LAKE SUPERIOR NATIONAL ESTUARINE RESEARCH RESERVE

MANAGEMENT PLAN
2020–2025

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ACRONYMS

AOC	Area of Concern
ATV	all-terrain vehicle
BUI	beneficial use impairments
CDMO	Centralized Data Management Office
CTP	Coastal Training Program
CZMA	Coastal Zone Management Act
DSPA	Duluth Seaway Port Authority
EPA	Environmental Protection Agency
FOLSR	Friends of Lake Superior Reserve
GDP	Gross Domestic Product
GIS	Geographic Information Systems
GLERL	Great Lakes Environmental Research Lab
HUC	hydrologic unit code
IT	Information Technology
KEEP	K–12 Estuarine Education Program
LSRI	Lake Superior Research Institute
MET	meteorological
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPCA	Minnesota Pollution Control Agency
NERRS	National Estuarine Research Reserve System
NOAA	National Oceanic and Atmospheric Administration
NRI	Natural Resources Institute
NRRI	Natural Resources Research Institute
OCM	Office of Coastal Management
ORD	Office of Research and Development
PAC	Procurement, Acquisition, and Construction
RAB	Reserve Advisory Board
SBPA	Stream Bank Protection Area
SLRA	St. Louis River Alliance
SLRCAC	St. Louis River Citizen Action Committee
SMF	Superior Municipal Forest
SNA	State Natural Area
SWMP	System-Wide Monitoring Program
TNC	The Nature Conservancy
TOTE	Teachers on the Estuary
UMD	University of Minnesota Duluth
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
UWS	University of Wisconsin-Superior
WDNR	Wisconsin Department of Natural Resources
WPMA	Wisconsin Point Management Area

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ACKNOWLEDGMENTS

The staff of the Lake Superior National Estuarine Research Reserve would like to thank the dedicated partners whose support and collaborative efforts have encouraged the Reserve to grow and thrive in its first decade. The impact of the work of the Reserve is both created and magnified through their efforts, from the designation process through today.

Cover: Pokegama Bay (Credit: Hannah Ramage)

PREPARED BY

University of Wisconsin–Madison Division of Extension
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PREPARED FOR

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
Office for Coastal Management
Ecosystems and National Estuarine Research Reserves Program
1305 East West Highway
Silver Spring, MD 20910

University of Wisconsin–Madison Division of Extension
432 North Lake Street
Madison, WI 53706

This Management Plan has been developed in accordance with National Oceanic and Atmospheric Administration regulations, including all provisions for public involvement. It is consistent with the congressional intent of Section 315 of the Coastal Zone Management Act of 1972, as amended, and the provisions of the Wisconsin Coastal Management Program.

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A view of the St. Louis River Estuary (Credit: Wisconsin Coastal Management Program)

EXECUTIVE SUMMARY

Plan, Purpose, and Scope

In October 2010, the National Oceanic and Atmospheric Administration (NOAA) designated portions of the St. Louis River Estuary as the Lake Superior National Estuarine Research Reserve (Lake Superior Reserve or Reserve). This area is a member of the National Estuarine Research Reserve System (NERRS or Reserve System), a network of 29 areas representing diverse biogeographic regions and estuarine types located within the United States. Established by the Coastal Zone Management Act (CZMA) of 1972, the Reserve System is a partnership between federal and state authorities to provide for the long-term stewardship of designated estuaries. The University of Wisconsin–Madison Division of Extension (formerly University of Wisconsin Extension and hereinafter referred to as the UW–Madison Division of Extension) is the lead state agency for the Lake Superior Reserve.

This is the first revision of the Reserve's management plan since designation. Major accomplishments during the first management plan's implementation included acquiring permanent facilities for the Reserve's operations; hiring core sector leads and structuring in more support staff; opening a public, interpretive center and classroom; and expanding formal partnerships in research and education across the region. Major goals for this new management plan during the next five years include acquiring permanent housing for visiting students and researchers; growing the sectors by structurally supporting additional staff; advancing our geographic information systems (GIS) and data management priorities; and developing formal advisory board and strategic relationships with the private sector in this region.

This Management Plan describes the Reserve and its management for 2020 through 2025. It provides key goals, objectives, and strategies for the Reserve and offers both guidance for daily operations and aspirational targets to advance the overall mission of the Reserve and the NERRS. In terms of geography, the plan identifies a tiered scope, focusing first on the St. Louis River Estuary and watershed. A second tier focuses on the coastal areas of the South Shore of Lake Superior in Wisconsin and the North Shore of Lake Superior in Minnesota. The third tier focuses on the entire Lake Superior watershed.

This Management Plan reflects the efforts of regional partners and was developed through a combination of primary research, staff-led strategic planning, and input from advisory board members and stakeholders. It is aligned

with other plans of regional significance, such as the St. Louis River Remedial Action Plan and the Lake Superior Lakewide Area Management Plan, as well as the NERRS 2017–2022 Strategic Plan. The goals and objectives in this Management Plan are linked to strategies and metrics that will be used to measure progress or success in accomplishing the identified objectives at the completion of this plan in 2025.

Reserve Context

The Lake Superior Reserve is situated on the freshwater estuary at the confluence of the St. Louis River and Lake Superior, the largest and most pristine of the Great Lakes. An expansive system, it forms the river mouth of the largest U.S. tributary to Lake Superior. The St. Louis River Estuary contains diverse freshwater estuarine habitats and interfaces with urban areas and a busy industrial port, allowing for extensive applied research and educational opportunities. The Reserve encompasses 16,697 acres of terrestrial land, wetlands, and water that are significant to supporting the Reserve's goals and protects the integrity of core areas (i.e., key land and water areas vital to the functioning of the estuarine ecosystem) for long-term research and monitoring.

The St. Louis River is 192 miles long and is bordered by both Wisconsin and Minnesota for 23 miles. The 1,872,807-acre watershed is impacted by human activities, such as forestry, mining, hydropower, urban development, and limited agriculture. The combination of ecosystems within the Lower St. Louis River—freshwater wetlands and aquatic habitats, baymouth bar complex, and surrounding upland forest—are unusual in Lake Superior, the Great Lakes region, and the world. Many of the ecosystems and native species are rare or declining across their ranges. This concentration of such diverse ecosystems, along with the location at the headwaters of the Great Lakes, makes this freshwater estuary a critical migratory stopover and an important breeding area for many species. Despite human impacts, the St. Louis River Estuary is one of the largest such complexes on the Lake Superior shore, representing a significant source of productivity for the entire Lake Superior ecosystem. The freshwater estuary and its tributaries are unusual in having such a variety of habitat types supporting a large and diverse assemblage of native fish species.

Landowning partners of the Lake Superior Reserve include the City of Superior, Douglas County, University of Wisconsin–Superior (UWS), and the Wisconsin Department of Natural Resources (WDNR). The Reserve is situated on the ancestral land and ceded territory of the Anishinaabe people (Ojibwe/Chippewa), who have continuously practiced traditional lifeways and resource management in the region. The estuary contains the largest and busiest port in the Great Lakes and the furthest inland port in the United States. While the Reserve does not own land and operates in partnership with the groups listed above, the WDNR-owned 346-acre Clough Island, the largest island in the estuary, will be considered for inclusion in the Reserve boundary during the time period of this Management Plan.

Administration of a NERR is accomplished through federal, state, and local partnerships. At the federal level, NOAA is responsible for the administration of the NERRS through the Office for Coastal Management (OCM). NOAA provides funding allocated by Congress to eligible state agencies for the operation of reserves and construction and land acquisition activities. NOAA also provides program guidance, oversight, and conducts periodic evaluations. The Lake Superior Reserve is administered at the state level by the UW–Madison Division of Extension. Within the Division of Extension, the Reserve is situated in the statewide multi-disciplinary Natural Resources Institute (NRI). A Memorandum of Understanding (MOU) between the University of Wisconsin Board of Regents and NOAA establishes the roles and responsibilities of both agencies (see Appendix B).

Priority Coastal Management Issues

Between 2019 and 2025, research, monitoring, education, outreach, and stewardship core programs at the Lake Superior Reserve will collectively focus on the following key issues as related to our geographic area of focus:

A. Changing Climate
B. Water Quality and Healthy Ecosystems
C. Strengthening Community and Sense of Place

Reserve Goals

The Reserve envisions a Lake Superior where coastal watersheds and estuaries are understood, valued, and thriving!

The mission of the Reserve is to work in partnership to improve the understanding of Lake Superior's coast and estuaries. We address issues affecting the watershed through the integration of research, education, outreach, and stewardship. This mission is achieved by striving toward the following goals:

GOAL I

A Healthy Lake Superior:

Reserve science and collaborations inform management and policy decisions that lead to healthy estuaries and a healthy Lake Superior.

GOAL II

A Strengthened Community and Sense of Place:

Members of the community develop a strong sense of place, based on the ecological, social, cultural, and economic values of the Lake Superior watershed.

GOAL III

Outreach and Engagement Are Innovative:

The audience for Reserve programming is expanded and engaged in response to partner needs and emerging issues.

GOAL IV

The Twin Ports Are Collaborating:

Regional collaboration/cooperation between cities, counties, states, governments, tribes, citizens, and businesses is strengthened across boundaries to improve habitat and water quality.

GOAL V

The Schools and Community Model Collaboration:

Educational programming and communication strategies serve as a model for how to effectively engage learners and integrate research to raise awareness of watershed issues.

GOAL VI

The Lake Superior Estuarium Is a Destination:

The Reserve and the Lake Superior Estuarium are a resource and destination for science-based information about the relationship between the coastal environment and our communities.

Reserve Niche

The Lake Superior Reserve functions as a convener in a bi-state watershed and provides opportunities for synthesis and value-added collaboration between universities, local government, state, and tribal agencies and nonprofit organizations. As partners in the delisting of the St. Louis River Area of Concern[1] (AOC), the Reserve provides needed staff time, information, and support for remediation and restoration efforts. The System-Wide Monitoring Program (SWMP) plays a unique local role, producing long-term water quality data and connecting it to regional needs. Research efforts contribute to the understanding of freshwater estuaries and the influence of tributaries on the health of Lake Superior, which is especially valuable in a period of climatic change. By supporting regional initiatives such as the People and Places Workgroup, Reserve staff promote inquiry related to the integration of natural and social sciences in resource management. In the Reserve's education program, regional schools build meaningful partnerships with scientists and land use managers. Teachers gain and sustain skills in outdoor and inquiry-based learning, advancing science literacy and increasing academic engagement. The CTP fills a vital need for local decision-makers, providing popular place-based and relevant professional development.

Reserve facilities enhance and create opportunities for research and learning. Situated on the waterfront on Barker's Island in Superior, the Lake Superior Estuarium provides a unique window into the St. Louis River Estuary and a boost for tourism in the city. The Confluence Room public meeting space has been well utilized in its 2-½ years, hosting over 11,000 visitors and being used by 225 community organizations. Two research vessels and a well-equipped dockside laboratory with office space for guests and visiting researchers invite collaboration locally, across the state of Wisconsin, and around the nation.

Reserve Programs Overview

The current core Reserve programs—research, monitoring, education, and coastal training—integrate with one another to reach the goals of the Reserve through ongoing collaboration, communication, shared programs, and shared priorities. Each program operates from a mission that defines its role and audience in the larger operations of the Reserve:

The Research and Monitoring Program has a mission of fostering and sustaining collaborative research, thereby increasing the understanding of Lake Superior's estuaries and coastal communities. The program's target audiences are scientists and natural resource managers. By fostering and coordinating collaborative, applied science, the program reaches and partners with city, tribal, state, and federal agencies, universities, and nonprofit organizations.

The Education Program builds exemplary model education programs that elevate public connection to and concern for freshwater resources through deeper understanding of the Lake Superior watershed and its estuaries. Education reaches formal educators via professional development opportunities, especially through the Rivers2Lake Education Program (www.rivers2lake.org). School students in grades PK–12 participate in educational programming through Rivers2Lake and other formal and informal programs. Community and conservation action education programming reach the broader Twin Ports community and beyond.

The Coastal Training Program (CTP) transforms coastal decision-makers into coastal leaders by providing skills training and collaborative learning opportunities that inspire thoughtful management of Lake Superior. The audience of the CTP are community stakeholders whose decisions impact the Reserve's priority coastal issues—climate change, water quality and healthy ecosystems, and a strong community and sense of place. A "coastal decision-maker" is someone who plans, manages, or designs activities that impact the health of Lake Superior.

National Estuarine Research Reserves

GREAT LAKES
1. Lake Superior, WI
2. Old Woman Creek, OH

NORTHEAST
3. Wells, ME
4. Great Bay, NH
5. Waquoit Bay, MA
6. Narragansett Bay, RI

MID-ATLANTIC
7. Hudson River, NY
8. Jacques Cousteau, NJ
9. Delaware, DE
10. Chesapeake Bay, MD
11. Chesapeake Bay, VA

SOUTHEAST
12. North Carolina, NC
13. North Inlet-Winyah Bay, SC
14. ACE Basin, SC
15. Sapelo Island, GA
16. Guana Tolomato Matanzas, FL

GULF OF MEXICO
17. Rookery Bay, FL
18. Apalachicola, FL
19. Weeks Bay, AL
20. Grand Bay, MS
21. Mission-Aransas, TX

WEST
22. Tijuana River, CA
23. Elkhorn Slough, CA
24. San Francisco Bay, CA
25. South Slough, OR
26. Padilla Bay, WA
27. Kachemak Bay, AL

PACIFIC
28. He'eia, HI

CARIBBEAN
29. Jobos Bay, PR

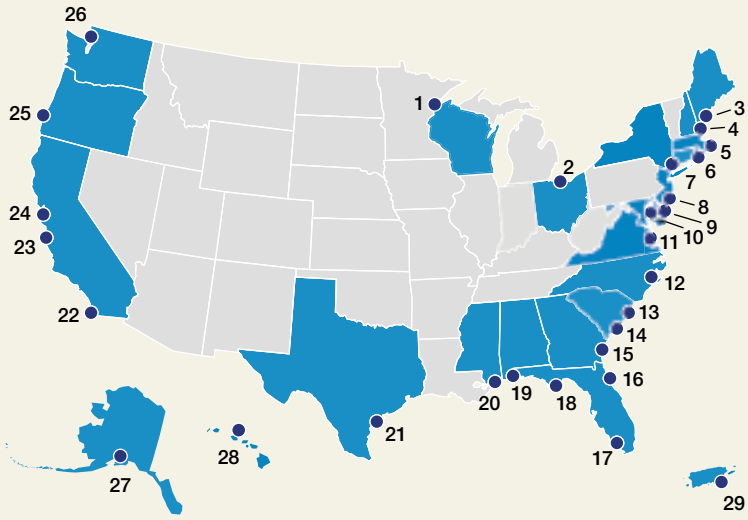


Figure 1.1. National Estuarine Research Reserve System map showing biogeographic regions

NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM

The NERRS was created by the CZMA of 1972, as amended, to augment the National Coastal Zone Management Program, which is dedicated to comprehensive, sustainable management of the nation's coasts.

The Reserve System is a network of protected areas representative of the various biogeographic regions and estuarine types in the United States. Reserves are established for long-term research, education, and interpretation to promote informed management of the nation's estuaries and coastal habitats (15 CFR § 921.1(a)). The system currently consists of 29 reserves in 24 states and territories, protecting over one million acres of estuarine lands and waters.

NERRS is a partnership program between the NOAA and the coastal states. NOAA provides funding, national guidance, and technical assistance. The state partner manages reserve resources on a daily basis and works collaboratively with local and regional partners.

NERRS Strategic Goals

Estuaries are biologically rich, economically valuable, and highly vulnerable ecosystems. The vision and mission of the Reserve System reflect the importance of these systems within our communities.

Vision: Resilient estuaries and coastal watersheds where human and natural communities thrive.

Mission: To practice and promote stewardship of coasts and estuaries through innovative research, education, and training using a place-based system of protected areas.

