes the planning framework under which this restoration vision was developed. The intent of the Level 2 analysis is to establish a partner- and community-supported vision for restoration on a meso-scale within the large Lake Superior Sustainability Partnership Region (Figure 1), such that individual projects that may be undertaken by partners within the geographic zone can align with and contribute to achievement of the restoration vision over time.

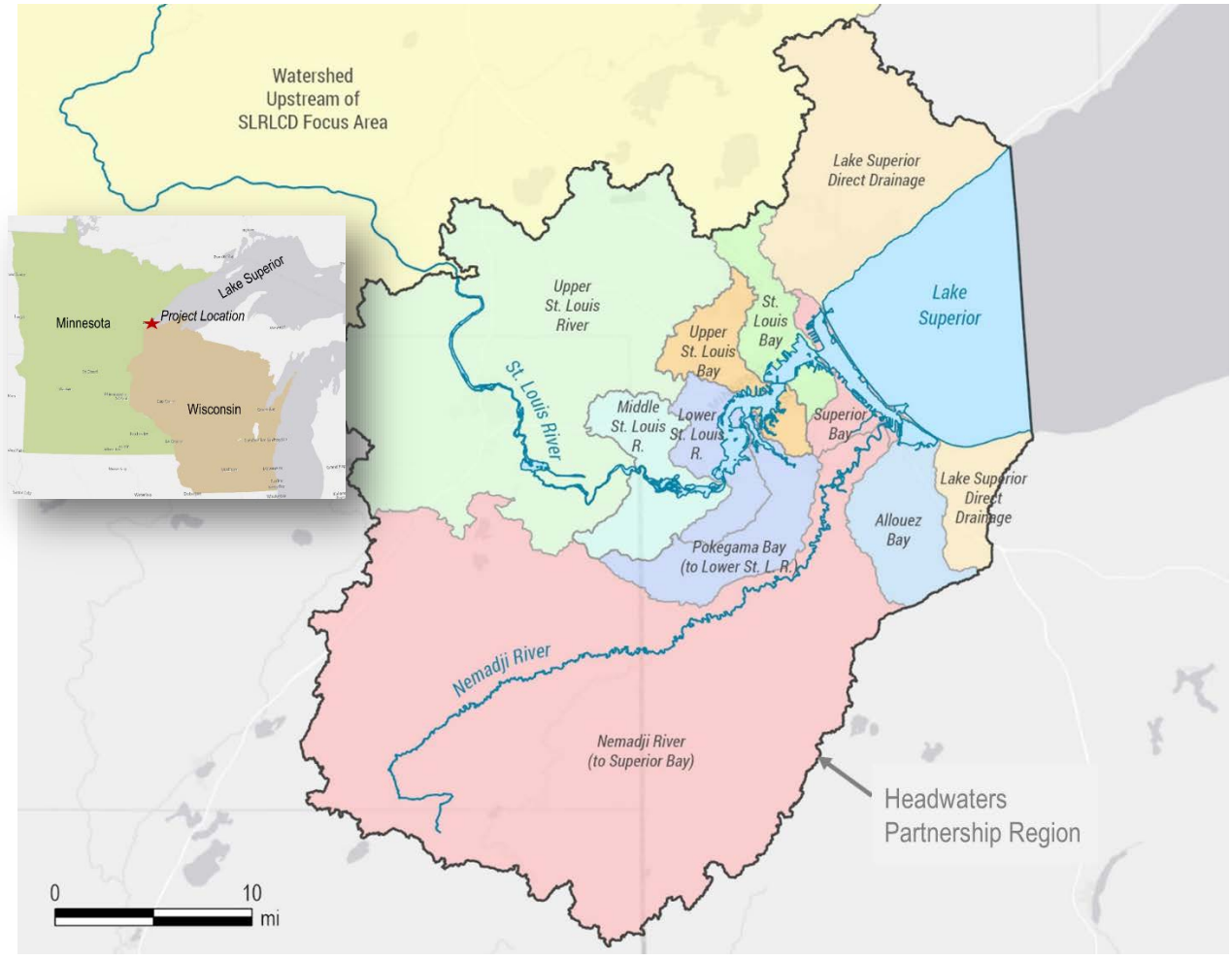

Figure 1: Geographic Zones within the Headwaters Partnership Region

The restoration vision for Allouez Bay was developed based on information gathered from a large group of partners (Appendix A) working within the geographic zone. A series of team meetings and workshops were held

to discuss available information, current conditions, and information gaps and to develop the components of the restoration vision presented herein. An understanding of community values was developed through outreach efforts conducted by the Lake Superior Research Reserve.

2 SITE DESCRIPTION

The Allouez Bay geographic zone is located on the east side of the Headwaters Partnership region (Figure 1). It's contributing watershed is approximately 20,000 acres in size with two main tributaries, Bear and Bluff Creeks. Allouez Bay is separated from Lake Superior by the 3-mile-long Wisconsin Point coastal barrier spit. Allouez Bay is influenced by the Nemadji River under certain flow conditions, as well as Lake Superior.

This section describes historical conditions and current conditions relevant to the restoration vision for Allouez Bay, as well as a comparison of these as it pertains to the physical configuration of Allouez Bay.

2.1 HISTORICAL CONDITIONS

Wisconsin Point was settled by Ojibwe people sometime in the mid to late 1700's. A small settlement led by Chief Joseph Osaugie occupied the area. Osaugie family members provide valuable oral histories of conditions in Allouez Bay. Their stories tell of Allouez Bay teeming with waterfowl and full of wild rice. Families gathered both rice and medicinal plants in the area. Cultural and historic resources on Wisconsin Point are described in the Wisconsin Point Management Plan (NRPC, 2012).

The 1863 Hearding map (Bureau of Topographical Engineers of the War Department, 1863) is one of the oldest known maps of the St. Louis River estuary and provides valuable information about the location and extent of wetlands and other features within Allouez Bay (Figure 1). Extensive areas of floating vegetation were historically located in the southeast portion of Allouez Bay, and river islands and land spits on both the north and south formed a somewhat closed entrance to the bay.

Based on evaluation of aerial photography (Figure 2) and navigational charts (Appendix B), the spatial extent of wetlands in Allouez Bay has decreased over time. Koch (1981) mentions that this trend is opposite of what one might expect with the incoming streams providing significant sediment loads, but also recognizes that other factors, such was water level changes may be involved.