The NERRS program goals, from federal regulations 15 CFR § 921.1(b), include the following:

1. Ensure a stable environment for research through long-term protection of National Estuarine Research Reserve resources;
2. Address coastal management issues identified as significant through coordinated estuarine research within the system;

3. Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation;
4. Promote federal, state, public, and private use of one or more reserves within the system when such entities conduct estuarine research; and
5. Conduct and coordinate estuarine research within the system, gathering and making available information necessary for improved understanding and management of estuarine areas.

NOAA and the states work together to create a dynamic five-year Reserve System strategic plan to meet these program goals and NOAA's mission of science, service, and stewardship. The 2017–2022 Reserve System Strategic Plan focuses reserve core strengths of research, education, and training on three core issues: environmental change, water quality and quantity, and habitat protection and restoration. The Reserve System's strategic plan goals are as follows:

1. *Protecting Places*: Enhance and inspire stewardship, protection, and management of estuaries and their watersheds in coastal communities through place-based approaches.
2. *Applying Science*: Improve the scientific understanding of estuaries and their watersheds through the development and application of reserve research, data, and tools.
3. *Educating Communities*: Advance environmental appreciation and scientific literacy, allowing for science-based decisions that positively affect estuaries, watersheds, and coastal communities.

Biogeographic Regions and Boundaries

NOAA has identified 11 distinct biogeographic regions and 29 subregions in the United States, each of which contains several types of estuarine ecosystems (15 CFR § 921, Appendix I and II). When complete, the system will contain examples of estuarine hydrologic and biological types characteristic of each biogeographic region. As of 2017, the system includes 29 reserves and one state in the process of designating a reserve.

Each reserve boundary will vary depending on the nature of the ecosystem. Boundaries must include an adequate portion of the key land and water areas of the natural system to approximate an ecological unit and to ensure effective conservation. Reserve boundaries encompass areas for which adequate state control has been or will be established by the managing entity over human activities occurring within the reserve. Reserve boundaries include a "core" area of key land and water encompassing resources representative of the total ecosystem, which if compromised could endanger the research objectives of the reserve, as well as a "buffer" area designed to protect the core area and provide additional protection for estuarine-dependent species, including those that are rare or endangered. Buffer areas may also include areas necessary for facilities required for research and interpretation. Additionally, buffer areas are identified to accommodate a shift of the core area as a result of biological, ecological, or geomorphological change that could be reasonably expected to occur. (15 CFR § 921.11 (c)(3))

Administrative Framework

The process for federal designation of a national estuarine research reserve has many steps and involves many individuals and organizations. While each reserve is a partnership program between NOAA and a coastal state, many entities collaborate to support the designation of a reserve. Other partners include federal and state agencies, nonprofit groups, universities, and members of the local community. For more information on the designation process, see the NERRS website.[2]

Upon designation, the reserve implements the approved Management Plan and is eligible for NOAA financial assistance on a cost-share basis with the state. Management plans provide a vision and framework to guide reserve activities during a five-year period and enable the reserves and NOAA to track progress and realize opportunities for growth. Each Management Plan contains the reserve goals, objectives, and strategies supported by programs focused on research and monitoring, education and outreach, training, and stewardship. They also outline administration, public access, land acquisition, and facility plans and needs, as well as restoration and resource manipulation plans, if applicable.

Reserves are increasingly confronted with complex questions regarding new uses in or near reserves that may or may not be compatible with the Reserve System's mission. A thoughtful and comprehensive Management Plan provides a foundation for addressing these challenges to protect and manage reserve resources wisely and ensure that the public and coastal decision-makers value and protect coastal resources.

NOAA administers the Reserve System and establishes standards for designating and operating reserves, provides support for reserve operations and system-wide programming, undertakes projects that benefit the Reserve System, and integrates information from individual reserves and programs to support decision-making at the national level. Additionally, NOAA periodically evaluates reserves for compliance with federal requirements and with the individual reserve's federally approved Management Plan, as mandated under Section 312 of the CZMA (15 CFR § 921.40).

NOAA currently provides leadership and support for three system-wide programs, including the SWMP, K-12 Estuarine Education Program (KEEP), and the CTP, as well as a national program to support collaborative research in the Reserve System. NOAA also provides support for initiatives focused on the Reserve System's priorities.

A view of the St. Louis River Estuary from Enger Park in Duluth, Minnesota (Credit: Marie Zhuikov)

LAKE SUPERIOR RESERVE

History and Local Management

Impetus for designation

The Lake Superior Reserve is the only reserve located in Wisconsin and within NOAA's Lake Superior Biogeographical Subregion. The 16,697-acre Lake Superior Reserve serves as a field laboratory where scientists can study naturally functioning systems and where students and the general public can learn about freshwater estuarine ecology. As a transition zone between land and water, the Reserve contains a variety of habitats including sedge meadow, emergent marshes, barrier beach, upland coniferous forests, lowland hardwoods, and open water areas of the estuary, river, and near the shore of Lake Superior.

Overview of process and rationale used to designate lands

The St. Louis River was one of 35 sites evaluated by the state and its nomination was the result of several years of hard work and support from citizens, local and tribal governments, organizations, and conservation agencies. The University of Wisconsin Extension (now the UW–Madison

The designation of the Lake Superior National Estuarine Research Reserve on October 26, 2010.

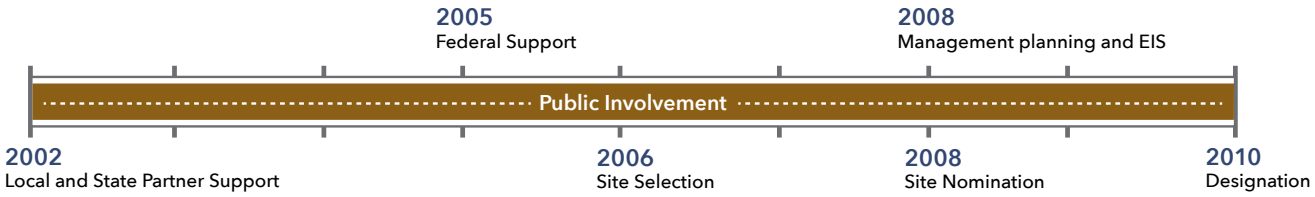


Figure 2.1. Designation timeline

Division of Extension) led the process, in collaboration with the Wisconsin Coastal Management Program, WDNR, and The Nature Conservancy (TNC), to identify the most appropriate site for a Lake Superior Reserve. The site selection process spanned 25 meetings over 18 months, and over 70 members participated on four teams. A Site Selection Technical Team provided shared leadership and scientific expertise, and included representation by local individuals and organizations.

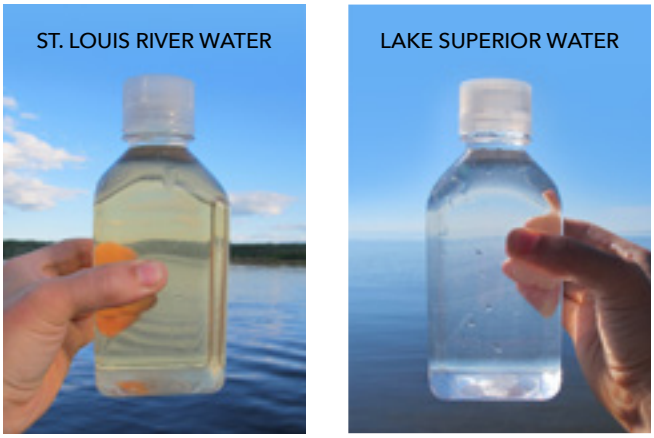
Former Wisconsin Governor Jim Doyle nominated the St. Louis River Estuary for NERR designation on May 30, 2008, and the Lake Superior Reserve was designated in October 2010. The designation was made in order to raise the national profile of Wisconsin's Great Lakes resources, bring national recognition to the value of freshwater estuaries and the Great Lakes ecosystem, and to enhance existing research and education programs throughout the Lake Superior Basin.

Ecological Attributes

The St. Louis River Estuary is a drowned river mouth that was formed from tilting of the basin (differential isostatic rebound), a consequence of glacial retreat after the last ice age. The Upper St. Louis River flows through northeastern Minnesota with headwaters surrounded mostly by forest and peatlands. The peatlands in the Upper St. Louis River release tannins into the river, which result in "tea-colored" water. This colored dissolved organic matter is an important carbon source for phytoplankton and microbes in the estuary and lake. The Middle St. Louis River flows over granite bedrock formations, through three hydroelectric dams, and then into the St. Louis River Estuary. The estuary flows through a thick layer of glacial clay deposited approximately 11,000 years ago. The highly erodible clay, primarily on the Wisconsin side of the estuary, results in "chocolate-milk-colored" water, particularly from the Red, Pokegama, and Nemadji Rivers, and Bear and Bluff Creek. This can easily be seen in aerial imagery of Allouez and Pokegama Bay.

Changes in water depth within the river are influenced by the seiche, which occurs regularly when wind or atmospheric pressure causes oscillations in the water of Lake Superior. The change in the water level as a result of the seiche is usually less than a foot with a daily mean fluctuation of 12.6cm at the Duluth entry.[3] Areas of the river closest to the lake are most strongly influenced, but a strong seiche can reverse the direction of the river's flow to upper Pokegama Bay[4] and mix lake and river water as far upstream as Fond du Lac.[5] This process of mixing chemically different lake and river water in an area of protected embayments is what makes the Lower St. Louis River an estuary.

The mouth of Pokegama Bay opens into the main channel of the St. Louis River (Credit: Bob Cragin)



Geomorphology

The present St. Louis River channel was shaped primarily by the glaciers of the Pleistocene epoch, which began approximately 2 million years ago. As glaciers advanced and retreated, receding for the last time around 10,000 years ago, the melting ice and flowing meltwater left behind complex patterns of sediment, including moraines, drumlins, beach sands, and lake-bottom clays.[6] The bedrock over which the Upper St. Louis River flows is part of the Canadian Shield, the stable ancient core of the North American continent. The middle river flows over the Middle Precambrian Thomson Formation through Jay Cooke State Park, with whitewater gorges often used for kayaking and rafting. From below Jay Cooke State Park to the Fond du Lac neighborhood, the river crosses the Fond du Lac Formation, which is made up of brown to red sandstone, siltstone, and shale approximately 950 to 1,040 million years old. Below Fond du Lac, coarse-grained, dark-gray gabbro forms the high ridgeline on the Minnesota side of the river. This gabbro, along with the fine-grained volcanic basalts that are visible along the Lake Superior shoreline in Duluth, formed as the result of continental rifting about 1,100 million years ago.[7]

The St. Louis River below the Fond du Lac Dam is an estuarine system that flows through thick layers of red clay that were deposited approximately 11,000 years ago as the Superior Lobe of the Laurentide Ice Sheet retreated.[8] After the level of ancestral Lake Superior dropped approximately 1,250 years ago,[9] the river and its tributaries cut deeply incised valleys through the clay. When the lake level rose again, the river valley was flooded, creating a complex estuary with an irregular shoreline and bays at the mouth of each tributary. The ongoing, gradual rebound of the earth's crust faster to the east and north is causing the water level to continue rising slowly within the estuary.[10] Estimates of the effect of this tilting on water level at the western end of Lake Superior range from 15cm to 23cm per century.[11, 12]

The baymouth bar that protects the waters of the Duluth-Superior Harbor is typical of freshwater estuary systems. Historically, there was only one break in the baymouth bar, what is now the Superior Entry, where water from both the St. Louis River and the Nemadji River flowed out into Lake Superior.[13] Completed in 1871, a new channel was dug through the bar on the Minnesota side to facilitate shipping, the Duluth entry. The lakeward side of the bar is composed primarily of sand, and the landward side consists of finer sediments. The baymouth bar shelters the harbor from the high-energy wind and waves of Lake Superior, allowing wetland habitats to develop. Remnants of at least two older baymouth bars that formed during earlier periods of higher lake levels are found within the estuary: Grassy Point and Rice's Point (Minnesota)/Connors Point (Wisconsin).[14]

Hydrology

The hydrologic regime is the primary physical process that determines the morphology and sediment qualities of estuarine aquatic habitats. Water movement through the estuary is complex because it is affected by both the flow of the St. Louis River (and tributaries) and the changing water level of Lake Superior. The water level of Lake Superior fluctuates on a daily, seasonal, and annual basis. Lake level fluctuations lack a predictable pattern and result from the seiche and the variability in precipitation and evaporation. The bi-directional movement of water acts to both scour areas and deposit sediments. This creates a complex array of protected bays, deeper channels, and shallow flats. The St. Louis River Habitat Plan recognizes ten different aquatic habitat types including natural riverine reach, upper estuarine channels, sheltered bays, clay-influenced river mouths and bays, estuary flats, lower dredged estuarine channels, and industrially influenced bays and slips.[15]

Hydrology also influences nutrient cycling by determining water residence time. Nutrients are carried into the wetlands from three primary sources: 1) the surrounding uplands via the river and its tributaries, 2) water treatment plants, and 3) Lake Superior. Depending on conditions, the St. Louis River Estuary can be either a source or a sink for nutrients. For example, seiche events deliver Lake Superior water high in nitrate into the estuary where summer low-flow conditions increase rates of denitrification, removing nitrate from the system.[16]

Climate and weather

Northwest Wisconsin experiences a cold temperate continental climate that is moderated by the cool waters of Lake Superior. Average annual rainfall is 30 inches and average annual snowfall is 55 inches. Most of the precipitation falls in the summer months from June through September.[17] The coldest month is January with an average high of 20.7°F and an average low of 1.9°F. The warmest month is July with an average high of 76.6°F and an average low of 55.7°F.[18] Climate change models for northwest Wisconsin predict an increasing frequency of intense storm events, more precipitation falling in the spring and autumn,

fewer days of intense cold, and a longer growing season.[19] Analysis of temperature data from 1950 to 2006 indicate that extreme cold days (temperatures below 0°F) have already decreased by 14 to 20 days and the length of the growing season has increased by four weeks.[20] In the winter, the St. Louis River Estuary is covered by a thick layer of ice that varies from 12 to 35 inches in February depending on temperatures and location.[21] Ice usually develops in mid-November and ice melt usually occurs in late April, although this varies greatly depending on the year.

Key habitats and species

Most of the St. Louis River Estuary was relatively shallow when first charted by William Hearding in 1861. Extensive emergent marshes and floating vegetation islands in the lower estuary were described in Hearding's notes. It has been estimated that, since 1861, approximately 3,400 acres of wetlands have been lost in the estuary through a combination of dredging and filling; this includes 1,700 acres of shallow, open-water aquatic habitat in St. Louis Bay and Superior Bay that was converted to deep shipping channels.[22] Most of the changes have been in the lower section of the estuary (Superior Bay and St. Louis Bay) in order to facilitate shipping.

One classification of aquatic habitat types in the St. Louis River Estuary is described and mapped in the St. Louis River Habitat Plan.[23] Habitat types in the upper estuary include large riverine reach, sheltered bays, clay-influenced river mouths, upper estuarine (undredged) river channel, and upper estuary flats. Habitat types in the lower estuary include lower estuary (industrial harbor) flats, lower estuarine (dredged) river channel, industrial slips, industrially influenced bays, and a clay-influenced bay. There are numerous ongoing projects to remediate sites with legacy contaminants, modify bathymetry to promote aquatic vegetation, increase wild rice populations, and reduce sediment and nutrient loads throughout the estuary.

Teachers explore wild rice in Pokegama Bay (Credit: Deanna Erickson)

Over 300 plant species occur in the estuarine wetlands and uplands surrounding the estuary. Submerged, floating leaved, and emergent aquatic plant communities are found throughout the estuary. Northern wild rice or manoomin is a species important to the ecosystem and ricers, especially Native Americans, through both cultural identity and as a food source. Wild rice was more abundant before European colonization and restoration efforts are ongoing to increase the density of wild rice stands throughout the estuary where conditions are appropriate. The most common native aquatic plants include cattails, arrowhead, bur-reed, sedges, eelgrass, and water lilies. Water clarity, depth, and hydrodynamic regime are three important factors that determine the location of aquatic plant communities. Water clarity is affected by the turbidity and tannin staining of the tributary rivers and streams, as well as resuspension of fine sediments within the estuary. Changes in water clarity are also related to climate and rainfall; sediment load is greatest following heavy rains.[24] Differences in water clarity influence the depth of light penetration and the amount and type of submerged vegetation.[25] In clay-influenced river mouths and bays with greater turbidity, such as Allouez Bay and Pokegama Bay, submerged aquatic vegetation is restricted to shallow depths. However, exposure also greatly influences submerged aquatic vegetation. Hydrodynamic regime is affected by fetch (the distance of open water where waves can build) and volume and velocity of water flow.[26]

The terrestrial habitat surrounding much of the estuary is considered the most southerly extent of the northern boreal forest. The boreal tree community is comprised primarily of white cedar, black spruce, balsam fir, paper birch, poplar, aspen, and red and white pine. There are also extensive thickets of speckled alder. Green and black ash are often found along rivers and streams. With the discovery of the invasive beetle emerald ash borer in Superior in 2013, populations of ash trees have steadily declined.

The estuary supports a diverse fish community of approximately 52 native species.[27] This includes the iconic lake sturgeon and several game fish (walleye, smallmouth bass, and northern pike) important both culturally and for tourism.

The estuary and adjacent uplands are important habitats for birds, both for breeding and as a migratory stopover. There are approximately 100 species of birds that breed in estuary habitats including the threatened or piping plover and the endangered common tern. Bald eagles are an iconic species that breed throughout the estuary. There are an additional 233 bird species that pass through the estuary on their way around the western edge of Lake Superior to breeding sites in the north and west.[28]

Social Attributes

The Lake Superior Reserve is situated near the Twin Ports cities of Duluth, Minnesota and Superior, Wisconsin, which have become a regional retail and service center for northern Minnesota and northern Wisconsin. Tourism and recreation drive the Great Lakes economy in the Twin Ports, with some 6.7 million tourists visiting each year, drawn in large part by the beauty and natural amenities of the St. Louis River and Lake Superior. Multiple universities and colleges in the region, a large industrial port, two large medical facilities, energy and trade, as well as education and health services, contribute significantly to the overall coastal regional economy.

Although the Twin Ports economy has sustained growth and employment over the past several years, poverty rates across St. Louis and Douglas counties, where the Twin Ports are located, remain higher than the overall state poverty rates. Minorities and those with low educational attainment are particularly vulnerable to environmental hazards. Douglas County ranks "medium-high" on the 2006–2010 Social Vulnerability Index, compared with other counties across the country, and St. Louis County ranks "medium".[29] The Lake Superior Reserve also has a relatively high social sensitivity index value, according to the 2013 Climate Sensitivity of the NERRS report.[30] This report indicates a variety of reasons for higher social sensitivity to climate change, including the high percentage of Native Americans in the region, the low median home values, the high percentage of homes receiving some form of public assistance, and a higher degree of natural-resource-dependent economies.

The busy harbor of Duluth and Superior (Credit: Bob Cragin)

Population dynamics

Prior to European settlement, the region was home to the Fond du Lac Band of Lake Superior Chippewa and remains so today, with tribal reservation lands adjacent to the City of Cloquet approximately 20 miles west of Duluth, Minnesota. European settlement and development of the area began in earnest in the mid-19th century. The population of the Twin Ports peaked in the first half of the 20th century, and has since declined.[31] In 2017, the population of Douglas County was 43,503, and its urban center, Superior, Wisconsin was 26,473. Comparably larger are the populations of St. Louis County (200,294) and its urban center of Duluth, Minnesota (86,066).

Today, the population of the region is predominantly white. Ninety-three percent of the combined populations of St. Louis and Douglas counties identify as white, three percent identify as American Indian or both white and American Indian, two percent identify as black or African American, and just over one percent identify as Asian.

Educational attainment levels for adults in the Twin Ports region are consistent with state levels. Fifty-four percent of the population age 25 and older have a high school degree or some college, while 28 percent have a bachelor's degree or higher. There are a concentration of universities and colleges in the Twin Ports, and a significant proportion (14 percent) of Duluth and Superior residents are enrolled in an undergraduate college program. In the City of Superior, 54 percent of the population over 3 years of age is enrolled in K–12, and in Duluth, 40.5 percent of the population over age 3 is enrolled in K–12.

Recreating on the St. Louis River Estuary (Credit: Ryan Feldbrugge)

Economic and employment trends

The coastal economy of St. Louis and Douglas counties comprises all activities and industries reported by the Bureau of Labor Statistics. In 2015, the Natural Resources and Mining sector and the Trade, Transportation, and Utilities sector were the largest in terms of their contribution to the combined gross product of the two counties, each contributing 17 percent of the total.[32] In contrast, the Education and Health Services sector is the largest across the two counties in terms of employment numbers, making up 33 percent of coastal employment, followed by the Leisure and Hospitality sector with 12 percent. The Great Lakes economy includes only those sectors and industries which are closely related to marine activities, as defined by the NOAA Economics: National Ocean Watch. The Great Lakes economy in Douglas and St. Louis counties, defined in terms of gross product, was impacted by the 2008 financial crisis, however it has been recovering since, with significant growth starting in 2012.[33] The unemployment rate remained steady between 2011 and 2015 at 7 percent in Douglas County and fell in St. Louis County from 8.3 percent to 7 percent.[34] The recovery has been led by the Tourism and Recreation sector, which has made consistent gains since 2010. In 2013, the sector made up 58 percent of the Great Lakes economy gross product and employed 91 percent of the Great Lakes economy workers across the two counties. The Great Lakes economy, in turn, employed 7 percent of the total coastal workforce and made up 3.4 percent of coastal gross product in 2013.

Twin Ports Coastal Economy

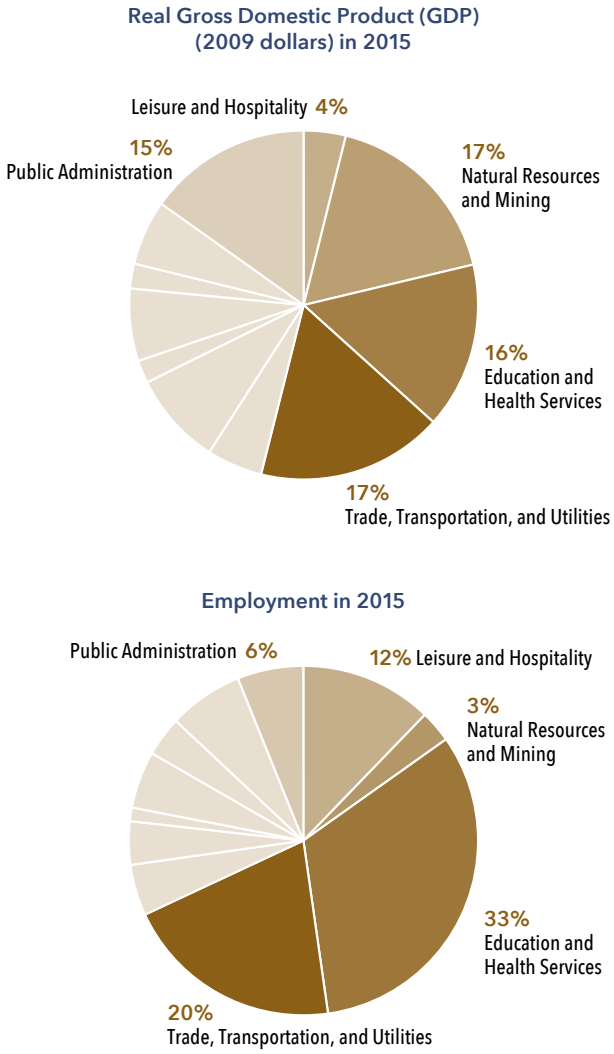


Figure 2.2. Twin Ports coastal economy, share of GDP, and employment for each sector

Social vulnerabilities

Social vulnerability refers to the characteristics of a person or group in terms of their capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard.[35] Common indicators of social vulnerability include the rate of older adults within the population (who may face mobility challenges), minority or historically disenfranchised populations (who may lack resources due to historical racial inequity and disadvantage), and the poverty rate. In a planning context, it is useful to think of social vulnerability as a place-based attribute. A total of 15 social vulnerability indicators, ranging from socioeconomic factors to housing status to mobility, were used to develop the Census tract-based map of Douglas County shown below, using the Social Vulnerability Index Mapping Dashboard Tool hosted by the Centers for Disease Control.[36]

Poverty rates across the two counties and in the Twin Ports cities are higher than their respective state levels, a statistical finding that is common when comparing urban areas to rural areas. Twenty-one percent of families with children under 18 in the City of Superior live in poverty, compared with 17 percent in Douglas County and 14 percent in the state of Wisconsin.[37] In Duluth, 17 percent of families live in poverty, compared with 16 percent in St. Louis County and 11 percent in Minnesota.

A larger proportion of the minority population lives in poverty than does the population that identifies as white. In St. Louis County, 42 percent of individuals who identify as American Indian and 60 percent of those who identify as black or African American live in poverty. In Douglas County, 34 percent of American Indians and 31 percent of African Americans live below the poverty line. In the Twin Ports region, an individual with a low education level is more likely to live in poverty compared with the state populations. In the City of Superior, 30 percent of individuals who are not high school graduates live in poverty, compared with 24 percent in the state of Wisconsin, and in the City of Duluth, 35 percent live in poverty, compared to 25 percent in the state of Minnesota.

Twin Ports Great Lakes Economy

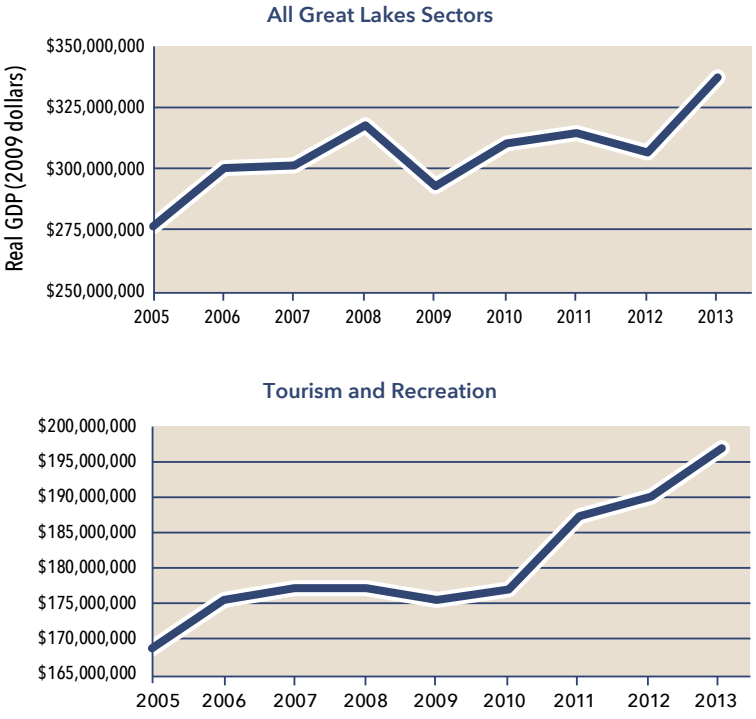


Figure 2.3. Twin Ports Great Lakes Economy, growth across all sectors and in the tourism and recreation sector (Source: NOAA Economics: National Ocean Watch Data.)

Ecosystem services in the St. Louis River Estuary

The Lake Superior Reserve hosted a workshop in the spring of 2016 and identified key messages important to understanding and applying an ecosystem services approach in the region. "Ecosystem services" means ecosystem outputs that benefit individual people or the community. This is not to say that ecosystems and the organisms in them do not have intrinsic value, but that the ecosystem services framework is human- and community-centered. Projects employing this approach are interdisciplinary, involving ecological and social research, and stakeholder engagement and methods range from monetary valuation to qualitative social science methods. In order for an ecosystem services approach to be applicable to management and decision-making, it is important to directly connect indicators of ecosystem health and function to measurements of human well-being. Valuing ecosystem services is useful for evaluating trade-offs of management or policy decisions in terms of the benefits they provide to society, characterizing

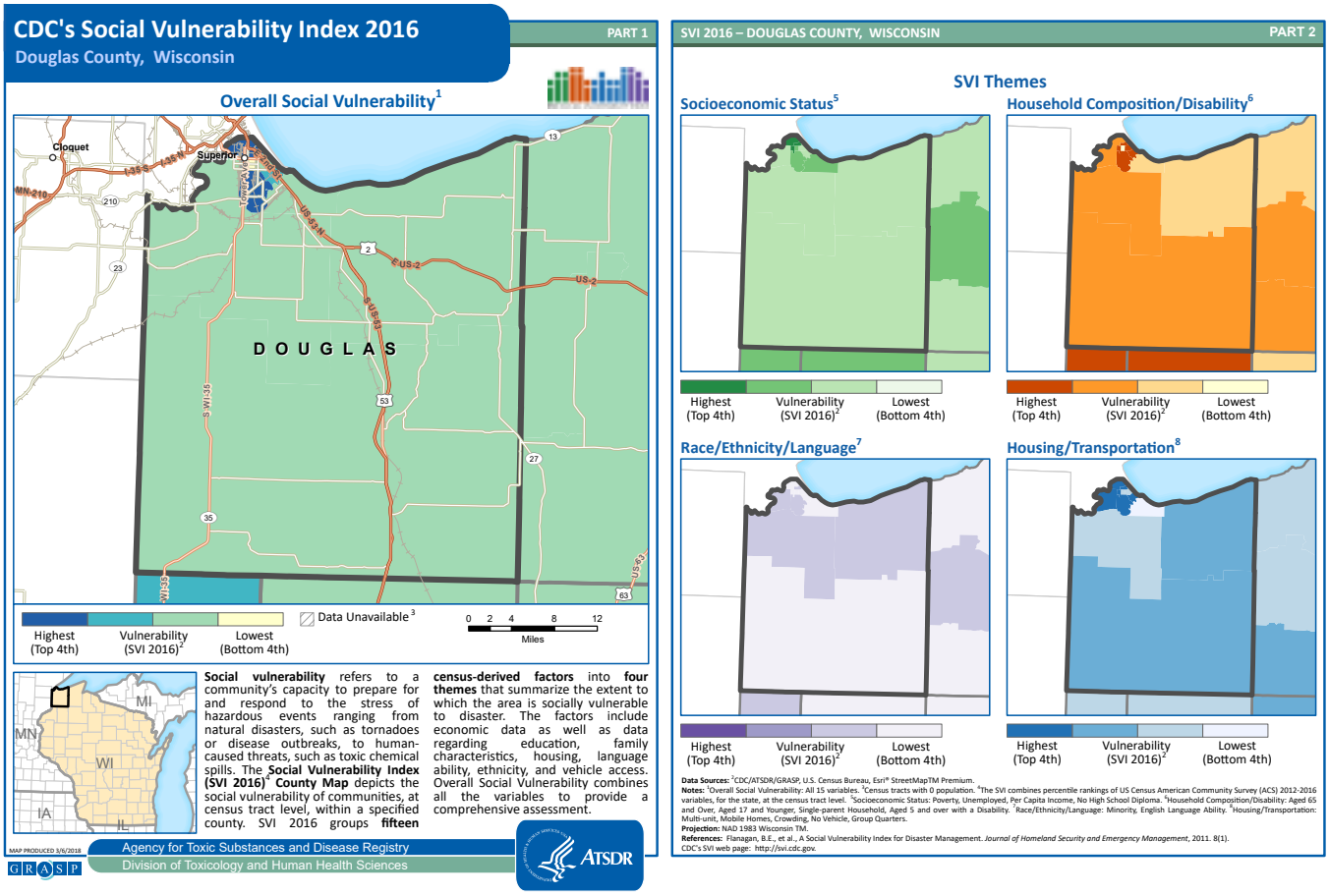


Figure 2.4. Social Vulnerability Index map assessment for Douglas County, 2016

the benefits of programs and activities, understanding the relative benefits of restoration options, and prioritizing those options. One of NOAA's objectives for the Reserve System, under an ecosystem-based management framework,[38] is to examine the relationship between ecosystem health and function and the services provided at specific locations under different conditions.[39]