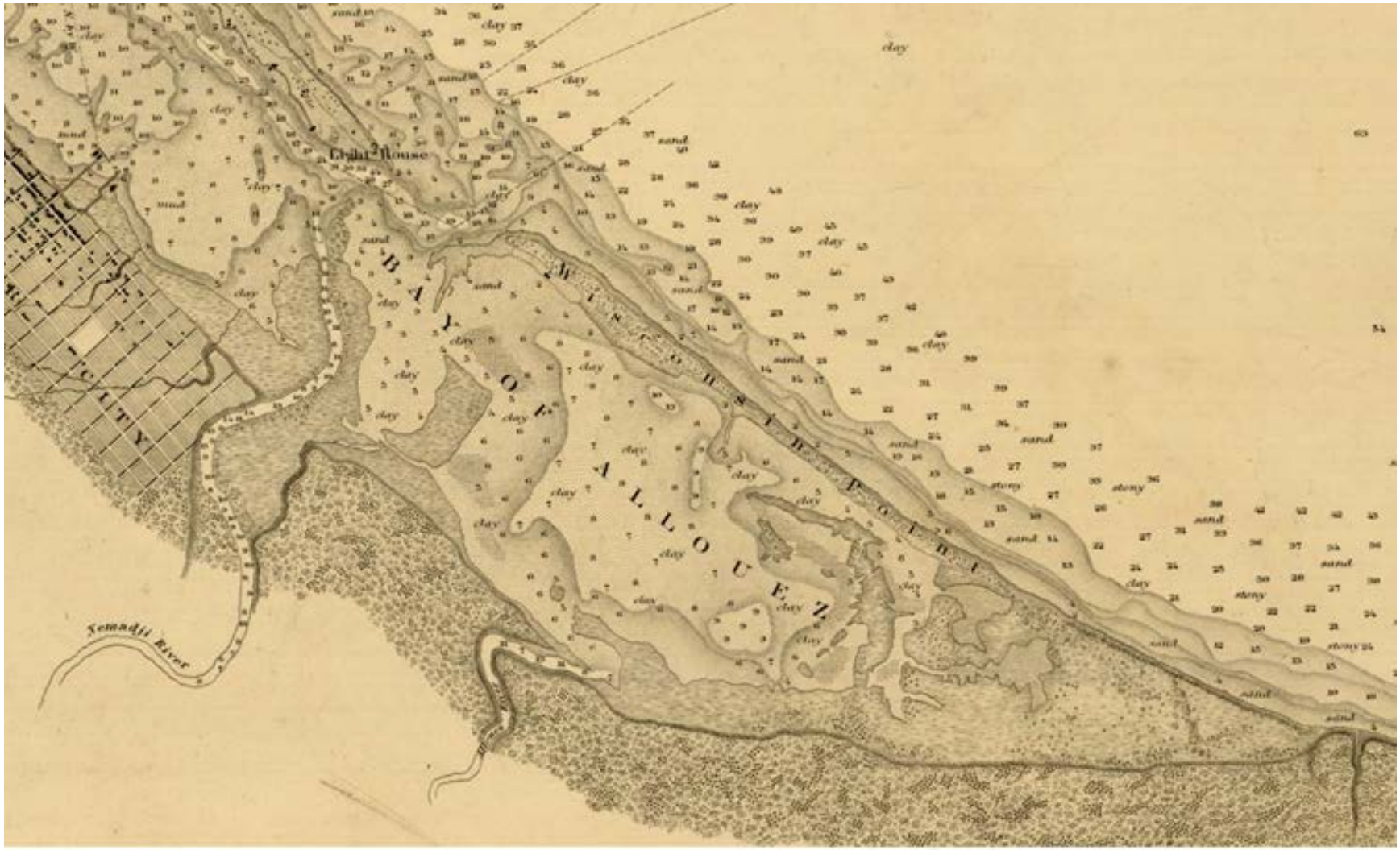

Figure 2: 1863 Hearding Map Zoomed in to Allouez Bay

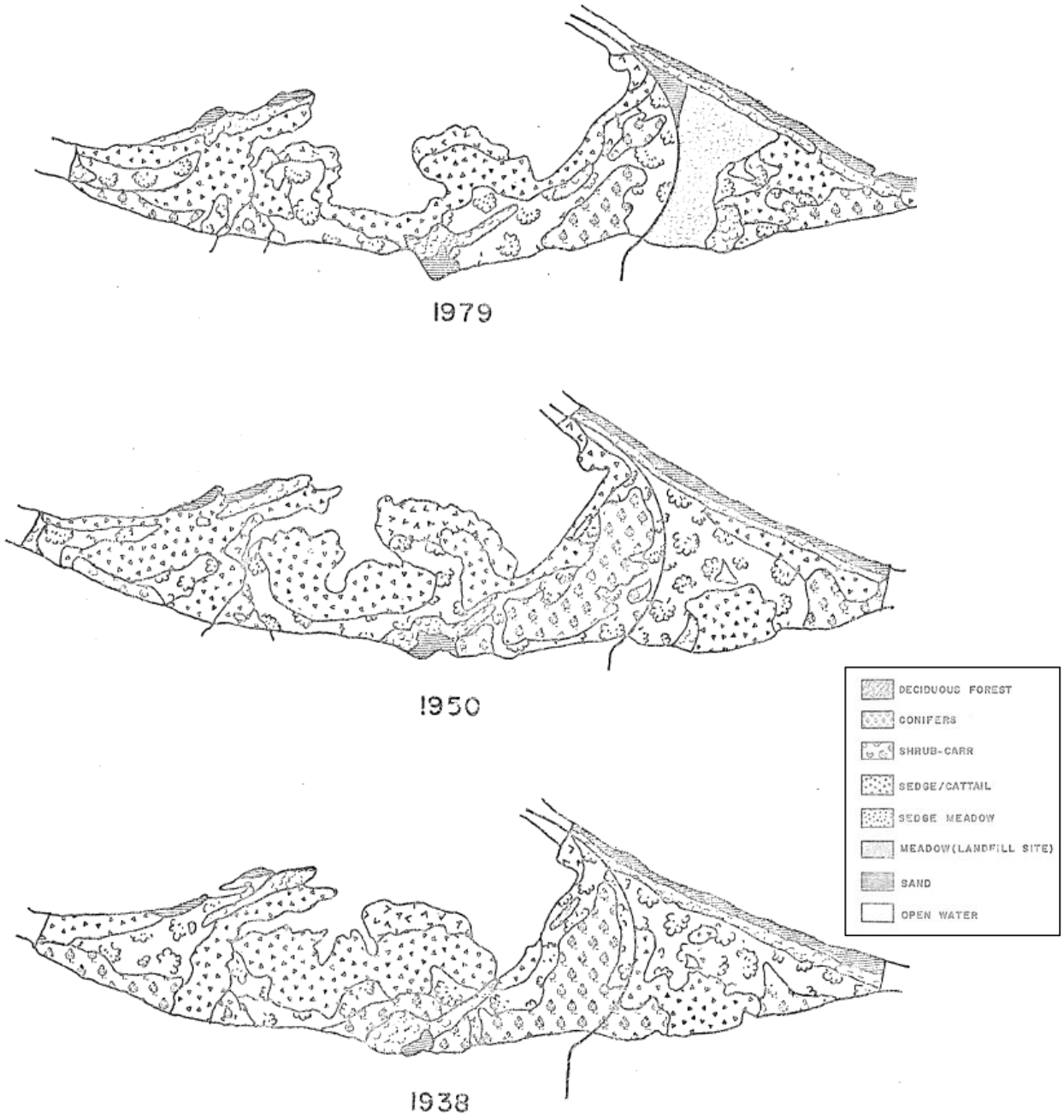

Figure 3: Vegetation Cover of the Allouez Bay Wetland as Interpreted from Aerial Photography (Source: Koch, 1981)

2.2 CURRENT CONDITIONS

Existing current and historical data and reports for Allouez Bay were shared by partners and stored in a Sharepoint site. This information was reviewed and then discussed by partners in a series of meetings with the intent of developing an understanding of what is known and unknown about conditions in Allouez Bay. This section presents a brief summary of known conditions for important physical and biological features in the bay. Uncertainties and information gaps are listed in Section 16.

Bathymetry and Relative Exposure Index

The most recent available bathymetry information for Allouez Bay (Figure 1) is from a 2012 dataset developed by the U.S. Environmental Protection Agency Great Lakes Toxicology and Ecology Division (USEPA GLTED) using LiDAR data, National Oceanic and Atmospheric Administration sounding data for the estuary, and bathymetric surveys conducted for specific remediation and restoration sites (SRA International, 2012).

Allouez Bay is generally shallow, with water depths less than 14 feet through most of the bay (Figure 1). A deep hole with water depths ranging from 14 to 20 feet exists in the southern portion of the bay.

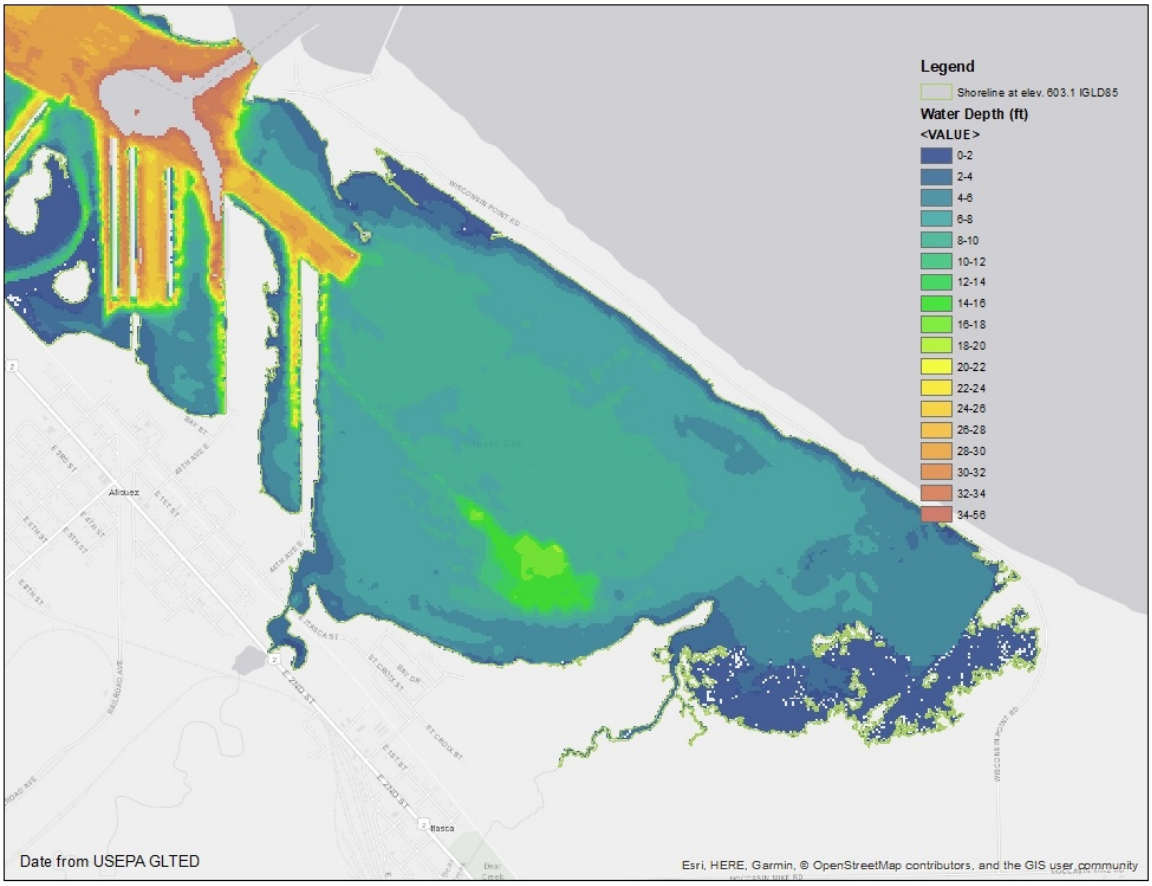

Figure 4: Water Depths with Shoreline at Elevation 601.1' IGLD85

The relative exposure index (REI) for the St. Louis River was developed by researchers at USEPA GLTED. The index integrates fetch distance by wind duration and wave height (a function of fetch, wind speed, and wind direction) into a scaled index, with higher numbers indicating exposure to higher wind and wave energy (Angradi et al, 2013). REI model results for Allouez Bay indicate that the wetlands in the southeast portion of Allouez Bay receive the greatest predicted wind and wave energy, likely due to the long fetch from Superior Bay into Allouez Bay (Figure 4). This information led partners to suspect that wind and wave energy may be contributing to the spatial loss of wetlands in the bay over time.

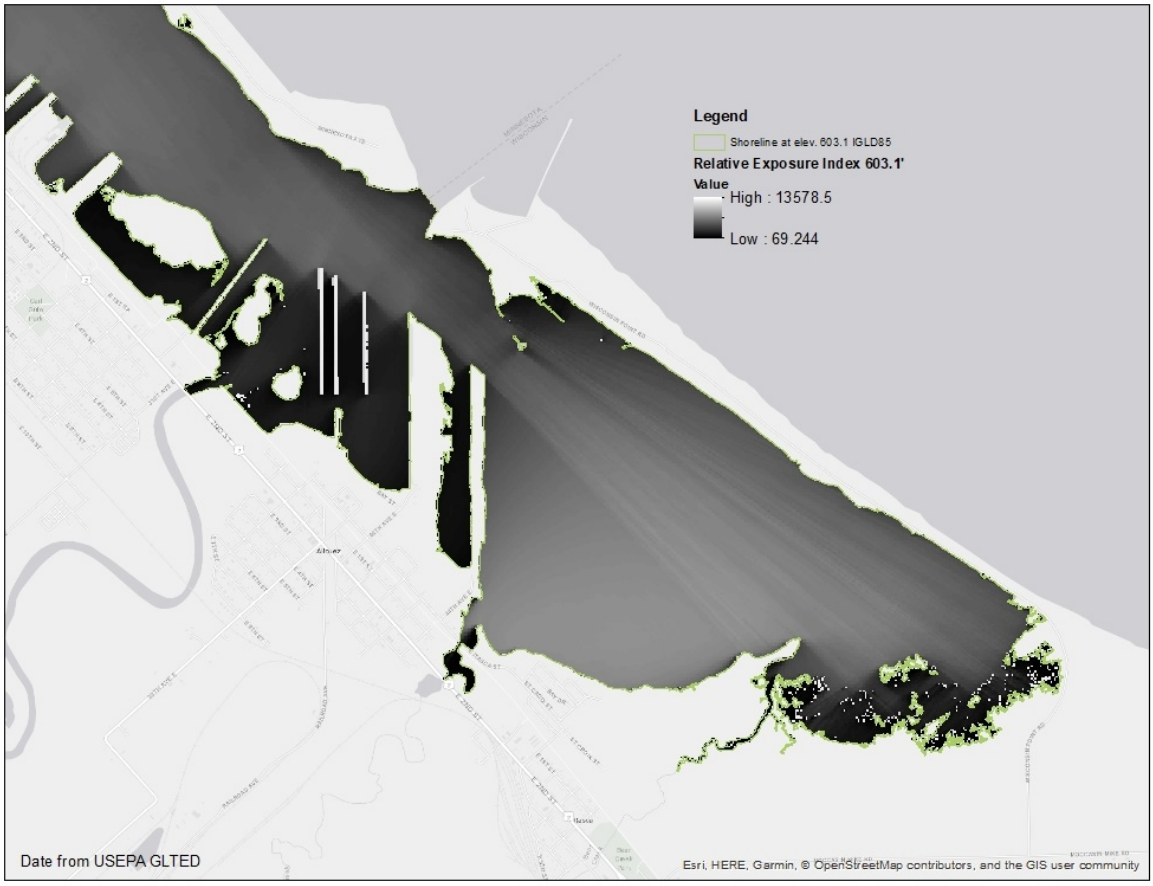

Figure 5: Relative Exposure Index for Allouez Bay with Shoreline at Elevation 603.1' IGLD85

Birds

Allouez Bay was historically regionally significant for breeding marsh birds and likely significant for shorebirds (breeding and stopover) and land bird stopover. Recent surveys indicate that breeding marsh birds are still present; nine of the ten selected focal species (see Section 4) were identified in monitoring completed in 2020 and 2021 (Bracey et al., 2022). However, it is thought that the density is lower than could be expected for the size of the marsh. Recent restoration of sandy shoreline within the restricted access Piping Plover restoration area is expected to support increased use by migrating shorebirds with the intent of supporting possible nesting of Piping Plover.