The St. Louis River watershed provides multiple ecosystem services to the visitors and residents of the Twin Ports region. The estuary contains four land cover types: forest, wetland, water, and developed; and there is also agricultural land cover within the watershed. One local research initiative has developed indicators for 23 biophysical services in the estuary that have been mapped according to their benefits, ecosystem-mediated processes, service providing areas, final ecosystem services, and their value according to a social welfare function.[40] For the purpose of mapping ecosystem services, the estuary region was defined by the dam at Fond du Lac, Minnesota as the upriver boundary, Lake Superior as the downriver boundary, and 100 meters from the water's edge as the riparian boundary. The purpose of this mapping exercise was to identify areas where remediation and restoration processes aimed at use-impairment delisting for the AOC also provide ecosystem service benefits that could be realized through community revitalization. Eleven faunal final ecosystem services were identified in the estuary, including boat and ice-caught fish, shore-caught fish, lake sturgeon, esocid fishes, walleye, colonial waterbirds, bald eagles, white-tailed deer, waterfowl, semi-aquatic fur-bearers, and riparian and semi-aquatic wildlife, and finally, wild rice as an important floral ecosystem service. Aquatic services identified included boating and power cruising areas, sailing areas, a seaplane runway, shipping channels, and wave energy attenuation areas. Public parks and trails, beaches, Native American sacred sites, and natural viewscapes are key landscape features. Bald eagles span 40 percent of the riparian area and natural viewscapes can be found across 51 percent of the area.[41]

These mapped services provide clear economic, recreational, aesthetic, and cultural values to the Twin Ports region. Additional services provided by the estuary, such as flood protection, water supply, science and education

opportunities, and carbon sequestration, also contribute to community health, well-being, and resiliency. Wild rice was identified in a 2015 ecosystem services assessment of the St. Louis River watershed as an important natural resource used for food by people and animals that provides habitat to wildlife and removes carbon from the atmosphere. Wild rice also offers cultural services in the form of local heritage and traditions and spiritual fulfillment.[42] Restoration efforts and green infrastructure projects can increase these important services, while unsustainable development and climate change impacts threaten their decline.

While these two efforts differed in methods and results, they serve as examples of commitment by the research and management community in the Twin Ports and beyond to adopt an ecosystem services approach and to utilize this framework. While the 2014 Ecosystem Services pilot workshop produced baseline community knowledge of this approach and introduced scientists and managers to a range of potential methodologies, much local and regional work remains to be done—especially around the social, cultural, and economic services that contribute to the experience of living in the Lake Superior region. These ecosystem services, together with those that are biophysical in nature, collectively relate to the strategies, objectives, and metrics inherent in the Lake Superior Reserve's research, education, and CTPs. It is anticipated that these programs, by applying an ecosystem services lens, will contribute to the collection of local data, analysis, products, and information that will serve a broad community of coastal decision-makers.

Archaeological and Cultural Resources

Indigenous presence and place

The Lake Superior Reserve is sited within the traditional territory of the Anishinaabe (Ojibwe/Chippewa) people. Lands along the St. Louis River were ceded to the U.S. government by the Ojibwe in both 1842 and 1854. Ojibwe people retained the rights to hunt, fish, and gather in traditional territory outside of the boundaries of reservation land. Traditional relationships with the St. Louis River Estuary continue today. Both the Fond du Lac Band of Lake Superior Chippewa and the Great Lakes Indian Fish and Wildlife Commission now conduct monitoring, research, and restoration work within the boundaries of the Reserve and within the estuary as well as Lake Superior.

Many locations of historical importance to Ojibwe people exist in the St. Louis River Estuary, and several of those sites also reflect the influence of the fur trade in the region. Sites that may be shared publicly were identified by the Fond du Lac Band of Lake Superior Chippewa in the "Onigamiinsing Dibaajimowinan (Duluth Stories)" project. The following sites are included in the boundaries of the Lake Superior Reserve or exist in close proximity to Reserve boundaries as described by the project:

CAMPSITES

Connors Point Campsite
Archaeological evidence gathered before 1914 indicates that prior to its development, Connors Point was used as a Native campsite. (Wisconsin Archeological Society 1914:56)

Wisconsin Point Campsite
Archaeological and documentary evidence indicate that Native people have used Wisconsin Point as a campsite and burial place for centuries. Among those who lived and was buried on Wisconsin Point was Chief Joseph Osaugie (1802-1876). Like Minnesota Point, Wisconsin Point, as a place of traditional importance within the indigenous landscape, was used and occupied by Ojibwe families into the twentieth century. (Wisconsin Archeological Society 1914:56)

Billings Park Campsite
Superior's Billings Park neighborhood was the site of an Ojibwe camp along the St. Louis River. (*Superior Evening Telegram*, July 15, 1954)

Nemadji River Campsite
An Ojibwe village was located near the mouth of the Nemadji River. (*Superior Evening Telegram,* September 28, 1951; July 15, 1954)

BURIALS

Wisconsin Point Burials
An Ojibwe and French burial ground is located near the end of Wisconsin Point. In order to make way for planned docks, which were never constructed, burials were removed from the graveyard in 1918 and relocated to a mass grave within the cemetery of St. Francis Xavier in Superior. The location of the burial ground on Wisconsin Point is still marked and burials may remain on the point. (Diocese of Superior 2014; Ennis 2014).

Connors Point Burials
A mound and burials were reported on Connors Point in Superior. (Wisconsin Archeological Society 1914:56; Carlson 2012:7)

Billings Park
A burial ground was reported in the Billings Park neighborhood of Superior. (*Superior Evening Telegram*, July 15, 1894)

St. Francis Xavier Cemetery
In 1919, burials from Wisconsin Point were relocated to a mass grave in this cemetery along the Nemadji River. (Diocese of Superior 2014).

MISSION

Allouez Mission
About 1667, Jesuit Father Jean Claude Allouez is reported to have had a temporary mission near the mouth of Bluff Creek. (Stowe 1942:101)

Figure 2.5. Important Ojibwe Heritage Sites (Source: Bruce White for the Fond du Lac Band of Lake Superior Chippewa, 2018. Onigamiinsing Dibaajimowinan/Duluth Stories, www.duluthstories.net. Used with permission.)

Any activities proposed in areas containing archeological resources are subject to necessary environmental review to ensure that the cultural and archeological sites are protected, as led by Reserve landowner partners.

Industrial history and the St. Louis River AOC

Industry grew along the St. Louis River in the late 1800s. The first railroad arrived in 1870, and ships navigated Superior Bay. Sawmills, oil refineries, iron ore docks, paint factories, steel and paper mills, and meat-packing plants were built along the banks. The U.S. Steel Duluth Works plant opened on the western shore of Spirit Lake in 1915, with bold plans to smelt ore from Minnesota iron mines in the upper reaches of the St. Louis River. A coke plant and other industries also developed here. Protected from the fierce lake wind, these industries kept profit and jobs in Minnesota by not shipping ore to plants in Ohio and other Midwestern states. But in a time with little protective regulation, waste was released into the river. While the steel plant operated, it released a variety of pollutants into Spirit Lake. These included heavy metals such as lead, copper, and zinc, and polycyclic aromatic hydrocarbons (PAHs). Natural habitat and wetlands disappeared and pollutants lingered in the sediment. By the 1970s, the river was considered dead. Floating sewage and smelly water kept people away from the shore.

More complete treatment of wastewater began in 1978. By 1981, people began to fish and boat on the river again. In 1987 the St. Louis River was designated one of 43 impaired AOCs in the Great Lakes. Wisconsin and Minnesota state agencies, tribal agencies, federal authorities, engaged private sector entities, and nonprofits are working steadfastly to remove beneficial-use impairments from legacy pollution and restore habitat so that the estuary can be delisted around 2025. To restore the river, these partners are remediating polluted sediment, planting wild rice, monitoring fish and wildlife, and restoring habitat. The ongoing clean-up of the St. Louis River—while maintaining a busy port—is an achievement that demonstrates social and political commitment to the estuary and Lake Superior.

Threats and Stressors

A Great Lakes AOC, the St. Louis River Estuary was degraded through historical actions. Legacy contamination remains today, notably in estuary sediments. While the multi-state, federal, and tribal effort to remediate and restore the estuary and address beneficial use impairments (BUIs) is ongoing, BUIs remain as stressors in the ecosystem. The BUIs, designated through the Stage 1 Remedial Action Plan for the estuary in 1992, are the following:

- BUI 1: Fish Consumption Advisories
- BUI 2: Degraded Fish and Wildlife Populations
- BUI 3: Fish Tumors and Other Deformities (delisted in 2019)
- BUI 4: Degradation of Benthos
- BUI 5: Restrictions on Dredging
- BUI 6: Excessive Loading of Sediment and Nutrients (delisted in 2020)
- BUI 7: Beach Closings and Body Contact Restrictions
- BUI 8: Degradation of Aesthetics (delisted in 2014)
- BUI 9: Loss of Fish and Wildlife Habitat

There are approximately 60 rivers and streams that enter the St. Louis River Estuary. Each delivers various levels of water, nutrients, pollutants, and sediments to the estuary and ultimately Lake Superior. A study published in 2014 evaluated anthropogenic stress in the St. Louis River watershed, using an index that included road density, point-source pollution permit density, population density, and percent agricultural and developed land.[43] Stressor scores were significantly and positively correlated with total suspended solids, turbidity, total phosphorus, nitrite and nitrates, dissolved oxygen saturation, pH, specific electrical conductivity, chloride, sulfate, and E. coli in the upper watershed. In the urban-influenced watersheds of the lower estuary, the index reflected the presence of nitrite and nitrates, ammonium, and chloride. Streams in the upper watershed that exhibited a higher degree of stress included the Partridge River, East Two River, Barber Creek watershed and the East Swan River, mainly tributaries associated with mining activity. Estuary tributaries with a higher degree of stress include Faxon, Newton and Bear Creek, and the Pokegama River watershed in Superior. In Minnesota, U.S. Steel, Stewart, Keene, Merritt, and Miller Creeks exhibit cumulative urban and industrial impacts. Additional water quality stressors include contaminants of emerging concern and pharmaceuticals, which enter the river though municipal water discharge. Stormwater and treated wastewater also increasingly carry microplastics to the estuary and Lake Superior. Refining and transportation of petroleum products via rail and pipeline, as well as the possibility of ship transport, poses the threat of water and air contamination. New copper mining proposals are also under permit review in the upper watershed of the St. Louis River.

The interrelated effects of climate change, extreme flood events, invasive species, and harmful algae blooms pose

threats that are being studied by the Reserve and its partners. The potential for increasing future loss of wetlands poses threats to the St. Louis River watershed and may reduce native stands of vegetation, increasing erosion, turbidity, and nutrients in water, particularly during large flood events. The estuary continues to exhibit mercury and PCB contamination and fish consumption advisories are in effect for the watershed as a whole, with separate and more stringent guidance for the estuary. Changes in climate will also ripple out into economic changes and shifts in cultural identity, especially impacting lower income and underserved members of the community.

Boundary Description

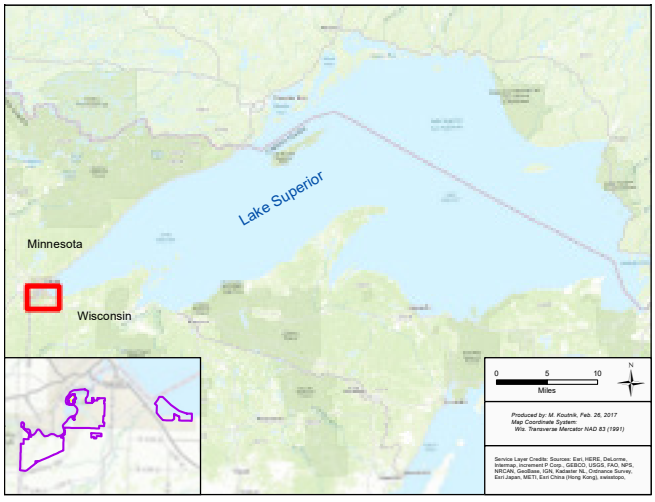
The Lake Superior Reserve is situated on the freshwater estuary at the confluence of the St. Louis River and Lake Superior (see Map 2.1). Lake Superior is the largest of the Great Lakes, and the most pristine.[44] The Reserve is a diverse, large complex that contains a variety of representative terrestrial and aquatic habitats. It possesses a unique combination of pristine and altered areas, allowing for maximum research and educational opportunities. The boundaries of the Lake Superior Reserve include land and water areas significant to supporting Reserve activities and protecting the integrity of core areas for long-term research and monitoring. The boundaries also include land and water areas that provide opportunities for research and monitoring, experiential learning, and training programs. In addition, the boundaries include land and water areas that contribute to the protection of the ecological health of the St. Louis River Estuary and Lake Superior coastal habitats.

The St. Louis River is bordered by Wisconsin and Minnesota. The largely forested St. Louis River watershed is 1,872,807 acres in size. Given that 97.6 percent of the St. Louis River watershed is located in Minnesota,[45] addressing relevant research, education, and stewardship needs requires close collaboration between the two states. Although the Lake Superior Reserve boundaries are located solely in the Wisconsin waters and lands, there is a need and demonstrated desire to collaborate across state boundaries by both Wisconsin and Minnesota partners.

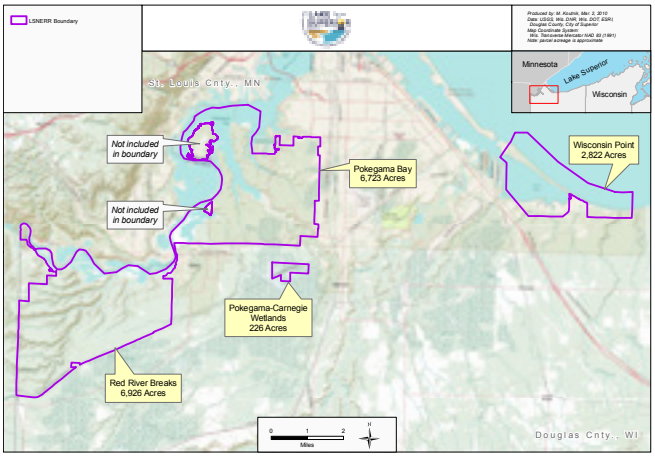
The Lake Superior Reserve site is located on the southwestern coast of Lake Superior (see Map 2.2) and contains approximately 16,697 acres of terrestrial (7,886 acres), wetland (4,136 acres), and aquatic (4,675 acres) habitats. These areas, under four public entity ownerships, consist of the following components:

- Red River Breaks containing lands owned by Douglas County and WDNR;
- Pokegama-Carnegie Wetlands containing lands owned by WDNR;
- Pokegama Bay containing lands owned by the City of Superior and Douglas County;
- Wisconsin Point containing lands owned by the City of Superior, Douglas County, UWS, and the WDNR, the federal government and the Fond du Lac Band

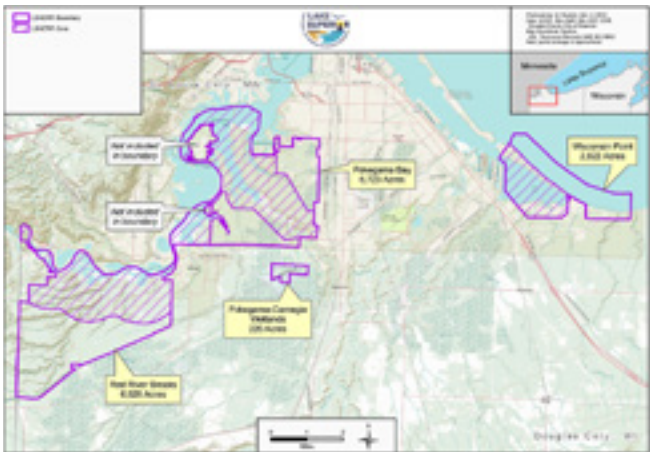
The Port of Duluth-Superior is the largest and busiest port on the Great Lakes.[46] The Reserve boundary does not include areas that are directly affected by the working port and waterfront industrial and commercial uses. Most of these port properties are privately owned and state control is not practical or desirable.