Coastal Wetlands and Wild Rice (Manoonmin)

The wetlands in the southeast portion of Allouez Bay consist of intact native plant communities with infestations of cattail, purple loosestrife, and other invasive species. A total of 84 native plant species and seven invasive species were identified in surveys conducted between 2011 and 2020 in submergent, emergent, and wet meadow areas (Hartsock et al., 2022). Based on oral histories, the extent of wetlands in the bay has been reduced significantly due to water level changes.

Cattail infestation is extensive in these wetlands (Figure 2), with the highest density populations existing along the along the shorelines of the floating mat and emergent marsh (Schwarting and Beaster, 2021).

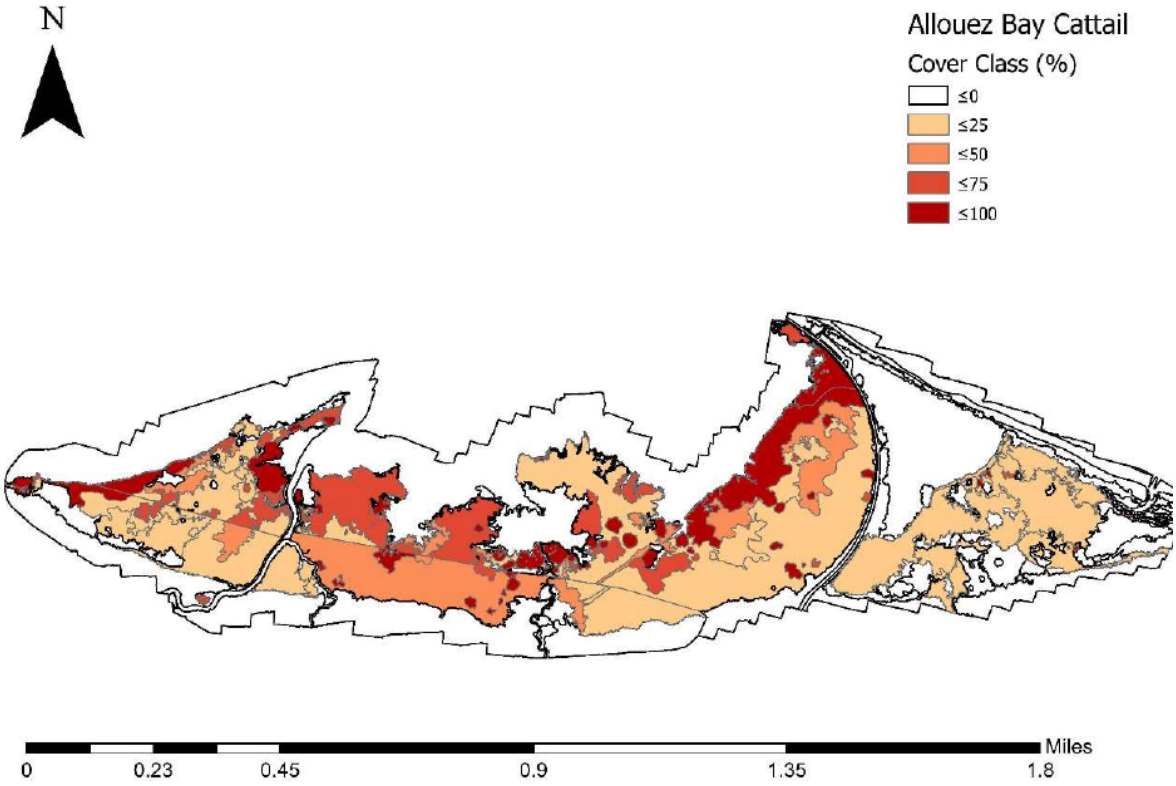

Figure 6: Cattail Cover in Allouez Bay Wetlands (Source: Schwarting and Beaster, 2021)

Wild rice restoration efforts have been underway in the bay since 2015. Wild rice grows well when it is protected from browsing geese and competition from invasive plant species (Beaster, 2021).

Many of the wetlands in the southeast corner of the bay have been cut off by the Moccasin Mike Road that leads to Wisconsin Point. Culverts under road are suspected to limit hydrologic exchange with the wetlands east of the road.

Fish

Allouez Bay has a viable recreational fishery supported by the varied habitat features such as shoreline and fringe wetlands and deeper, open water (Piszczek, 2021). The wetland habitats are critical for phytophilic spawners such as Northern Pike and Muskellunge, which use those habitats in the spring. They will also use those habitats for cover in the summer if water temperatures are suitable. The deeper, open water is used in the summer by Walleye and Lake Sturgeon; these species typically spawn near Fond du Lac, well up-river from Allouez Bay, during the spring. The bay also supports non-game species that serve ecological functions as well as a prey base (e.g., various sucker and minnow species).

Water Quality

Allouez Bay is clay-influenced and experiences elevated turbidity. Limited water quality data exists for the bay, and nutrient cycling processes are unknown. Based on paleolimnology results, open-water nutrient conditions are worse than they once were, and there are signs further eutrophication will occur (Reavie, 2020). The tributaries of Bear and Bluff Creeks are known to contribute significant sediment and nutrient loads to Allouez Bay (WDNR, 2020).

2.3 COMPARISON OF HISTORICAL AND CURRENT CONDITIONS

The wetlands in the southeast portion of Allouez Bay are of particular interest as a habitat feature due to their extent and the presence of high-quality native plant communities. REI modeling (Figure 4) indicates that a possible reason for the spatial decline of the wetlands may be due to increased wind and wave energy from human alternations. For comparison to current conditions, the REI model was run by staff from USEPA GLTED for historical conditions using a digitized, orthorectified version of the 1863 Hearding map created in GIS.

Comparison of the REI exposure index for current conditions and the historical conditions (Figure 5), confirms the hypothesis that prior to physical alterations in the bay, including construction of the Superior shipping entry, dredging of the navigation channel, and construction of piers in the bay, that wind and wave energy was less overall in the bay due to the presence of river islands, floating vegetation, and protective spits. This comparison led to the concept of creating more sheltered conditions in Allouez Bay to support expansion of the wetland area, as described in Sections 7 and 8.

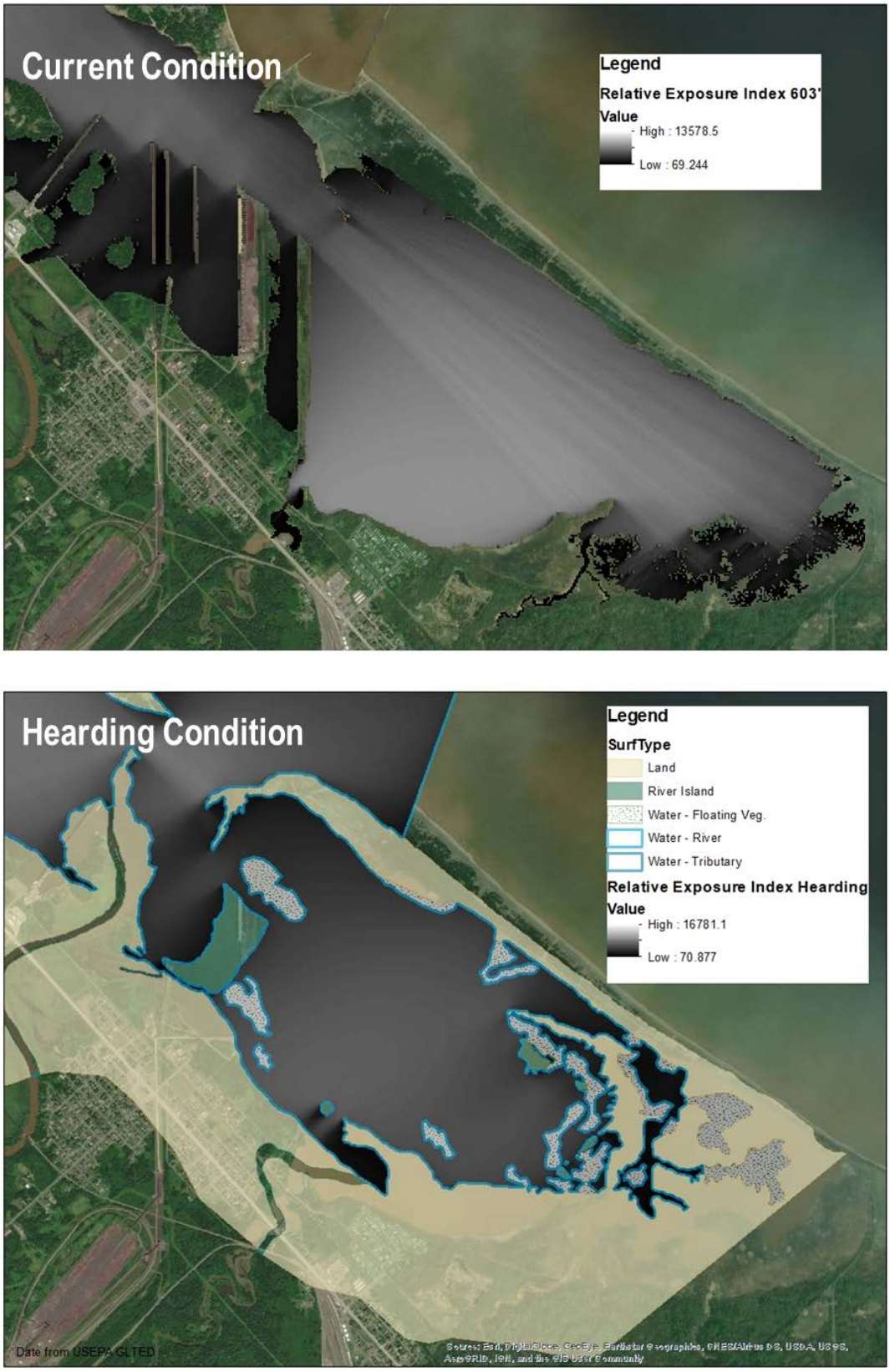

Figure 7: Comparison of Predicted Relative Exposure Index for Current Conditions and Historical Conditions

3 COMMUNITY VALUES

Allouez Bay is situated alongside the Itasca and Allouez neighborhoods in Superior. Many families have frequent and sometimes multi-generational experiences there. To better understand relationships with the Bay and inform thoughtful conservation planning that supports these relationships, the Lake Superior National Estuarine Research Reserve conducted a series of informal input sessions for community members.

To collect personal input in an informal setting, the Lake Superior Reserve Director created a poster showing maps of Allouez Bay past and present and set up a table at four community events spanning the time period of June to October.

The director had conversations with 34 community members over a four-month period in summer and fall 2021. This number does not include several very brief conversations where no substantial input was provided. Additionally, the director spoke with City Councilor Jenny Van Sickle, who represents the district.

The following themes emerged from the community input received:

1. Community members engage in and value opportunities to hunt, fish, gather and explore along Allouez Bay year-round and are interested in the fish and wildlife habitat provided by Allouez Bay.
2. Community members have observed some ecological losses or changes through time.
3. Most access to Allouez Bay from neighborhoods is unimproved, informal, or difficult. In most cases, improved access is desired.
4. Community members value the beauty and undeveloped nature of Allouez Bay and wish to see it preserved or restored.

The overall conclusion from the community input is that there is a need for increased community outreach. As the restoration process moves forward, it will be important to provide informational opportunities and seek guidance and input from community members at the neighborhood level to refine restoration projects. City Councilor Jenny Van Sickle recommended providing information at common neighborhood gathering locations such as churches and church socials, the popular and historic Belgian Club, and public schools, or soliciting input directly at the 44th Ave E boat launch. With urban neighborhoods so close to the area, knowledge, and engagement in the process of conservation can support overall community identity and well-being.

4 CONSERVATION TARGETS

Allouez Bay provides habitat for a wide variety of fish, wildlife, and plant species. The following animal, plant, and plant community conservation targets were established by partners for the Allouez Bay geographic zone:

Birds

- Bald Eagle (*Haliaeetus leucocephalus*)

- Osprey (*Pandion haliaetus*)
- Piping Plover (*Charadrius melodus*) and other migrating shorebirds
- Migrating songbirds
- Breeding marsh birds, focal species include:
    - American Bittern (Botaurus lentiginosus)
    - Least Bittern (Ixobrychus exilis)
    - Marsh Wren (Cistothorus palustris)
    - Sedge Wren (Cistothorus platensis)
    - Pied-billed Grebe (*Podilymbus podiceps*)
    - Sora (Porzana carolina)
    - Swamp Sparrow (Melospiza georgiana)
    - Virginia Rail (*Rallus limicola*)
    - Yellow-headed Blackbird (Xanthocephalus xanthocephalus)
    - Black Tern (Chlidonias niger)
- Waterfowl (excluding Canada Geese)

Fish

- Lake Sturgeon (*Acipenser fulvescens*)
- Muskellunge (*Esox masquinongy*)
- Northern Pike (*Esox Lucius*)
- Walleye (*Sander vitreus*)

Insects

- Hairy-necked tiger beetle (*Cicindela hirticollis rhodensis*)
- Alkali bluet (*Enallagma clausum*)

Reptiles

- Blanding's turtle (*Emydoidea blandingii*)

Mammals

- Muskrat (*Ondatra zibethicus*)
- Beaver (*Castor canadensis*)
- Mink (*Neovison vison*)
- Otter (*Lontra canadensis*)
- Franklin's Ground Squirrel (*Poliocitellus franklinii*)
- Northern Long-Eared Bat (*Myotis septentrionalis*)

Plants and Plant Communities

- Wild rice (*Zizania palustris*, Manoomin)
- Emergent marsh community
- Native submergent plant community
- Great Lakes dune community
- Great Lakes beach community
- Northern Dry-mesic Forest

5 PRIORITY INVASIVE SPECIES FOR CONTROL

The following invasive species are present in the Allouez Bay geographic zone and have been identified as important targets for management of impacts or potential impacts on habitat:

- Curly leaf pondweed (*Potamogeton crispus*)
- Emerald ash borer (*Agrilus planipennis Fairmaire*)
- Eurasian watermilfoil (*Myriophyllum spicatum*)
- Non-native cattail (*Typha angustifolia and Typha glauca*)
- Purple loosestrife (*Lythrum salicaria*)
- Phragmites (*Phragmites australis*)
- Yellow iris (*Iris pseudacorus*)

Consideration should also be given to prevention of future establishment of invasive species through appropriate restoration design and implementation. Aquatic habitat modifications should discourage colonization by non-preferred, non-native fishes such as goby and ruffe. These species are often found in and

among large substrates such as cobble and small and large boulders, particularly throughout the lower river and bays.

While not an invasive species, Canada Geese (*Branta canadensis*) present in Allouez Bay hinder wild rice reestablishment due to their herbivory on wild rice once germination occurs during the growing season. Therefore, population management of this species has been identified as an integral component of wild rice restoration efforts.

6 GUIDING PRINCIPLES FOR RESTORATION

The following principles were established by partners to guide restoration activities within the Allouez Bay geographic zone:

- Protect and maintain high quality habitats, while seeking opportunities to enhance degraded areas.
- Consider climate change by identifying adaptation and mitigation strategies as projects are implemented.
- Identify and seek to fill important data and knowledge gaps.
- Avoid unintended consequences (i.e., do not make things worse) through use of an integrated planning approach.
- Conduct meaningful community engagement with communities surrounding and using Allouez Bay.

7 ECOLOGICAL DESIGN GOALS

Based on the review of available information, identification of issues to be addressed, and community interviews, partners determined that the overall goal for restoration in Allouez Bay is to increase sheltered conditions in the bay to support extensive and diverse marsh habitat that supports fish, birds, and other wildlife that is valued by the community.

The following list of key features is intended to guide implementation of this vision:

- Reduce wind and wave energy in the eastern portion of the bay
- Protect existing high quality habitat areas
- Increase length of softened shoreline
- Increase area and density of aquatic vegetation
- Preserve existing off-channel deep water
- Protect, restore, and enhance habitat for the selected animal and plant conservation targets
- Maintain or increase cultural and recreational uses, including but not limited to: hunting, fishing,

gathering, birding, and paddling

- Increase public access for surrounding neighborhoods
- Maintain the undeveloped nature and natural beauty of the bay
- Protect cultural heritage of the area

8 RESTORATION VISION

The vision for restoration of Allouez Bay includes creation of a sheltered bay system that is functionally similar to what was historically present and is integrated into other habitats and community access objectives in Allouez Bay, Wisconsin Point, and the wetlands east of Moccasin Mike Road.

The restoration vision (Figure 1) includes protection, restoration & enhancement, and human access elements as described below. The numbers following each item correspond to the numbers on Figure 1.

Existing high quality habitat protection (1, 2, 3, 4, 5) – High quality habitat exists in a number of locations throughout Allouez Bay and its riparian areas. These include the pine forest and dune communities on Wisconsin Point; the restored limited access shorebird area; and portions of the wetlands on the southeast corner of Allouez Bay. These areas support a wide range of the conservation targets established for the area. Preservation of these habitats may include planning for climate resiliency, particularly as it relates to storm surge and water level fluctuations.

Sheltered bay creation (6, 7) – Establishment of sheltered conditions focuses on the reduction of wind and wave energy across the bay, which increased due to human alterations of the area, through the creation of underwater shoals. This reduction in energy will promote the presence of submerged, emergent, and floating leaf vegetation. Increased water clarity within the more quiescent areas of the site is anticipated. Bottom surface elevations will be established to support the presence of seasonal mudflats (Figure 2) to support migrating shorebirds as water levels fluctuate. The expansion of aquatic vegetation in the sheltered areas will increase the available habitat for fish, marsh birds, shorebirds, and aquatic mammals.

Deep water habitat preservation and enhancement (8) – The existing deep water habitat of 8-15 feet in Allouez Bay will be preserved and expanded. A connection will be made to the deep water of the navigational channel to support migration of fish throughout the system. Clean, organic and mineral soils and gravel are desired substrate. Deep, open water provides overwintering habitat for native fish species such as Walleye, Lake Sturgeon, Muskellunge, Northern Pike, Black Crappie, Bluegill, and Bass. Species such as Lake Sturgeon and Walleye use deep water habitat in the summer. Some benthic macroinvertebrates also utilize this habitat.

Wetland complex creation at mouth of Bluff Creek (9) – A wetland complex is desired at the mouth of Bluff Creek to reduce turbidity from the stream by providing opportunities for settling within the wetland vegetation. A wetland complex was historically present in this location.

Evaluate and address culverts for fish passage and hydrologic connection (10) – Culverts along Bear Creek will be evaluated for fish passage and addressed as needed. Culverts under Moccasin Mike Road will be assessed for both fish passage and their impact on hydrology of the wetlands east of the road.

Softened shoreline creation along Wisconsin Point bayside (11) – Shoreline on the bay side of Wisconsin Point will be softened to increase the amount of habitat available for marsh birds in the bay.

Emergent marsh habitat enhancement on Wisconsin Point bayside (12) – Enhancement of these existing wetland areas will include evaluating opportunities for establishing vegetation, including potentially seeding for wild rice.

Protect high quality wetlands, control invasives, and enhance interspersion (13) – Priority will be given to preserving the integrity of existing high native plant communities within these areas. More impacted areas will be enhanced through invasive species control and enhancing interspersion, through techniques such as channeling and potholing.

Public access creation on southeast side of Allouez Bay (14) – A location to provide public access to neighborhoods adjacent to Allouez Bay will be sought on the south side of the bay. A potential location is the Duluth Sail and Power Squadron dock.