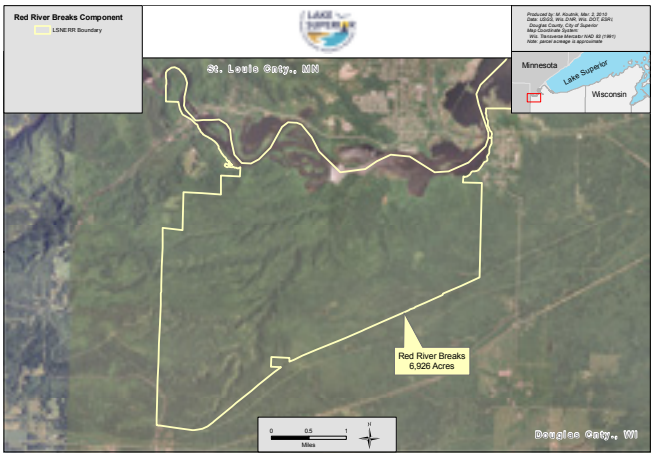
Map 2.1. Lake Superior Reserve boundaries relative to Lake Superior (enlarged version found in Appendix A)



Map 2.2. Lake Superior Reserve boundaries (enlarged version found in Appendix A)



Map 2.3. Lake Superior Reserve core and buffer areas (Appendix A)



Map 2.4. Lake Superior Reserve Red River Breaks component (Appendix A)

Core and buffer

Pursuant to 15 CFR § 921.11, Reserve boundaries encompass two areas: key land and water areas (or "core area") and a buffer area. Key land and water areas must "encompass an adequate portion of key land and water areas of the natural system to approximate an ecological unit" and be representative of the total biogeographic habitat. The Lake Superior Reserve core area (see Map 2.3) was selected based on the following criteria:

1. Vital to the function of the St. Louis River Estuary;
2. Maintains a sufficient level of control to ensure the long-term viability of the Lake Superior Reserve for research and natural processes;
3. Encompasses resources representative of the total St. Louis River Estuary system;
4. Contributes to the preservation of a full range of significant physical, chemical, and biological factors essential to the diversity of fauna, flora, and natural processes occurring within the St. Louis River Estuary determined through—

    a. Lower St. Louis River Habitat Plan;
    b. Wisconsin's Lake Superior Coastal Wetlands Evaluation;
    c. State Natural Area (SNA) designation directly on the waters of the St. Louis River

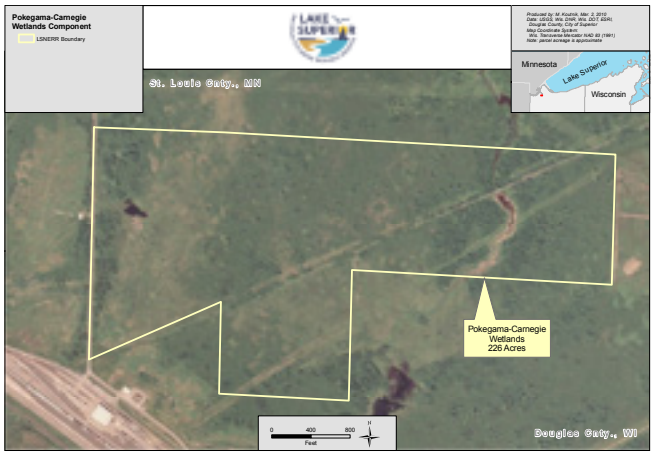
The buffer area was selected based on the following criteria as described in 915 CFR 921.11: The term buffer zone refers to an area adjacent to or surrounding key land and water areas and essential to their integrity. Buffer zones protect the core area and provide additional protection for estuarine-dependent species, including those that are rare or endangered. When determined appropriate by the state and approved by NOAA, the buffer zone may also include an area necessary for facilities required for research and interpretation. Additionally, buffer zones should be established sufficient to accommodate a shift of the core area as a result of biological, ecological, or geomorphological change which reasonably could be expected to occur.

1. Ability to protect the core area and provide additional protection for species that rely on the core area;
2. Located adjacent to, surrounding, or is essential to the integrity of the core area;
3. Maintains a sufficient level of control to support the long-term viability of the Lake Superior Reserve for natural processes, as well as research and education

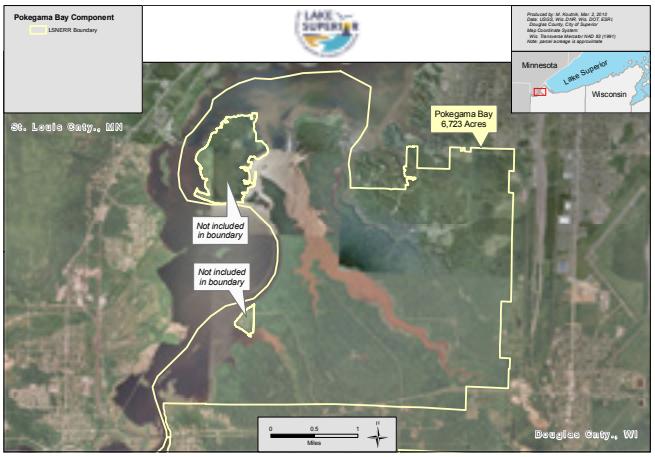
The core (9,196 acres) and buffer (7,501 acres) consist of the following publicly owned areas within the Reserve boundary:

Red River Breaks (approximately 6,926 acres)

The core area includes all adjacent islands and wetlands within the St. Louis River, the area of the St. Louis River within Wisconsin's boundary, the uplands of the St. Louis and Red River Streambank Protection Area within one mile of the river's shoreline, and the lands owned by Douglas County in Special Use designation. The buffer area is within the WDNR St. Louis and Red River Streambank Protection Area and located directly south of the core (see Map 2.4).



Map 2.5. Lake Superior Reserve Pokegama Carnegie Wetlands component (Appendix A)



Map 2.6. Lake Superior Reserve Pokegama Bay component (Appendix A)

Pokegama-Carnegie Wetlands (approximately 226 acres)

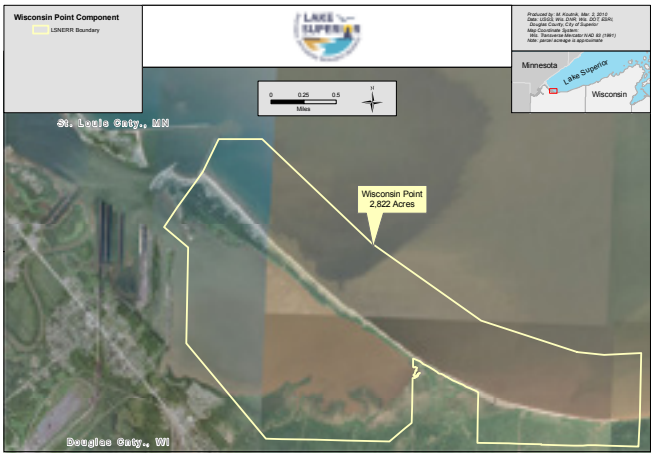
This entire component is buffer area and is a dedicated SNA (see Map 2.5).

Pokegama Bay (approximately 6,723 acres)

The core area is identified by the boundary of Dwight's Point and Pokegama Wetlands SNA within the Superior Municipal Forest (SMF), connecting waters of the St. Louis River upstream to the Red River Breaks, and areas owned by Douglas County and identified as Oliver Marsh. The buffer is the remaining areas within the SMF not identified as core areas (see Map 2.6).

Wisconsin Point (approximately 2,822 acres)

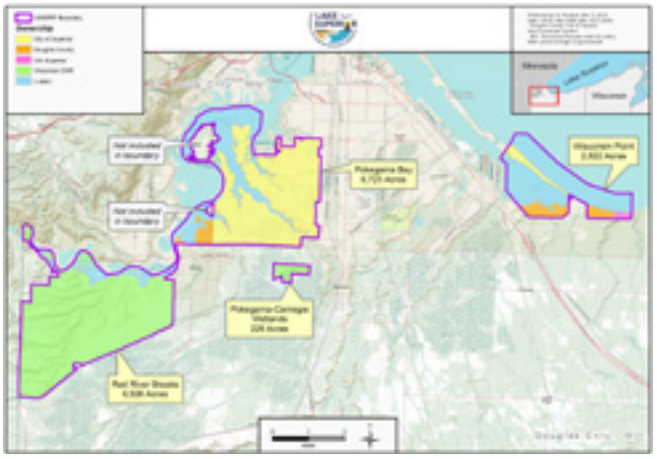
The core area consists of all land within the Reserve boundary on Wisconsin Point that is owned by the City of Superior and WDNR, areas adjacent to Allouez Bay owned by Douglas County, and water portions of Allouez Bay. The buffer area consists of Douglas County lands located on the Lake Superior shoreline, land surrounding Dutchman Creek that is owned by UWS, and Lake Superior waters bordering this component (see Map 2.7).



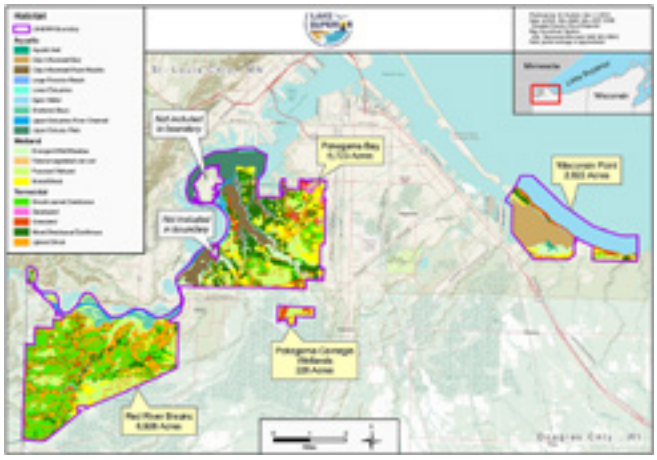
Map 2.7. Lake Superior Reserve Wisconsin Point component (Appendix A)

Land ownership and land use type

The site is a combination of four land components and portions of the connecting waterways. Each component of the Reserve possesses a unique combination of habitats (see Maps 2.8 and 2.9).



Map 2.8. Lake Superior Reserve ownership (Appendix A)



Map 2.9. Lake Superior Reserve habitat types (Appendix A)

Red River Breaks

St. Louis River Streambank Protection Area – WDNR ownership

The St. Louis River Marshes/Red River Breaks are an integral part of one of the largest freshwater estuaries on the western Great Lakes, and the Lower St. Louis River offers unique large-scale protection and restoration opportunities in an urban setting.[47] It is considered a high priority owing to its large size, recent state acquisition of lands within the area, and its significance to water quality in the estuary.

Significant wetlands lie within the Upper St. Louis River Estuary; the neighboring Wisconsin shoreline is almost entirely undeveloped and includes a large block of rough, forested, roadless terrain. The area is a mixture of state and private ownership. The Minnesota side of the St. Louis River, not formally part of the Reserve but sharing the St. Louis River, also harbors valuable wetlands, including remnant patches of wire-leaved sedge fen at the Oliver Bridge and downstream at Grassy Point.

Upper portions of the St. Louis River Estuary from Fond du Lac downstream to Oliver feature extensive emergent marshes. These are typically located inside the main channel's meanders, but also occur in protected, shallow bays along the upland shore. Important emergent aquatics include species typical of other Lake Superior stands (arrowheads, bulrushes, bur-reed, lake sedge, and cattails). Wild rice and sweet flag are locally common. Deeper waters of the marsh complexes support submergent and floating-leaved macrophytes.

The patches of marsh associated with the main channel are often bordered by a natural levee adjoining the flowing river. Where well-developed, the levees are vegetated with tall wetland shrubs and lowland hardwoods, especially speckled alder, red-osier dogwood, meadowsweet, willows, black and green ash, and box elder.

This site borders the Red River and associated Wisconsin tributaries of the Lower St. Louis River and contains an extensive block of undeveloped and roadless forest dominated by pole-size trembling aspen. The canopy is sparse, with a dense understory of speckled alder in many stands. Conifers, which were formerly dominant here, occur as scattered individuals or in small stands, and white spruce, white pine, and white cedar are the most important species. In poorly drained "flats," on the level ridges between ravines, there are patches of black-ash-dominated hardwood swamp and thickets of speckled alder and other tall wetland shrubs. Areas of standing water are infrequent but, where present, support small emergent marshes and broad-leaved sedge meadows.

The lower slopes of the steep-sided ravines are often springy, sometimes supporting remnant stands of white cedar and unusual herbs. Several springs were flowing with brightly colored orange water, the result of the presence of iron bacteria. Some of the small terraces a few meters above the streams in the ravine bottoms contain mature stands of large white spruce, black ash, and balsam poplar. Along the St. Louis River channel there are stands of emergent macrophytes, shrub swamp, and small patches of black ash swamp.

At least ten species of rare plants have been documented on the site. The area supports a representative diversity of the region's birds, including large populations of many neotropical migrants (e.g., wood warblers, vireos, flycatchers, and thrushes).

Douglas County Special Use Area – Douglas County ownership

Located along the shore of the St. Louis River, this small eight-acre parcel is contiguous to the St. Louis and Red River Streambank Protection Area to the east and is managed by Douglas County as "special use lands" under the state's County Forest Law, which recognizes the value of the land for conservation, rather than timber production.

St. Louis River

The portions of the St. Louis River within the State of Wisconsin and adjacent to the St. Louis and Red River Streambank Protection Area and Pokegama Bay, and connecting the two sites, are included in the Lake Superior Reserve boundary. The portions of the St. Louis River downstream of the Pokegama Bay, including the entire Duluth-Superior Port, are not included in the boundary. It should be noted that the river forms the political boundary between Wisconsin and Minnesota, which work together to address restoration and water quality issues, for example, with the AOC and through the implementation of a Remedial Action Plan. The states also work together via the cities of Duluth and Superior and the counties on wastewater treatment.

Pokegama Carnegie Wetlands

Pokegama Carnegie Wetlands SNA – WDNR ownership

Pokegama Carnegie Wetlands is owned by Douglas County and the WDNR. It was designated an SNA in 2006. Situated on level clay flats between the Pokegama and Little Pokegama Rivers, Pokegama Carnegie Wetlands features an extensive mosaic of wetland vegetation containing many rare plant species. A tall complex of shrub wetlands composed of speckled alder and willows has the greatest coverage with small patches of open sedge meadow dominated by coarse-leaved sedges and bluejoint grass also present. Widely scattered small pools support a variety of emergent and submergent aquatic plant species. Small "islands" of trees dot the wetland with tamarack, white pine, white spruce, red pine, trembling aspen, and balsam poplar. Of special significance are the numerous populations of rare plants occurring within the wetlands. Many are represented by large or multiple populations throughout the complex and some are not generally widespread within the Lake Superior region. A diversity of animals inhabit the site. Amphibians include wood frog, spring peeper, green frog, leopard frog, eastern gray tree frog, and American toad. Yellow warbler, golden-winged warbler, alder flycatcher, sora, Virginia rail, woodcock, sharp-shinned hawk, and common raven are some of the birds present here. The estuary also contains habitat for several semi-aquatic mammals including beaver, mink, river otter, and muskrat.

Pokegama Bay

SMF – City of Superior ownership

The SMF is a large natural community complex connected to a major freshwater estuary. A significant portion of this site was designated as an SNA in 1996. This designation encompassed much of the mature forest and marsh, and also included a part of the wet red clay flats where rare plants occur.