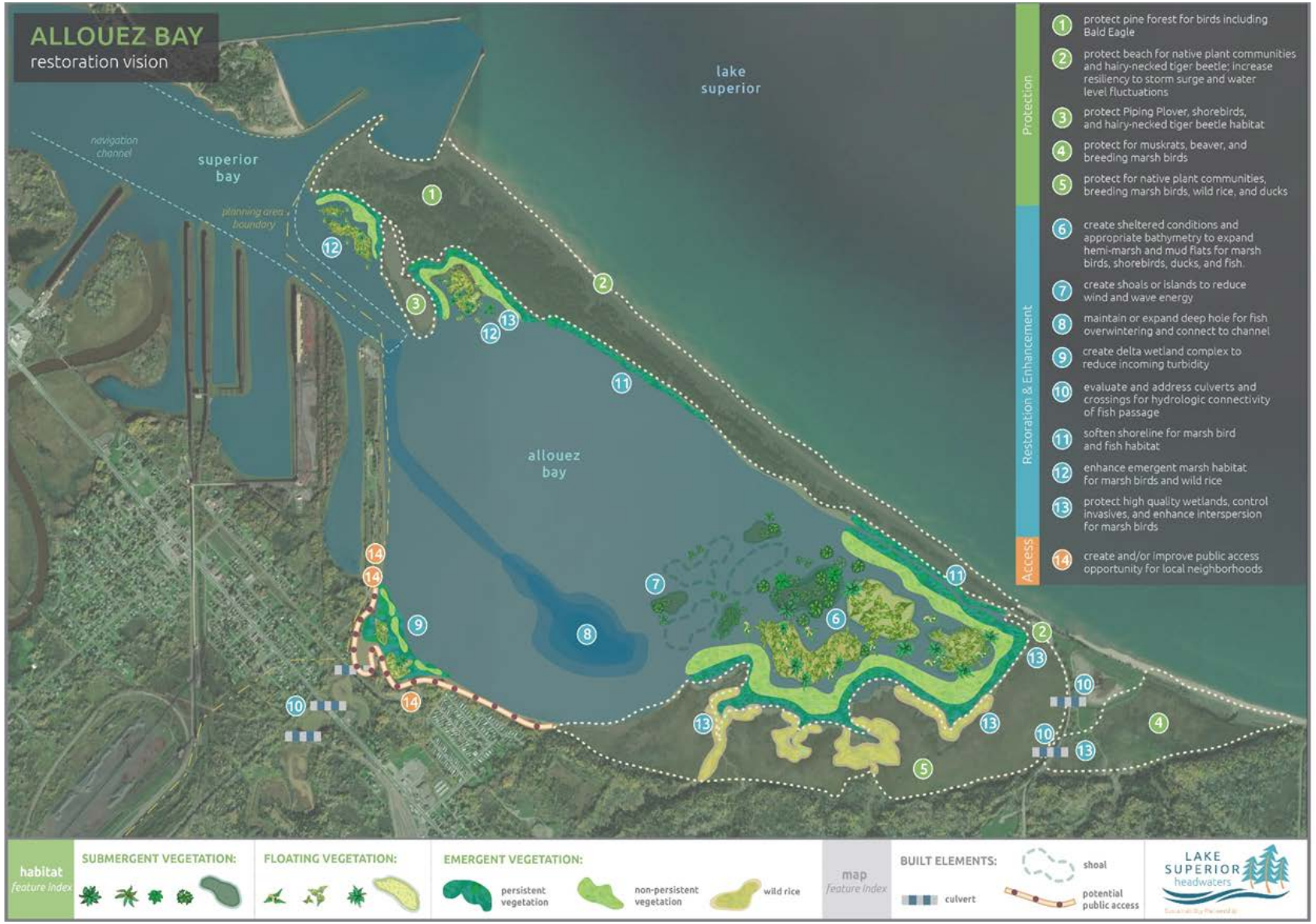

Figure 8: Plan view of Restoration Vision for Allouez Bay

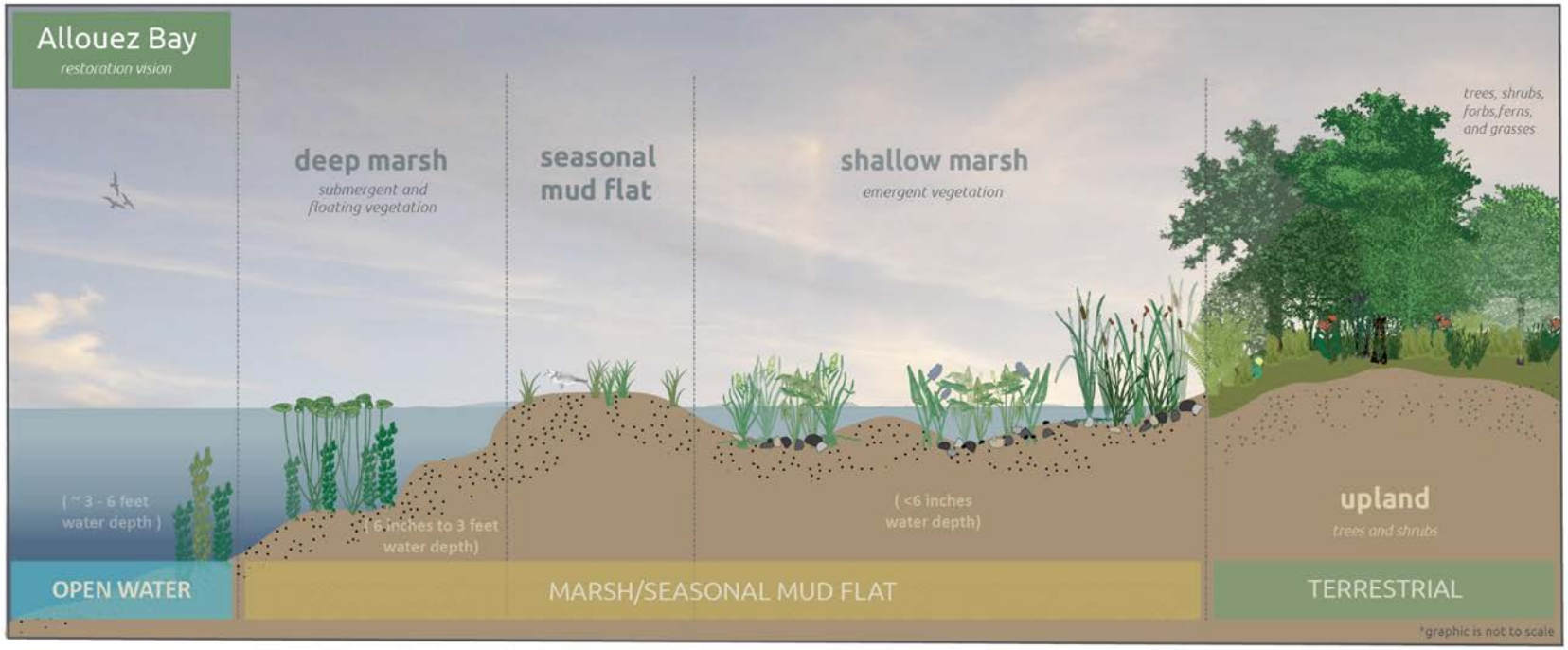

Figure 9: Cross-Section of Marsh/Mudflat

9 UNCERTAINTIES AND INFORMATION GAPS

Based on review of available information and discussion amongst partners involved in this planning process, a number of uncertainties and information gaps should be recognized at this conceptual planning stage. Following is a list of information that will support further planning and project design:

- Hydrodynamic modeling of Allouez Bay to understand circulation and energy patterns to inform restoration design and habitat suitability models for target species
- Water quality monitoring - the dynamics of total phosphorus, dissolved oxygen, and turbidity are of particular interest to assist habitat suitability modelling
- Blanding's turtle survey
- Fish survey
- Small mammal survey, including muskrat and otters
- Detailed Bathymetric survey for restoration design and improving cut/fill calculations
- Soil/sediment borings within the marsh area to better understand substrate composition, and historic sediment loading, native plant communities and inform geotechnical analysis and site stability
- Hydraulics, hydrology, sediment loading and water quality from Bear and Bluff Creek
- Community engagement and communication plan
- Land ownership – address platted lots in the bay to determine jurisdiction for submersed parcels and identify land conservation/protection priorities for terrestrial areas

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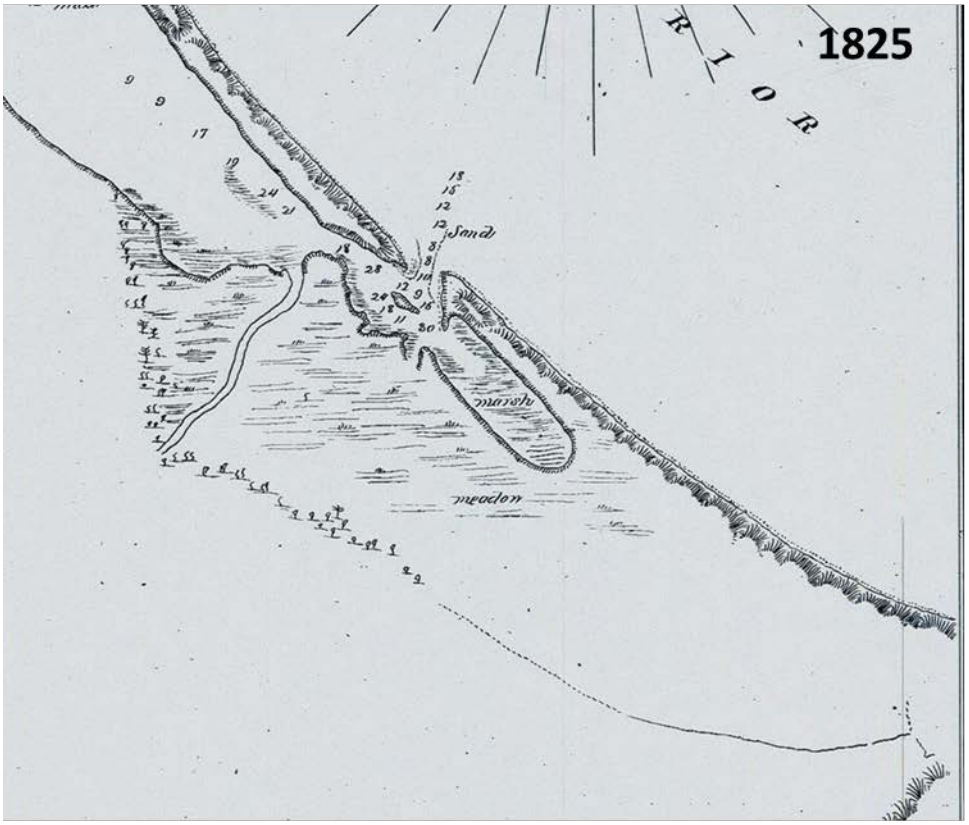
APPENDIX A: Partners Participating in Planning Process