The City of SMF contains a wealth of natural features unusual in the context of an urban-industrial center. Among the most significant of these are stands of mature coniferous forest, extensive emergent marsh, and wet clay flats supporting a mixture of shrub swamp and wet meadow. The site borders the St. Louis River Estuary, which dissects the uplands into a series of narrow, steep-sided ridges.

The extensive emergent marsh borders both sides of the Pokegama River (which is really an arm of the St. Louis River Estuary). Marsh composition is very similar to that of stands found along the lower stretches of the St. Louis River. Dominants include bur-reed, bulrushes, arrowheads, and cattail. Deeper waters support submergent and floating-leaved macrophyte species. The invasive exotic purple loosestrife is uncommon but widespread in the marsh. Efforts to control it should begin as soon as possible.

The shrub swamp and meadow complex provides habitat for several rare plants. The dominant plants are typical of Lake Superior region stands on red clay and include speckled alder, willows, lake sedge, and bluejoint grass. This wetland is the southwestern most portion of a former large and contiguous wetland that was partially destroyed and greatly disrupted by growth of the City of Superior. Rare animals such as Forster's tern, bald eagle, and merlin forage here.

The coniferous forests are composed primarily of species often associated with the boreal regions. Throughout the Lake Superior Clay Plain Ecoregional Subsection, this forest type has been greatly fragmented and often replaced by more monotypic stands of aspen. Thus the stands within this site have regional conservation significance. They could also provide a template for restoration actions considered elsewhere.

Oliver Marsh – Douglas County ownership

This large marsh occupies part of the St. Louis River Estuary between the Village of Oliver and the City of Superior Municipal Forest. A narrow, natural levee has developed on the outside bend of a channel meander and is partially vegetated with shrubs and small lowland hardwoods. The levee separates the northern portion of the marsh from the main channel. The emergent beds are typical of Lake Superior stands and include bulrushes, bur-reeds, lake sedge, cattails, sweet flag, and arrowheads. Pockets of wild rice occur in several protected bays fed by tiny streams draining the uplands to the east. A deep central lagoon between the natural levee and the emergent beds (that lie adjacent to the upland shore) harbors significant stands of floating-leaved and submergent macrophytes.

Most of the Wisconsin portion of the shoreline of this site is undeveloped and forested with the early successional species paper birch and trembling aspen. Remnant stands of conifers, mostly white spruce and white pine, are scattered along the clay bluffs. Where homes and docks have been constructed (as is the case near the Village of Oliver) erosion is often noticeable. Small patches of the invasive exotic purple loosestrife are often associated with the natural levees or disturbed shoreline areas. Slumps occur on many of the clay bluffs exposed to the direct action of water and ice, especially when they are unprotected by stands of aquatic vegetation. The Minnesota side of the river has more residential and industrial development but also has extensive marshes.

This is one of several high-quality marshes within the St. Louis River Estuary. Adjoining uplands are a protection priority to preserve the marsh.

Wisconsin Point

Wisconsin Point-City of Superior ownership

Wisconsin Point is the eastern portion of a long baymouth bar separating the waters of Lake Superior from Allouez Bay. Major site features include several miles of open sand beach and dunes, small interdunal wetlands, and a xeric forest of white pines and red pines. Wisconsin Point and adjacent Allouez Bay receive heavy visitation by migrating birds in the spring; this area has been identified as an Important Bird Area of Wisconsin.

Wisconsin Point Wildlife Management Area – WDNR ownership

Wisconsin Point is the eastern portion of a long coastal barrier spit separating the waters of Lake Superior from Allouez Bay a portion of the St. Louis River Estuary. Major site features include several miles of open sand beach and dunes, small interdunal wetlands, and a xeric forest of white and red pines. The point and adjacent Allouez Bay receive heavy visitation by migrating birds in the spring. Developments include roads, vehicle turnouts, a Coast Guard station, and breakwater.

A small, open interdunal swale near the western tip of the point supports a marsh community dominated by low graminoid plants, especially sedges and rushes. Several rare plants are present. The swale is surrounded by dense thickets of tall shrubs—mostly speckled alder, willows, and red-osier dogwood. These shrubs are encroaching on the openings and should be monitored and controlled if necessary. The shrubs do provide a measure of security for this fragile site by screening it from most passersby. During 1996 this swale was very wet, with standing water reaching a depth of over 30cm in July and August. This site will require both vigilance and active management to maintain and protect the many valuable natural features present.

A similar community was unintentionally created east of the inactive former Coast Guard station when an area was cleared of vegetation and then fenced in the hope the federally endangered piping plover would nest here. The center of this sand area was excavated to a depth slightly below the water table, providing suitable conditions for colonization by some of the interdunal swale plants, including several rare species. Two AOC projects were completed in this area, the Wisconsin Point Dunes restoration (2019) and Piping Plover habitat restoration (2020).

Lake Superior Frontage – Douglas County Ownership

This parcel is located on Lake Superior and contiguous to City of Superior property on the west and UWS property on the east. The landscape of this parcel is largely forested wetland elevated on a 40-foot bluff above a sandy beach that is contiguous with Wisconsin Point dunes. The wetland forest is a mixture of deciduous and coniferous trees and a scrub-shrub complex. It is managed by Douglas County and designated as "special use lands" under the state's County Forest Law.

Nelson Outdoor Laboratory – UWS ownership

This parcel of land is owned and managed by UWS. The area is used to enhance the instruction, research, and public service missions of the university. This land is available for use by the Lake Superior Reserve as the mission of a NERR is in sync with the operating agreement for the Nelson Outdoor Laboratory. Within the border of the City of Superior, adjacent to Wisconsin Point, Dutchman Creek runs for three miles and empties into Lake Superior at the Nelson Outdoor Laboratory. It has higher flows than other City of Superior streams and is relatively turbid. Though its riparian area is relatively undeveloped, it still receives stormwater inputs from private landowners who live along the creek. It cuts through sand beaches before reaching the lake, creating a place for high-quality coastal wetlands. During low flows, the river mouth is often disconnected from Lake Superior.[48]

Lake Superior

The waters of Lake Superior extending from the shoreline of this component to one-half mile from shore are included in the boundary of the Reserve. This near-shore area provides an important buffer to the Reserve core area and offers potential opportunities for research, monitoring, and education activities.

Allouez Bay

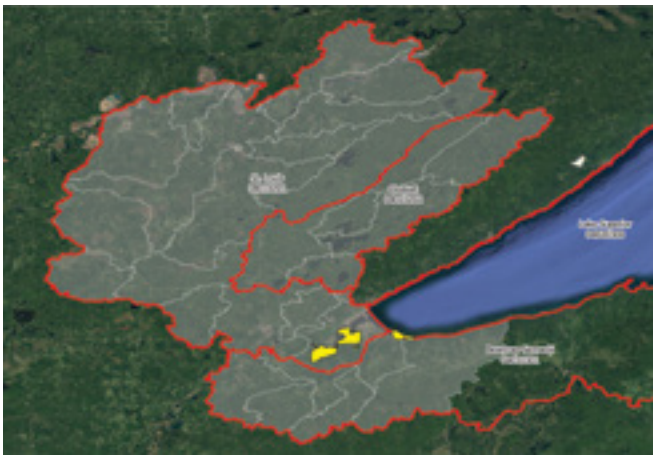
This site is a critical part of the regionally significant Lower St. Louis River Estuary, containing good, though disturbed, examples of natural communities endemic to the Great Lakes. This area supports many rare species and hosts major concentrations of migratory birds in the spring. Allouez Bay is situated between the City of Superior's eastside neighborhood of Allouez and Wisconsin Point. The eastern end of the bay is shallow and contains a large marsh with patches of sedge meadow and a drowned tamarack swamp present near the base of Wisconsin Point. Several streams, Bear Creek, Bluff Creek and the Nemadji River empty into the bay. A portion of the wetland at the head of the bay, but now cut off by the access road to Wisconsin Point, was filled in the past.

The marsh is dominated by tall native graminoids, such as bur-reeds, bulrushes, spikerush, sedges, and cattails. Broad-leaved arrowhead is also among the dominants. Deep areas within and on the margins of the emergent marsh support floating-leaved and submergent aquatic macrophytes. The portions of the wetland nearest the shore are dominated by sedges. Tamarack snags are scattered throughout parts of this area.

It is possible that this wetland formerly contained extensive mats of wire-leaved sedges, but eutrophication, sedimentation, and other disturbances led to changed conditions which aided the spread and eventual dominance of the coarser, more nutrient-tolerant emergents. Nevertheless, this wetland is composed mostly of native species, and plant diversity and wildlife values are quite high. In the early spring, substantial numbers of waterbirds of many kinds congregate here. This site may be especially significant in years when the break-up of ice on Lake Superior is late, and little open water is available inland. The marsh also supports many nesting birds, including uncommon marsh species and a few rare invertebrates.

Targeted watershed

Broadly, the proposed targeted watershed of the Lake Superior Reserve includes all land areas that drain to the St. Louis River Estuary and designated reserve properties. This includes the St. Louis River and its tributaries, as well as the Nemadji River watershed and Dutchman Creek, which drains directly to Lake Superior and falls within the Amnicon River-Frontal Lake Superior hydrologic unit code (HUC). The HUCs for all 8–10 HUC watersheds are listed in Figure 2.6 and shown shaded in grey on the satellite image in Map 2.10.



Map 2.10. Satellite image of targeted watershed boundaries (grey areas with red boundaries) and designated Reserve properties in yellow. (Appendix A)

LAKE SUPERIOR NERR HUC8 AND HUC10

HUC8	HUC10	NAME
04010201		St. Louis
	0401020101	Partridge River
	0401020102	Headwaters Saint Louis River
	0401020103	Embarrass River
	0401020104	Mud Hen Creek
	0401020105	West Two River
	0401020106	West Swan River-East Swan River
	0401020107	Sand Creek-Saint Louis River
	0401020108	Upper Whiteface River
	0401020109	Lower Whiteface River
	0401020110	Floodwood River
	0401020111	East Savanna River
	0401020112	Stoney Brook
	0401020113	Artichoke River-Saint Louis River
	0401020114	Midway River
	0401020115	Thompson Reservoir-Saint Louis River
	0401020116	Saint Louis River
04010202		Cloquet
	0401020201	Headwaters Cloquet River
	0401020202	West Branch Cloquet River
	0401020203	Boulder Lake Reservoir-Boulder Creek
	0401020204	Island Lake Reservoir-Cloquet River
	0401020205	Fish Lake Reservoir-Beaver River
	0401020206	Cloquet River
04010301		Beartrap-Nemadji
	0401030101	South Fork Nemadji River
	0401030102	Upper Nemadji River
	0401030103	Black River
	0401030104	Middle Nemadji River
	0401030105	Lower Nemadji River-Frontal Lake Superior
	0401030106	Amnicon River-Frontal Lake Superior

Figure 2.6. HUCs for the Lake Superior Reserve targeted watershed

Pokegama Bay Sentinel Site and Meteorological Station (Credit: Hannah Ramage)

LAKE SUPERIOR RESERVE STRATEGIC PLAN

The Lake Superior Reserve staff, working with Office of Coastal Management (OCM) facilitators, developed revised Mission and Vision statements, determined priority coastal issues upon which to focus, and developed core goals linked to an integrated logic model looking out 20 years. Below are the revised Vision and Mission statements, priority issues, core goals, and strategic objectives of the Reserve's 2020–2025 Management Plan. All strategic objectives and their strategies are incorporated into relevant chapters throughout this document.

Vision

Lake Superior coastal watersheds and estuaries are understood, valued, and thriving!

Mission

The Reserve works in partnership to improve the understanding of Lake Superior's coast and estuaries. We address issues affecting the watershed through the integration of research, education, outreach, and stewardship.

Priority Coastal Issues

A. Changing Climate
B. Water Quality and Healthy Ecosystems
C. Strengthening Community and Sense of Place

Core Goals

GOAL I

A Healthy Lake Superior:

Reserve science and collaborations inform management and policy decisions that lead to healthy estuaries and a healthy Lake Superior.

Thanks to the work of the Reserve, collaboration among researchers and managers leads to applied science, positively impacting coastal management. This collaboration improves data gap identification and action. Identified opportunities lead to critical professional experience for students and young professionals, especially at UWS, building a future workforce. By seizing opportunities to address information gaps and needs, data portals that support management and policy decisions are developed leading to habitat restoration and protection. Such policy is developed using actionable, timely, and useful data and information, strengthened through the integration of social science. Through such integration, and as a result of improved research and policy, opportunities ultimately expand for the public to experience the estuary and western Lake Superior. This leads citizens to understand and value the sociocultural and economic benefits of the lake and estuaries.

GOAL II

A Strengthened Community and Sense of Place:

Members of the community develop a strong sense of place, based on the ecological, social, cultural, and economic values of the Lake Superior watershed.

The work of the Reserve has led to increased citizen understanding about the lake and estuary and the sociocultural and economic benefits they provide, and has led citizens of Superior to become proud and engaged in building a thriving and resilient waterfront community. The concept of resiliency is broadly embraced, leading to policies for climate adaptation and resiliency planning. Superior residents implement these policies and through innovative research, quality place-based education, and innovative engagement of decision-makers, both the watershed and community become increasingly resilient. As a result of these integrated efforts, the Reserve is nationally recognized as a model for supporting community well-being.

GOAL III

Outreach and Engagement Are Innovative:

The audience for Reserve programming is expanded and engaged in response to partner needs and emerging issues.

Through the work of the Reserve, opportunities to fill research and data gaps are embraced by Reserve staff who develop successful programs and innovative outreach to better reach target audiences. Innovative strategies for engaging decision-makers are developed and improved through the application of social science. This leads to improved decision-making and better-informed policies focusing on climate adaptation and improving resiliency while strengthening community and sense of place.

GOAL IV

The Twin Ports Are Collaborating:

Regional collaboration/cooperation between cities, counties, states, governments, tribes, citizens, and businesses is strengthened across boundaries to improve habitat and water quality.

Through the work of the Reserve, improved citizen understanding and valuation of coastal resources and improved habitat restoration led to more opportunities for recreation and tourism in both states. Opportunities to experience the estuary increase from both sides and businesses in the watershed recognize this, motivating greater interstate activities and cross-political-border private sector initiatives. As a result of this, policies and culture increasingly support watershed-wide and cross-border business opportunities, simultaneously developing a unique niche for the City of Superior.

GOAL V

The Schools and Community Model Collaboration:

Educational programming and communication strategies serve as a model for how to effectively engage learners and integrate research to raise awareness of watershed issues.

Through the work of the Reserve, the research community is engaged with the education community. Residents in western Lake Superior know about the Reserve and Rivers2Lake, increasing participation annually. Both residents and educators come to rely upon the Reserve and the Rivers2Lake program, further reinforcing interest in participation in the Reserve's education programs. Through the application of social science information, the quality of learning through the Reserve's place-based educational programming is improved. This improved learning ultimately leads to the community embracing resiliency planning and policies while strengthening community and sense of place.

The exhibit hall at the Lake Superior Estuarium (Credit: Sarah Congdon)

GOAL VI

The Lake Superior Estuarium Is a Destination:

The Reserve and the Lake Superior Estuarium are a resource and destination for science-based information about the relationship between the coastal environment and our communities.

Thanks to the work of the Reserve, the Lake Superior Estuarium becomes a destination for visitors and residents alike, serving as a place to learn about, identify with, understand, and appreciate the coastal environment and its relationships to the community. Reserve staff understand and capitalize upon opportunities to fill information and knowledge gaps, and through closer collaboration between research and education, the Reserve better understands the educational needs of residents, defining the Superior niche. Businesses within the watershed take advantage of this niche to launch private sector initiatives. The Reserve makes use of improved understanding of resident and visitors through the integration of social science research and information, and with knowledge gaps and needs in mind, designs and implements a marketing strategy for the Lake Superior Estuarium. As a result of this marketing strategy and feedback to community place-based education, citizens better understand and value the social, cultural, and economic benefits of the Lake and estuary. The success of the Lake Superior Estuarium generates regional awareness of, and pride in, the Lake Superior Reserve.

RESERVE GOALS:

- A Healthy Lake Superior
- A Strengthened Community and Sense of Place
- Outreach and Engagement Are Innovative
- The Twin Ports Are Collaborating
- The Schools and Community Model Collaboration
- The Lake Superior Estuarium Is a Destination

Strategic Objectives

Research and monitoring

OBJECTIVE 1:

Identify the information and resources needed to strengthen understanding of the ecological processes and functions in Lake Superior estuaries, determine how people and communities value coastal environments, and inform policy decisions.

OBJECTIVE 2:

Lead and facilitate research projects that directly support managers and researchers, improving the ecological condition of Lake Superior estuaries and strength of communities along the coast.

OBJECTIVE 3:

Make data produced by the Reserve about the St. Louis River Estuary, Lake Superior, and surrounding communities available to stakeholders and the public.

OBJECTIVE 4:

Adapt and expand the SWMP to reflect present and potential ecosystem stressors including increased storm events, algal blooms, and habitat change.

Education

OBJECTIVE 1:

Use place-based and outdoor learning to support schools, educators, and youth in learning about and experiencing Lake Superior and its estuaries, increasing academic engagement, stewardship, and sense of place.

OBJECTIVE 2:

Strengthen education, collaboration between partners, and the local economy through the development and operation of the Lake Superior Estuarium, in order to generate public connection to and understanding of the Lake Superior watershed.

OBJECTIVE 3:

Use effective environmental communication and diverse research-based methods and media to develop sustained conservation action education that promotes active stewardship of estuaries and the Lake Superior watershed.

Coastal training

OBJECTIVE 1:

Coastal decision-makers have access to new knowledge and skills that will elevate their management of coastal systems.

OBJECTIVE 2:

Lake Superior coastal communities have increased their capacity to manage hazards and are planning for uncertain future conditions.

OBJECTIVE 3:

Coastal decision-makers are empowered to act in the best interest of coastal and estuarine resources.

OBJECTIVE 4:

Decision-makers capitalize on the Reserve's unique ability to operate across jurisdictions to address issues of coastal importance at both a local and regional scale.

Stewardship

OBJECTIVE 1:

Collaborate with landowning partners to support management planning, restoration, research, and monitoring that leads to healthy ecosystems and improved water quality in Lake Superior coastal watersheds.

OBJECTIVE 2:

Communicate research and provide training to communities and organizations to promote the conservation, restoration, and stewardship of coastal watersheds.

Administration

OBJECTIVE 1:

Provide and enhance the administrative structure needed to fulfill the Reserve's mission and conform to federal and state law and University of Wisconsin agreements.

Boundary and acquisition

OBJECTIVE 1:

Engage with landowning partners to identify areas, creating a process and a timeline for acquisition that aligns with the vision, mission, and core goals of the Reserve.

RESERVE GOALS:

- A Healthy Lake Superior
- A Strengthened Community and Sense of Place
- Outreach and Engagement Are Innovative
- The Twin Ports Are Collaborating
- The Schools and Community Model Collaboration
- The Lake Superior Estuarium Is a Destination

Facilities and construction

OBJECTIVE 1:

Complete development and begin operations of the Lake Superior Estuarium and continue to make adaptations that respond to the needs of the community.

OBJECTIVE 2:

Evaluate options for development of a dormitory (residence hall) facility and pursue funding to design and construct a facility responsive to Reserve, partner, and community needs.

Public access

OBJECTIVE 1:

Work with landowning partners to provide access for scientific research, education, and recreation to improve understanding of the Lake Superior watershed and to enhance community and a sense of place, while balancing the protection of Reserve resources.

OBJECTIVE 2:

Develop programs that increase awareness of access opportunities and encourage responsible use of Reserve resources by all members of the community.

Volunteers

OBJECTIVE 1:

The Friends of the Lake Superior Reserve intends to take on both tactical and strategic objectives in support of the Reserve. Among these are raising funds, recruiting and coordinating volunteers to support Reserve operations, and obtaining equipment to support Reserve operations.

Communications

OBJECTIVE 1:

Generate accessible and engaging scientific, social, and educational information delivered through media, publications, communications, and events in order to support Lake Superior estuaries and the communities on their shores.

OBJECTIVE 2:

Design and implement a marketing strategy for the Lake Superior Estuarium and other Reserve offerings that is responsive to partner and community needs.

Statement of Diversity and Inclusion

The Lake Superior National Estuarine Research Reserve, with the UW–Madison Division of Extension, provides affirmative action and equal opportunity in education, programming and employment for all qualified persons regardless of race, color, gender, creed, disability, religion, national origin, ancestry, age, sexual orientation, pregnancy, marital or parental, arrest or conviction record or veteran status. The Reserve also provides equal opportunities in employment and programming, including Title VI, Title IX, the Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act requirements.

Requests for reasonable accommodations for disabilities or limitations should be made prior to the date of the program or activity for which it is needed. Please do so as early as possible prior to the program or activity so that proper arrangements can be made. In certain situations, information related to requests may be shared with staff or units necessary to help coordinate an appropriate accommodation.[49]

The Reserve supports active, intentional, and ongoing engagement with diverse people in the communities in which we work—through our partnerships, research, coastal training, and educational programming. Intentional engagement increases awareness and understanding of the complex ways individuals and groups interact with natural systems and the Lake Superior watershed, including, but not limited to, traditional ecological knowledge.[50]

The Reserve recognizes that the St. Louis River Estuary occupies the land of the Ojibwe people. We encourage our visitors, communities, and partners to celebrate and honor ancestral Ojibwe land and the sacred lands of all indigenous peoples.

Mark McConnell helps students plant trees at Wisconsin Point (Credit: Deanna Erickson)

UW-Superior students survey invasive Purple Loosestrife in Pokegama Bay (Credit: Shon Schooler)

PROGRAM FOUNDATIONS

Research and Monitoring

Introduction

NERRS's mission provides that reserves are protected and managed to afford opportunities for long-term research. Research at each reserve is designed to fulfill the Reserve System goals as defined in the regulations (15 CFR § 921.1(b)).

To sustain these system goals, the 2020–2025 Reserve System Strategic Plan outlines research objectives to maintain and expand biophysical and socioeconomic monitoring to track environmental change, increase the use of collaborative research to address decision-maker needs, and ensure that science, education, and management audiences can use the data and tools developed by the system.

Reserve System Research Programs

Research is supported through the NERRS Collaborative Science Program that focuses on integrating science into the management of coastal natural resources. The program integrates and applies the principles of collaborative research, information, and technology transfer, graduate education, and adaptive management with the goal of developing and applying science-based tools to detect, prevent, and reverse the impacts of coastal pollution and habitat degradation in a changing environment. The program is designed to enhance the Reserve System's ability to support decisions related to coastal resources through collaborative approaches that engage the people who produce science and technology with those who need it. In so doing, the Collaborative Science Program seeks to make the process of linking science to coastal management decisions, practices, and policies more efficient, timely, and effective and share best practices and examples for how this can be done.

Reserve SWMP

Environmental monitoring is supported through the SWMP, which provides standardized data on national estuarine environmental trends while allowing the flexibility to assess coastal management issues of regional or local concern. The Reserve SWMP Plan describes SWMP and its role in supporting NERRS's mission and strategic goals, details the existing capacity, and outlines an implementation and development plan for the program. SWMP monitors short-term variability and long-term changes in water quality, biological systems, sea level and lake level change impacts on coastal habitats, and land use and land cover characteristics of estuaries and estuarine ecosystems for the purposes of informing effective coastal zone management. The program is designed to enhance the value and support the vision of the reserves as a system of national references sites and focuses on three ecosystem characteristics:

1. **Abiotic Characteristics**: Abiotic measurements are supported by standard protocols, parameters, and approaches that describe the physical environment including weather, water quality, hydrological, and sediment-related parameters. The monitoring program currently provides data on water temperature, specific conductivity, percent saturation of dissolved oxygen, pressure, pH, turbidity, salinity, concentration of dissolved oxygen, and pressure corrected water depth. Meteorological (MET) data include air temperature, relative humidity, barometric pressure, wind speed, wind direction, rainfall, and photosynthetically active radiation (PAR). In addition, the program collects monthly nutrient and chlorophyll as samples and monthly diel samples at one SWMP data logger station. Data is Federal Geographical Data Committee compliant and available via the Reserve System Centralized Data Management Office (CDMO).[51]
2. **Biotic Characteristics**: As funds are available, reserves are focusing on monitoring habitats and biodiversity.
3. **Watershed and Land Use Classifications**: The Reserve System is examining the link between watershed land use and coastal habitat quality by tracking and evaluating changes in coastal habitats and watershed land use/cover. This element is guided by the Reserve System Habitat Mapping and Change Plan.

Building on these foundational elements, the Reserve System is developing a network of sentinel sites and the capacity to assess the impact of sea level/lake level changes and inundation on the diverse set of coastal vegetative habitats represented in the system. Reserves are implementing a suite of activities, as described in the 2012 Reserve System Sentinel Site Guidance Document, to assess the relationship between vegetative communities (marsh, mangrove, and submerged aquatic vegetation) and sea level. Reserves are adding surface elevation tables and monitoring pore water chemistry along vegetation monitoring transects and linking their SWMP to a network of specialized spatial infrastructure to allow precise measurement of local sea level and lake level changes and subsequent impacts to key habitats. The Reserve System is working in partnership with NOAA's National Geodetic Survey and the Center for Operational Oceanographic Products and Services to support the development of sentinel sites.

Program objectives and strategies

Objective 1:

Identify the information and resources needed to strengthen understanding of the ecological processes and functions in Lake Superior estuaries, determine how people and communities value coastal environments, and inform policy decisions.

Strategies:

- Facilitate collaborations among managers and researchers to identify information needs (e.g., holding the annual St. Louis River Summit).
- Serve on committees that coordinate research, monitoring, and restoration activities in the St. Louis River Estuary and Lake Superior.

Objective 2:

Lead and facilitate research that directly supports managers and researchers, improving the ecological condition of Lake Superior estuaries and strength of communities along the coast.

Strategies:

- Develop and implement research prioritized and guided by Reserve staff, the Research Advisory Board, and partners.
- Assist outside scientists in developing and carrying out relevant research aligned with Reserve priorities.
- Collect required and elective monitoring (SWMP) data.

- Support collaborative graduate research through the Margaret A. Davidson Fellowship.
- Create student opportunities to both facilitate valuable hands-on research experiences and increase regional environmental science capacity including support for the Lake Superior Freshwater Fellowship Program.

Objective 3:

Ensure data produced by the Reserve and research partners are easily accessible to and approachable by stakeholders and the public.

Strategies:

- Quality controlled data from research projects are made available through online platforms (CDMO, Data Integration, Visualization, Exploration and Reporting (DIVER) tool, or Reserve website).
- Present research to collaborators at Reserve organized events, at conferences, in classrooms, at workshops, at Reserve Advisory Board (RAB) meetings, at the Lake Superior Estuarium, and in reports and publications.
- Engage and encourage students to present research to stakeholders, creating valuable experiences, skills, and knowledge.
- Collaborate with the other Reserve sectors to identify data summary and dissemination needs and explore novel and interactive formats that reach multiple audiences.

Objective 4:

Adapt and expand the SWMP to reflect present and potential ecosystem stressors including increased storm events, algal blooms, and habitat change.

Strategies:

- Develop and test methodologies to expand chlorophyll-a and phycocyanin monitoring throughout the estuary using sensors and laboratory techniques.
- Conduct sediment and nutrient analyses to support local research and long-term monitoring efforts especially related to AOC beneficial use impairment removal and flood event impacts.
- Collaborate with the larger monitoring community to identify critical temporal and spatial data needs.
- Coordinate and support regional habitat change mapping and analytical efforts, including mapping reserve boundary habitat and change over time.

Research and Monitoring Program context

Geographic scope

The geographic scope of the Lake Superior Reserve Research and Monitoring Program is three-tiered. The primary focus is the St. Louis River Estuary and watershed. The secondary level includes the estuaries along the South Shore of Lake Superior in Wisconsin and the North Shore of Lake Superior in Minnesota. The largest scope includes all the estuaries of Lake Superior. Ability to increase the scope of the Program depends on availability of resources to support additional staff and the development of strategic partnerships.

Audience and partners

The Lake Superior Reserve Research and Monitoring Program's target audiences are scientists and natural resource managers. By fostering and coordinating collaborative, applied science, the program reaches and partners with city, tribal, state, and federal agencies, universities, and nonprofit organizations across all three geographic tiers. It aims to reach and engage students of all ages to support research within the Reserve. The program also reaches multiple audiences through integration with other Reserve sectors. For example, SWMP datasets are used as learning tools in the Rivers2Lake education program.

Reserve partners are essential to the Research and Monitoring Program mission. Many sit on the Research Advisory Committee providing essential connections and expertise. The Reserve staff both support and rely on partners in collaborative science efforts. One example, the programs annual under-ice monitoring effort, demonstrates a combination of expertise, field effort, and laboratory capabilities that Reserve could not do alone. Strong connections with partners allows the program to both foster and coordinate timely research that is relevant to managers and policy makers.

Following is a list of organizations who frequently partner with the Lake Superior Reserve Research and Monitoring Program:

UW-Superior
UWS-Lake Superior Research Institute (LSRI)
Fond du Lac Band: Natural Resources
U.S. EPA Mid-Continent Ecology Division
Great Lakes Indian Fish and Wildlife Commission
1854 Treaty Authority
WI Sea Grant
MN Sea Grant
WI Coastal Management Program
MN Coastal Management Program
NOAA
WDNR
MN DNR
Minnesota Pollution Control Agency (MPCA)
University of Minnesota Duluth (UMD)
UMD-NRRI
UMD-LLO
UW–Madison
UMN Twin Cities
UW-Green Bay
Minnesota Land Trust
Landmark Conservancy
Douglas County, WI
City of Superior
Michigan Tech University
University of Colorado Boulder

Mission

The mission of the Lake Superior Reserve Research and Monitoring Program is to foster and sustain collaborative research, increasing the understanding of Lake Superior's estuaries and coastal communities. Support for this mission includes leading and coordinating quality research and monitoring, as well as assisting researchers and natural resource managers in tracking and prioritizing projects. In addition, the program aims to fulfil its mission by facilitating externally led research, offering expertise, equipment, and vessel support. The program will focus on identified research priority and monitoring needs, including climate change impacts, invasive species, restoration research, contaminants, and social science. The mission and objectives align directly with these Reserve System Strategic Plan objectives:

NERRS STRATEGIC PLAN 2017–2020,
APPLYING SCIENCE:

OBJECTIVE 1, STRATEGY 2: Develop additional monitoring modules to address emerging stressors, including climate stressors such as ocean acidification.

OBJECTIVE 1, STRATEGY 4: Conceptualize and pilot a socioeconomic data observing system in one or more regions, as well as a national, system-wide approach.

OBJECTIVE 1, STRATEGY 5: Leverage and apply NOAA partnerships, funding, and expertise to integrate biophysical and socioeconomic data, therefore providing the foundation for interdisciplinary and ecosystem services research.

OBJECTIVE 2, STRATEGY 1: Conduct collaborative research projects that engage natural resource managers and multiple sectors to address decision-makers and stakeholder needs.

OBJECTIVE 2, STRATEGY 2: Engage master's and doctoral students in collaborative research opportunities.

OBJECTIVE 2, STRATEGY 3: Maintain and strengthen partnerships with research institutions to conduct research and advance estuarine science at reserves.

OBJECTIVE 2, STRATEGY 4: Facilitate increased capacity and knowledge of collaborative research and tools and transfer successful approaches.

Program capacity

Staff

Current Lake Superior Reserve staff capacity in support of research and monitoring includes staff and students hired by UW–Madison Division of Extension. The Research and Monitoring Program is implemented by the Research Coordinator and Monitoring Coordinator, who oversee a SWMP Technician and two student research technicians. Additionally, the program often supports several students conducting research, including Lake Superior Freshwater Fellows, NOAA Hollings Scholars, and the Summer Undergraduate Research Fellows (SURF, UWS).