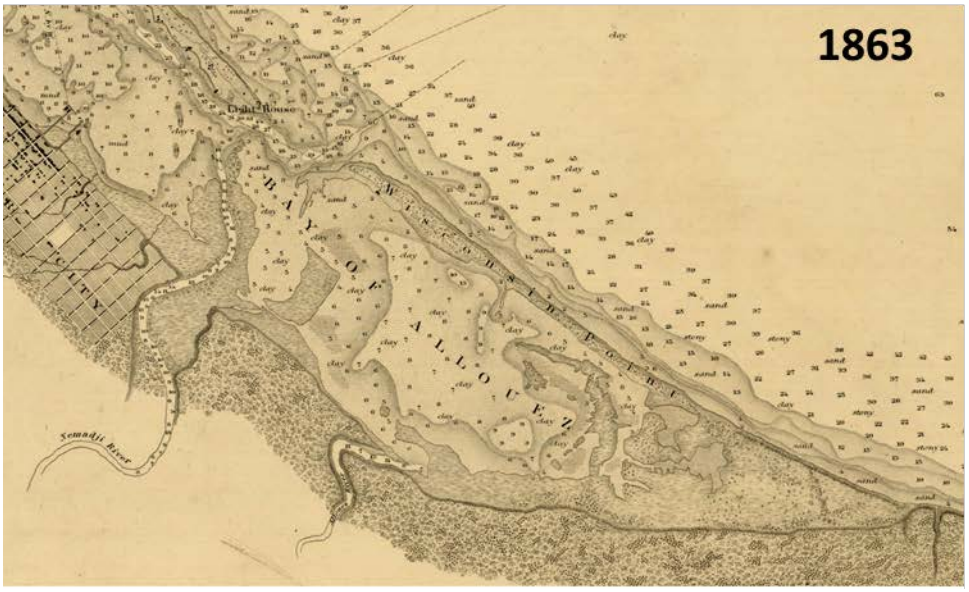
Name	Affiliation	Role/Expertise
Gini Breidenbach	Minnesota Land Trust	Project manager
Daryl Peterson	Minnesota Land Trist	Project management team
Reena Bowman	US Fish and Wildlife Service	Headwaters Partnership Advisory Group
Cherie Hagen	Wisconsin Department of Natural Resources (WDNR)	DNR lead; Headwaters Partnership Advisory Group
Deanna Erickson	Lake Superior Reserve	Managing community interests' pieces
Kelly Beaster	LSRI	Coastal wetlands; wild rice
Jeremy Bloomquist	St. Croix Chippewa	Tribal interests
Annie Bracey	NRRI	Birds
Val Brady	NRRI	Coastal wetlands
Linda Cadotte	City of Superior	Headwaters Partnership Advisory Group; City of Superior parks; Wisconsin Point Plan
Ellen Cooney	WDNR	Sediment
Josh Dumke	NRRI	Fish
Amy Eliot	LSRI	Wild rice
Dara Fillmore	WDNR	Invasive species
Christopher Filstrup	NRRI	Water quality
Alexis Grinde	University of Minnesota - Duluth - Natural Resources Research Institute (NRRI)	Birds
Dustin Haines	Lake Superior Reserve	Water quality
Jeremy Hartsock	University of Wisconsin-Superior Lake Superior Research Institute (LSRI)	Coastal wetlands
Kari Hedin	Fond du Lac Band; St. Louis River Habitat Workgroup co-chair	Tribal interests; St. Louis River Habitat Workgroup liaison
Tom Howes	Fond du Lac Band of Lake Superior Chippewa	Tribal interests

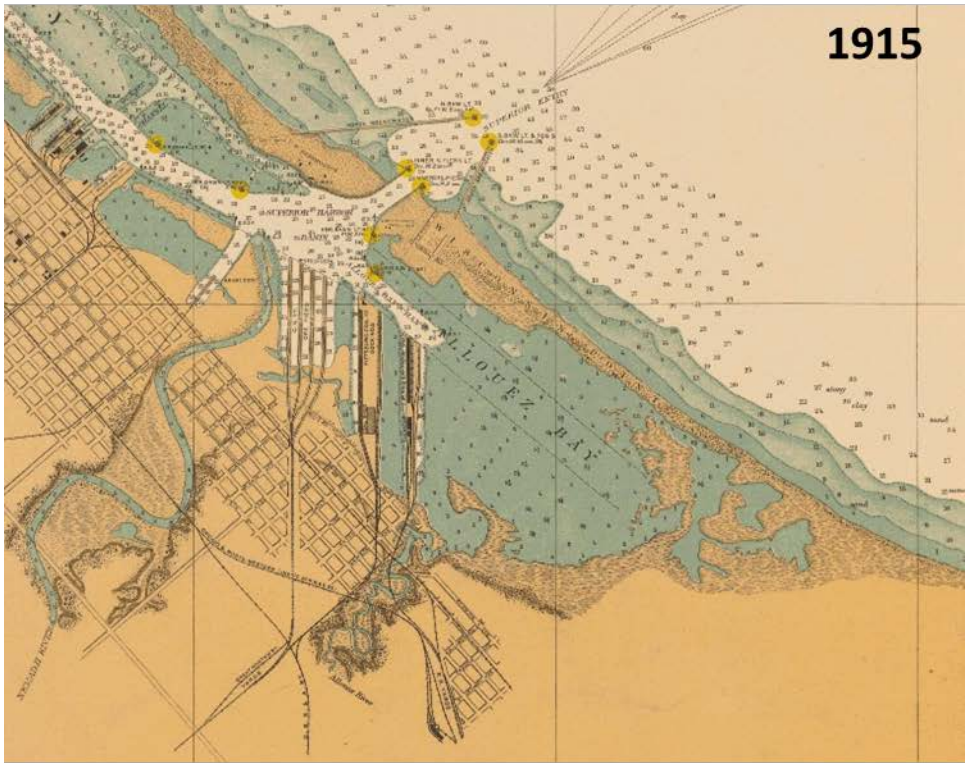
Name	Affiliation	Role/Expertise
Bradford Kasberg	Audubon Great Lakes	Birds
Steve LaValley	WDNR	General knowledge and experience
Jim Luke	US Army Corps of Engineers	Coordination
Ryan Magana	WDNR	T&E Species; High quality habitat
Sumner Matteson	WDNR	Birds
Nat Miller	Audubon Great Lakes	Birds
Paul Piszczek	WDNR	Fish
Hannah Rammage	Lake Superior Reserve	Water quality
Euan Reavie	NRRI	Paleolimnology
Reed Schwarting	LSRI	Coastal wetlands
Matthew Steiger	WDNR	Wild rice
Beilke, Stephanie	Audubon Great Lakes	Birds
Hollenhorst, Thomas	US Environmental Protection Agency Great Lakes Toxicology and Ecology Division	Mapping
Ashley Vandevoort	Douglas County, Wisconsin	Watershed

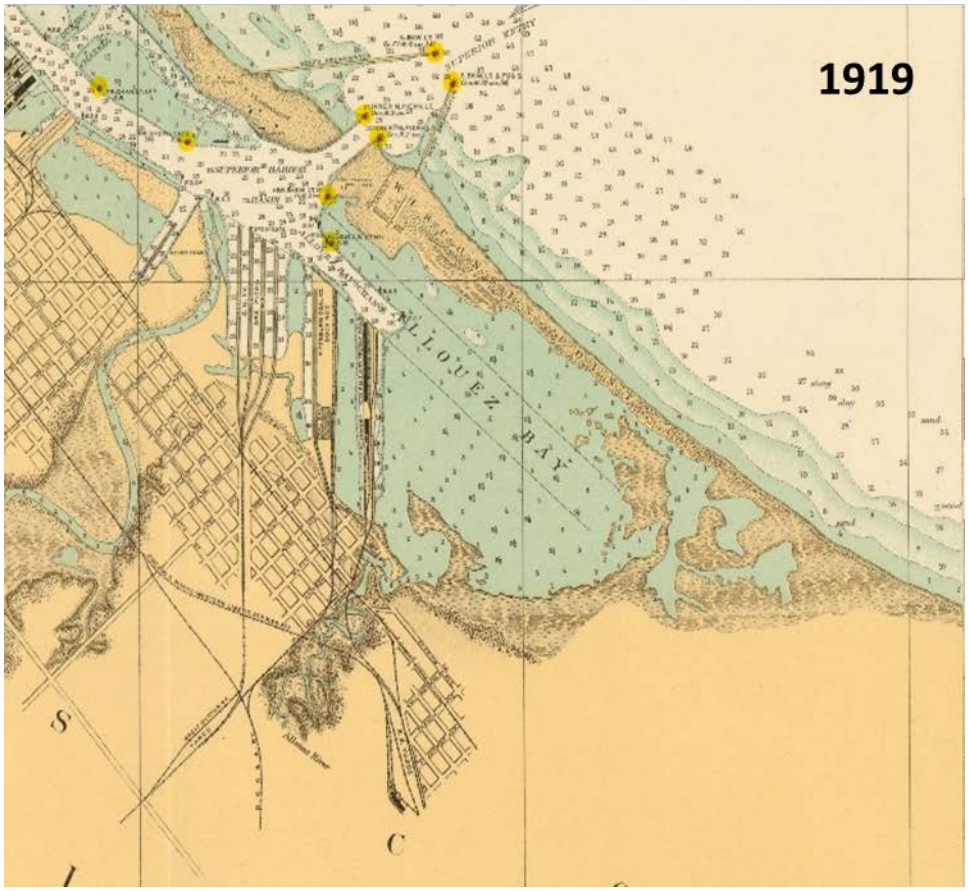
APPENDIX B – Allouez Bay Historical Navigation Charts

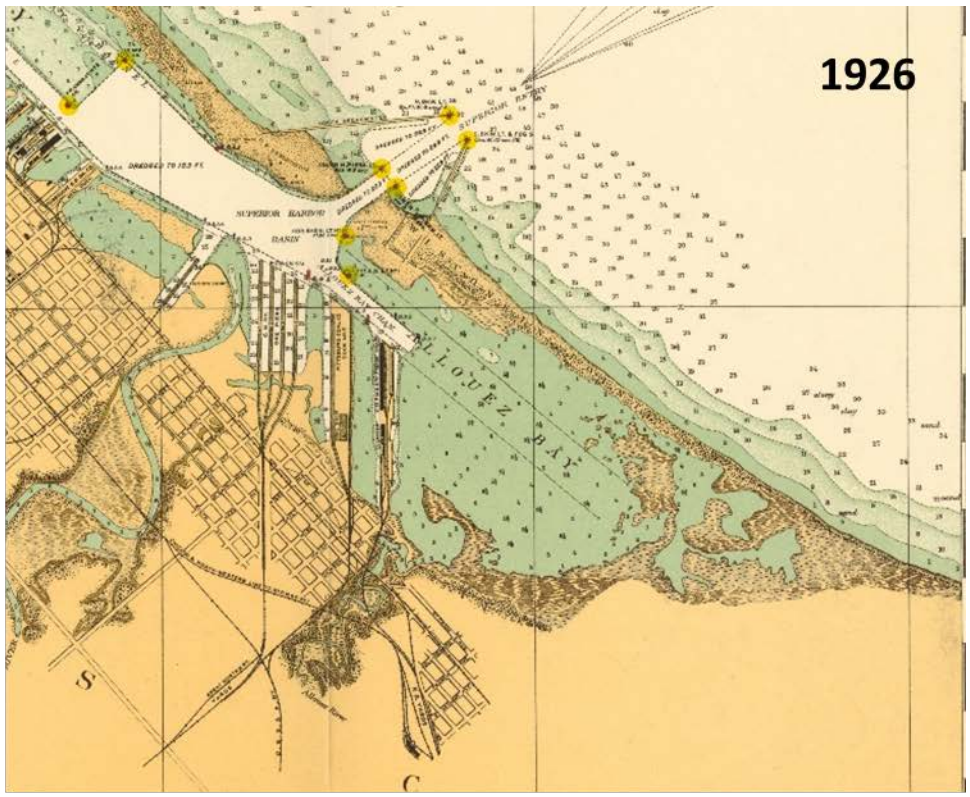
- Data source: **https://historicalcharts.noaa.gov/**
- Notes: The cropped images in this time series were from NOAA charts catalogued in the link above. There may be other charts available for years between the charts shown. However, the series was selected based on significant changes in Allouez Bay indicated on the maps.
- Individual maps are available on the Sharepoint site at: **https://mnland.sharepoint.com/:f:/s/SLRLCD/EhT7JJxwjWtEszRpWoimtxABraBz48P3Xlkl0m77fFa4Aw?e=3kjmRZ**
- Compiled by Gini Breidenbach, Minnesota Land Trust

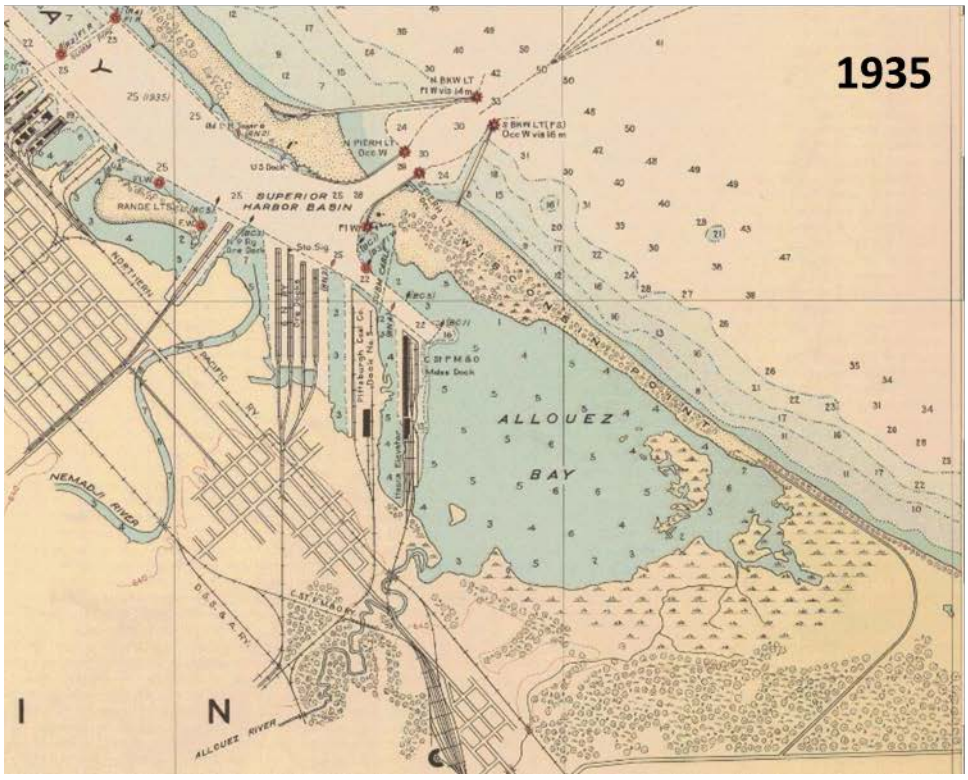

1825
Sand
marsh
meadow

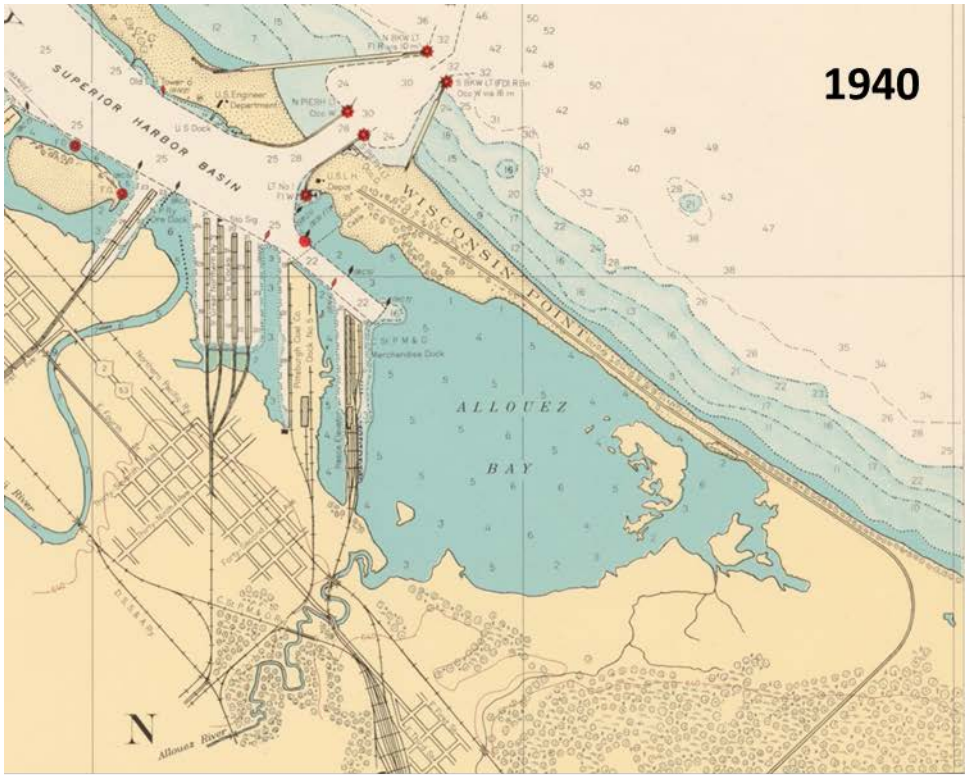

1863
Light House
BAYOU
ALLOUEZ
Semadi River

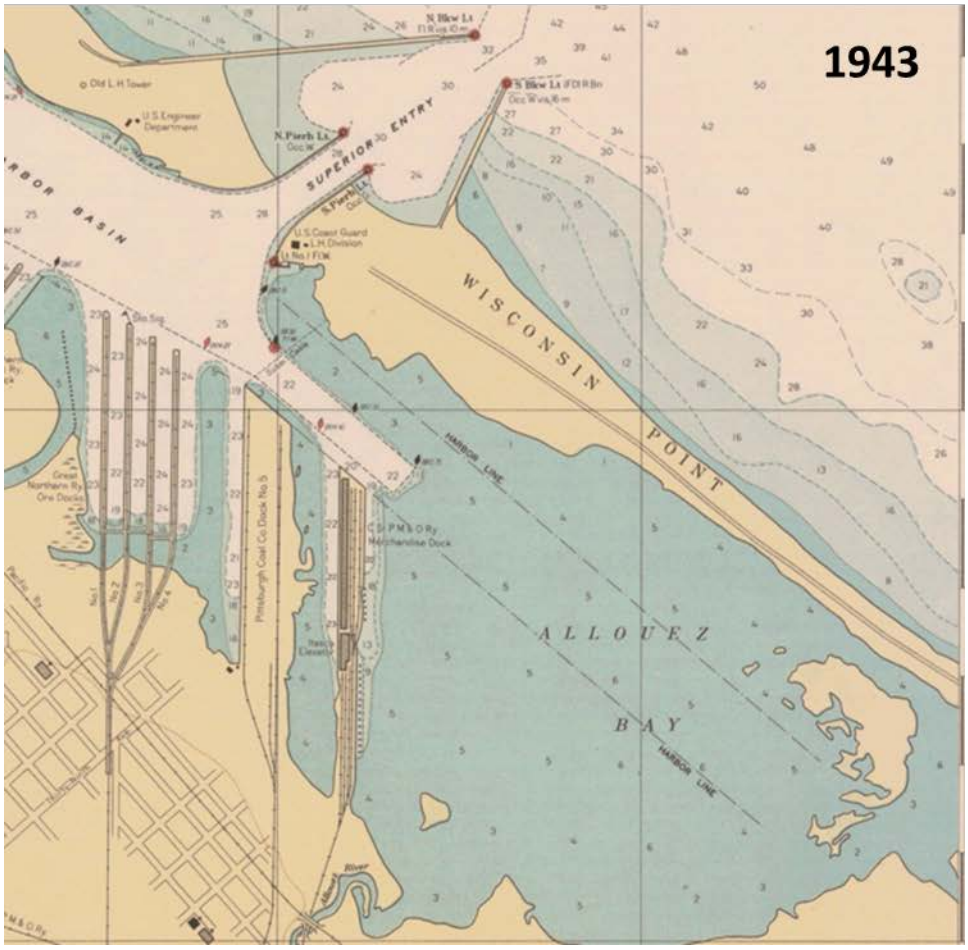

1915
L'OUEZ BAY

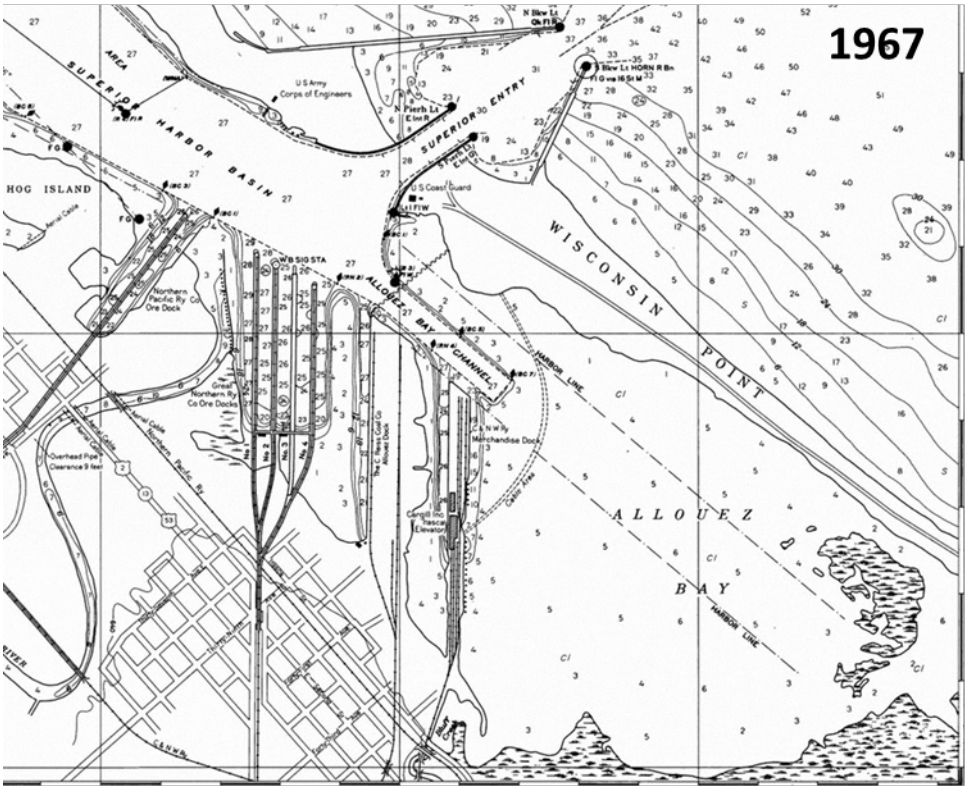

1919
L'OUEZ BAY

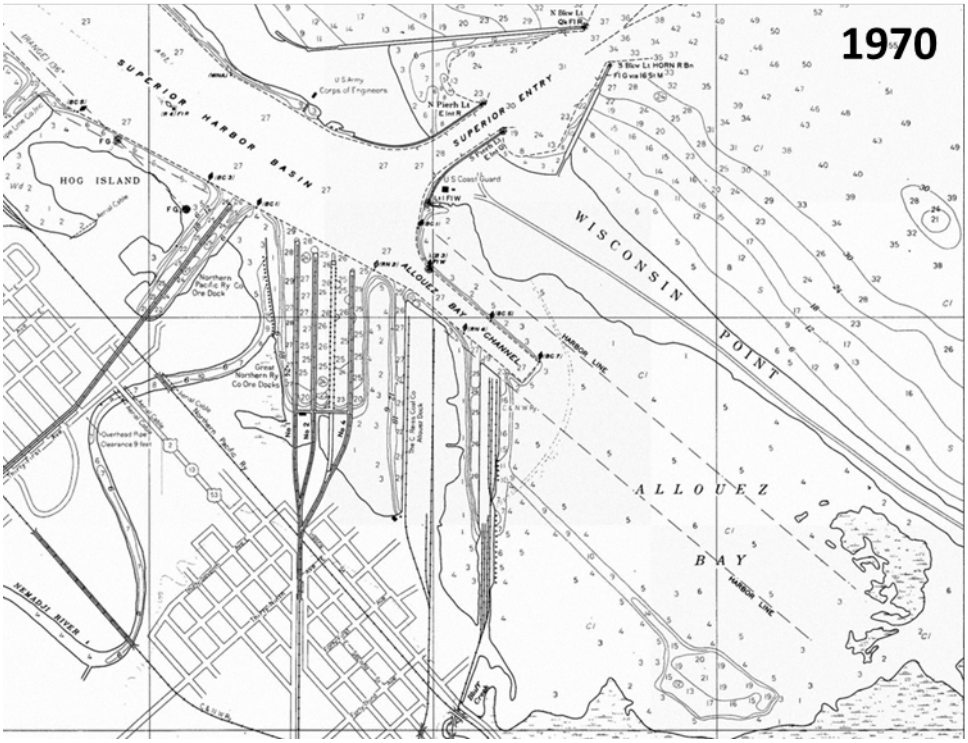

1926
ALLOUEZ BAY

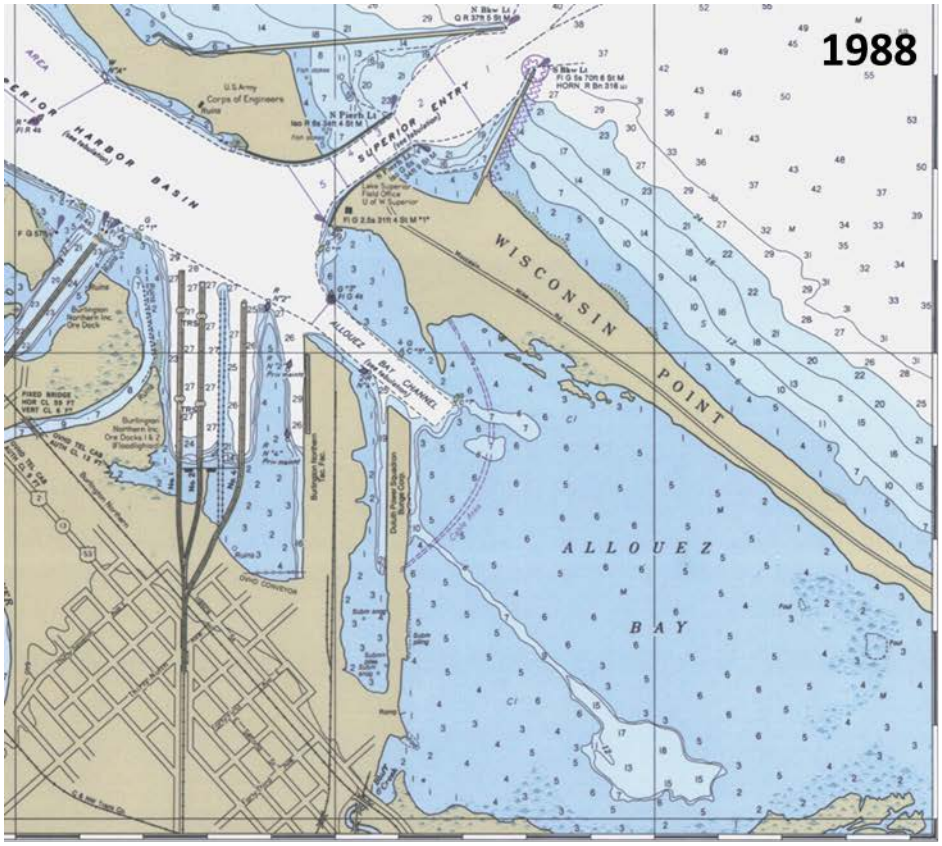

1935
SUPERIOR HARBOR BASIN
ALLOUEZ BAY
NEMADJI RIVER
ALLOUEZ RIVER

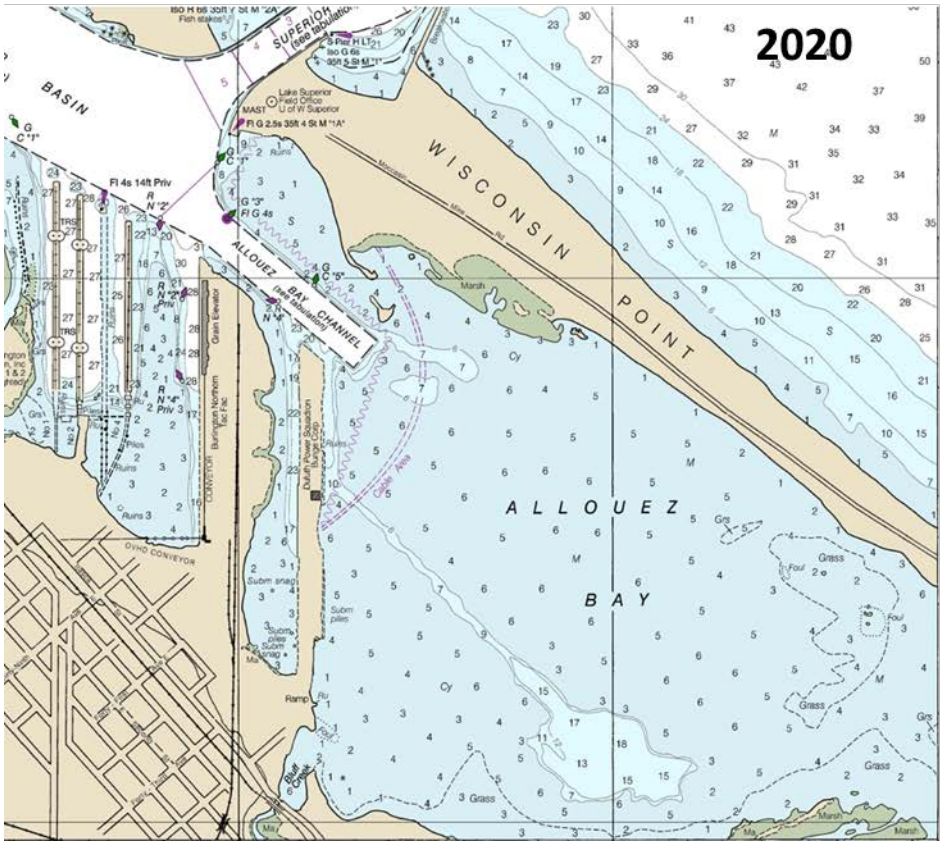

1940
SUPERIOR HARBOR BASIN
WISCONSIN POINT
ALLOUEZ
BAY
N
Allouez River


1943
SUPERIOR ENTRY
WISCONSIN
POINT
ALLOUEZ
BAY
HARBOR LINE
HARBOR LINE


1967
SUPERIOR HARBOR BASIN
SUPERIOR ENTRY
HOG ISLAND
WISCONSIN POINT
ALLOUEZ BAY
HARBOR LINE
U S Army Corps of Engineers
U S Coast Guard
Northern Pacific Ry Co Ore Dock
Great Northern Ry Co Ore Docks
Overhead Pipe Clearance 9 feet
Northern Pacific Ry
N W Ry Merchandise Dock
Cargill Inc Vascar Elevator
CANAL


1970
SUPERIOR HARBOR BASIN
SUPERIOR ENTRY
HOG ISLAND
WISCONSIN POINT
ALLOUEZ BAY
HARBOR LINE
U S Army Corps of Engineers
U S Coast Guard
Northern Pacific Ry Co Ore Dock
Great Northern Ry Co Ore Docks
Overhead Pipe Clearance 9 feet
Northern Pacific Ry
NEMADJI RIVER
CANAL


1988
HARBOR BASIN
SUPERIOR ENTRY
WISCONSIN POINT
ALLOUEZ BAY
ALLOUEZ BAY CHANNEL


2020
BASIN
SUPERIOR
WISCONSIN POINT
ALLOUEZ BAY
ALLOUEZ BAY CHANNEL
Fl 4s 14ft Priv
Fl G 4s