Program delivery

Priority research topics

Climate change impacts

Climate change is expected to alter the intensity and frequency of precipitation events, affect lake water levels, increase the length of the growing season, and reduce the number of extreme cold days in northern Wisconsin.[52] A summary of ongoing and projected changes to Lake Superior climate and ecosystems can be found in the 2014 Lake Superior Climate Change Impacts and Adaptation report. All these changes are expected to affect the St. Louis River Estuary. The Lake Superior Reserve implements several core components of the NOAA Sentinel Site Program to study long-term impacts on biophysical processes and biotic communities. This project integrates SWMP elements with supplemental monitoring to determine impacts on freshwater marsh resilience, wild rice productivity, and invasive plant populations in the estuary. Additionally, the Reserve supports research addressing environmental consequences of climate change related to ecosystem services, social well-being, and quality of life in the region.

Invasive species

Invasive species are considered a major impact on wildlife habitat, ecosystem processes, and species diversity around the world. As an international shipping port, the St. Louis River Estuary is an invasion "hot spot".[53] The Reserve coordinates and participates in several research efforts focused around the risks, impacts, ecology, and management of invasive species. The Reserve investigates biocontrol effectiveness on purple loosestrife (*Lythrum salicaria*), monitors rusty crayfish (*Orconectes rusticus*) populations, and evaluates alternative species success to forests threatened by emerald ash borer (*Agrilus planipennis*). The Reserve engages in research and monitoring with other species of interest to natural resource managers including non-native phragmites, round goby, tubenose goby, hybrid cattail, ruffe, Eurasian watermilfoil, curly-leaf pondweed, yellow iris, and zebra and quagga mussels. The Reserve will continue to play an active role in invasives species research, adapting and adding projects as needs arise.

Restoration research

The St. Louis River is an AOC with nine BUIs, including fish and wildlife populations and habitats (see the 2020 Remedial Action Plan Update for a roadmap to delisting)[54]. In conjunction with activity listed in the Remedial Action Plan, there are a number of complete, ongoing, and planned restoration projects in the St. Louis River Estuary. The Lake Superior Reserve collaborates and assists partners to monitor restoration sites, track the progress of projects, and centralize data for users. In addition, partners use SWMP datasets to monitor accumulative water quality changes as remediation and restoration projects are completed. Additionally, SWMP elective parameters help fill gaps in understanding, such as under-ice water quality. The Reserve is also actively engaged in wild rice restoration research, investigating impacts of water level fluctuations and geese herbivory on restoration success.

Contaminants

There is a legacy of pollution, primarily in the harbor of the Lower St. Louis River Estuary. Due to efforts detailed in the Remedial Action Plan, several of the most contaminated sites have been remediated and/or restored. However, several ecological consequences of historical pollution in sediments and the water column are unknown. The Lake Superior Reserve SWMP has been modified to include several additional parameters (total suspended solids and phycocyanin) so that monitoring data are directly relevant to water quality management and the AOC delisting criteria. The program also supports emerging contaminant research. Staff work closely with Dr. Lorena Rios Mendoza (UWS) studying microplastics and persistent organic pollutants. The Research and Monitoring Program is dedicated to contaminant research and will continue to respond to partner identified needs related to their impacts on the St. Louis River Estuary.

Social science

The Lake Superior Reserve will partner with scientists to improve our understanding of the socioeconomic and sociocultural aspects of Lake Superior coastal communities both within the watershed of the St. Louis River Estuary and along the coast. One social research topic with wide interest from partners is the completion of a historical cost–benefit analysis of the industry in the estuary, with a focus on production benefits versus environmental and social cost. There is additional interest in conducting ecosystem services projects and in developing ecosystem service valuations in the region, pertaining to things such as the effects of climate change on quality of life. There is a great deal of interest in studying the physical, mental, and emotional health impacts of climate change on Western Lake Superior communities. The Lake Superior Reserve, through partnerships and in collaboration with such entities as the People & Places Work Group, will seek to develop interdisciplinary efforts across a range of social sciences to tackle the human dimensions of research and management of coastal systems.

SWMP implementation

The Reserve implements the SWMP consisting of four continuous water quality monitoring stations, monthly nutrient and chlorophyll sampling, and MET station, and sentinel site. Three water quality stations are located on stable structures (bridge and dock pilings) within the thalweg of the river. An additional water quality station, coinciding with the MET station and sentinel site, is in the Pokegama River on a temporary structure that is removed in winter. Site locations were selected to represent the river to lake chemical gradient within the estuary. Additionally, the Pokegama River site was selected because it exhibits characteristics common to several South Shore tributaries of Lake Superior.

Monthly nutrient and chlorophyll sampling occurs at all four water quality stations during ice-free months. Twelve nutrient and chlorophyll samples are collected over a 24-hour period at one site. Additional elective parameters include total suspended solids, total phosphorus, and total nitrogen. SWMP data is archived at the CDMO as per established protocols.

The Reserve's sentinel site was placed in Pokegama Bay adjacent to the MET station and water quality monitoring site. The sentinel site was focused on examining the relationship between increasingly frequent storm events and flooding, which are the main climate change stressors. Annual surveys of change at this site allow Pokegama Bay to serve as a common reference site for South Shore tributaries, providing information about fine- and gross-scale change that can be expected elsewhere along the shore as climate change proceeds in this region.

Several components of SWMP are expanded to address local research and management needs. Because the St. Louis River Estuary is extensively iced over November through April, we collaborate with partners to perform a yearly winter synoptic survey. This effort fills a critical monitoring gap identified by the research community, as no other program regularly monitors under-ice water quality. Past and present winter research identified several areas with low dissolved oxygen and is working to identify the cause. SWMP is also contributing to algae research, working to add chlorophyll-a and phycocyanin sensors to all four water quality stations, contributing to regional efforts to better track algae blooms as well as identify predictors.

Program evaluation

The Research and Monitoring Program currently reports all Reserve-led and assisted research projects to the NERR Research Database. Curated by NOAA, the database helps assess the quantity of research projects as well as the dissemination format (journal publication, technical report, presentation, etc.). The Monitoring Program's data submission completeness and timeliness is tracked by the CDMO and the NERR SWMP Oversight Committee. Reserve staff are also evaluated on professional contributions such as peer-reviewed publications, conference presentations, and related work. The Research Advisory Committee periodically convenes to assess current research needs and relevance.

Needs and opportunities

Through a process of consultation with stakeholders and discussions with the Reserve Research Advisory Committee, the priority research and monitoring needs have been identified as climate change impacts, invasive species, restoration research, contaminants, and social science. The Reserve works to respond when possible to partner needs expressed through the ongoing St. Louis River's AOC delisting process, and the recent increasing interest in the effects of climate change, ecosystem services valuation, and better coordination and integration of social research with biophysical research. Although staff capacity and expertise limit the quantity and scope of studies, the Research

Coordinator and Monitoring Coordinator continue to build robust networks within the local, regional and national scientific community to fill gaps in internal expertise and support Reserve objectives. By providing tactical support, vessel use equipment, and program facilitates, the Research and Monitoring Program extends beyond internal expertise. Additional collaborations with UW–Madison and the social-science-focused People & Places Work Group will help the program reach its strategic objectives. The development of a Stewardship Program and funded Stewardship Coordinator position would greatly increase capacity in restoration research.

Education

Introduction

NERRS's mission includes an emphasis on education, interpretation, and outreach. Education at each reserve is designed to fulfill the Reserve System goals as defined in the regulations (15 CFR § 921.1(b)):

- Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation;
- Conduct and coordinate estuarine research within the system, gathering and making available information necessary for improved understanding and management of estuarine areas.

To sustain these system goals, the 2017–2022 NERRS Strategic Plan outlines education objectives that support the focus areas of protecting places, applying science, and educating communities. The Reserve Education programs described below are aligned to the following system objectives:

- **Applying Science Objective 3**: Scientific, management, and educational audiences will know about and effectively use reserve research, data, and products to understand the effects of climate and land use change on estuaries, ecosystem services, and human well-being.
- **Educating Communities Objective 1**: Coastal residents and visitors will increase their awareness and ability to improve stewardship of estuaries, coastal watersheds, and their communities.
- **Educating Communities Objective 2**: Educators and students will better understand and use Reserve System and NOAA resources for place-based and inquiry-based learning.
- **Educating Communities Objective 4**: The next generation of coastal professionals and environmental stewards will expand and be motivated through access to programs and facilities that facilitate research, resource management, and educational opportunities.

The Reserve System provides a vehicle to increase understanding of estuarine systems and improve decision-making among key audiences to promote stewardship of the nation's coast. Education and interpretation incorporate science-based content into a range of programs and methodologies that are tailored to key audiences around priority coastal resource issues.

Reserves conduct formal and informal education activities, as well as outreach activities that reach culturally diverse audiences of educators and students, environmental professionals, resource users, and the general public. Education and public programs, interpretive exhibits, and community outreach programs integrate elements of Reserve System science, research, and monitoring activities, and ensure a systematic, multi-faceted, and locally focused approach to fostering stewardship.

The Reserve System is committed to preparing tomorrow's future leaders to be responsible stewards with the knowledge and understanding of our nation's oceans and coasts. To fulfill this commitment, the Reserve System created KEEP to increase estuary literacy of students, teachers, and the general public. KEEP helps students and teachers learn essential coastal and estuarine concepts, develop data literacy skills, and strengthen critical thinking, team building, and problem-solving skills. K–12 and professional development programs for teachers include the use of established curricula aligned with state and national science education standards and frequently involves both onsite and in-school follow-up activity.

Teachers on the Estuary (TOTE) is a national teacher training program provided at most of the 29 national estuarine research reserves. Teachers use TOTE to increase their understanding of estuary science, including climate change, and they learn how to engage students in the investigation of changes in their local environment using data obtained from the Reserve's monitoring programs. Best practices for TOTE trainings include the use of NOAA data and products, a minimum of fifteen hours of contact time with teachers, and inclusion of estuarine science and research.

Conservation action education is another priority for the Reserve System. Conservation action education programs foster behavioral change to promote resource conservation. These programs work with audiences whose choices directly impact the integrity of our estuaries and their associated watersheds.

Objectives and strategies

Objective 1:

Use place-based and outdoor learning to support schools, educators, and youth in understanding and experiencing Lake Superior and its estuaries, increasing academic engagement, stewardship, and a sense of place.

Strategies:

- Continue operating the Rivers2Lake education program, which incorporates the watershed into classrooms across disciplines, by seeking sustainable and congruent funding streams.
- Offer nature- and watershed-oriented activities to young children, recognizing the importance of connecting with the natural world in early childhood to developing stewardship in later life.
- Broaden and expand mentoring and relationship building with professionals in formal education in support of Lake Superior watershed learning using TOTE practices.
- Build and support collaboration between nonformal educators, natural resource managers, tribal entities, scientists, and the formal education community in order to deepen place-based understanding.
- Integrate Reserve research into the Reserve's place-based educational programming.
- Collaborate with partners in our region and the UW System to expand the reach of the education program.

Measures:

- Percentage of educators who intend to integrate what they learned in the Rivers2Lake program beyond their initial participation (Lake Superior's TOTE).
- Number of students and youth who participate in Reserve educational programs.

Objective 2:

Strengthen education, collaboration between partners, and the local economy through the development and operation of the Lake Superior Estuarium, in order to generate public connection to and understanding of the Lake Superior watershed.

Strategies:

- Develop, evaluate, and expand the Lake Superior Estuarium exhibits through an inclusive process that reflects diverse natural history and human stories of the estuary and our community.
- Develop education programs and marketing strategies to encourage partner and community use of the Lake Superior Estuarium in support of the Reserve vision.
- Evaluate use and learning outcomes of the center to inform marketing, inclusivity, and future improvement efforts.

Measures:

1. Number of walk-in visitors at the Lake Superior Estuarium.
2. Number of education programs hosted at the Lake Superior Estuarium and evaluation of learning outcomes of those programs.
3. Number of residents and visitors participating in education programs hosted at the Lake Superior Estuarium.

Objective 3:

Use effective environmental communication and diverse research-based methods and media to develop sustained conservation action education that promotes active stewardship of estuaries and the Lake Superior watershed.

Strategies:

- Create, support, and collaborate with the creative arts to develop education efforts that reach a broad audience.
- Promote stewardship by providing experiential learning opportunities that empower citizens to protect water.
- Develop and promote citizen opportunities to participate in scientific research and data collection on relevant Reserve and partner projects.
- Develop and implement marketing and communications that share and promote Reserve activities with regional, state, and national audiences.

Measures:

1. Number of volunteers/participants engaged in stewardship activities and citizen science opportunities through Reserve programming.
2. Number of volunteers/participants who intend to integrate stewardship practices beyond participation in a conservation action education program.

Teachers conduct a dissolved oxygen text during the Rivers2Lake Summer Institute. (Credit: Ryan Feldbrugge)

Education program context

Geographic scope

Situated in the Lake Superior Watershed, the Reserve prioritizes educational programming for Northern Wisconsin and Minnesota coastal communities, especially Douglas, Bayfield, and Ashland Counties in Wisconsin and St. Louis County in Minnesota, as well as the Fond du Lac Band of Lake Superior Chippewa reservation. The UW–Madison Division of Extension provides state-wide reach for the program, while collaboration with other reserves and NOAA partners extends programmatic reach through the Great Lakes and to the national level.

Market analysis and needs assessment

In 2012, a market analysis and needs assessment were conducted to shape the development of the Reserve Education Program. Interviews with educators, stakeholders and administrators, a teacher focus group, and a citizen's focus group resulted in key recommendations for the education programs. The results of this assessment were compiled in the Education Strategic Plan. The strategies that were identified through the market analysis and needs assessment have been incorporated into the Education Program objectives and strategies listed above. Evaluation of the education programming is ongoing as the program evolves and the initially identified needs and market shift.

Target audience and partners

The Reserve Education Program reaches formal educators via professional development opportunities, especially through the Rivers2Lake Education Program (www.rivers2lake.org). School students in grades PK–12 participate in educational programming through Rivers2Lake and other formal and informal programming. Nonformal community and conservation action education programming reaches the broader Twin Ports community and beyond. The chart on the following page outlines audiences for each type of programming the Reserve provides, as well as examples of partners who work with us on those programs.

EDUCATION PROGRAM TYPES, AUDIENCE, AND EXAMPLES OF PROGRAM PARTNERS:

Program: TOTE (Rivers2Lake Education Program)
Audience: PK–12 teachers, PK–12 students in Lake Superior Watershed regional schools
Example of Partners:
Fond du Lac Resource Management
Great Lakes Aquarium
Great Lakes Indian Fish and Wildlife Commission
Lake Superior Maritime Visitor Center
School districts and administrators
Superior Rivers Watershed Association
The National Parks Service Great Lakes Network Office
Wisconsin Coastal Management Program
Wisconsin Sea Grant

Program: Formal and nonformal education programs for youth
Audience: PK–12 students, undergraduate, and graduate students
Example of Partners:
City of Duluth
City of Superior
Fond du Lac Tribal and Community College
Regional school districts
River Quest (Duluth Port Authority)
Superior School District School Forest
University of Minnesota Duluth
UW–Superior

Program: Conservation Action Education
Audience: Adult community members
Example of Partners:
City of Superior
Douglas County
NERRS Education Coordinators
Private Sector Businesses
UW–Madison Division of Extension NRI
WDNR
Wisconsin Master Naturalist Program

Program: Community programming, celebrations, and events
Audience: Adult and youth community members, regional visitors
Example of Partners:
City of Superior
Fond du Lac Band of Lake Superior Chippewa Lake
Superior Chamber of Commerce
Superior Magazine
Minnesota Sea Grant
Wisconsin Coastal Management Program
Wisconsin Sea Grant
UW–Superior
Wisconsin Public Radio

Program: Lake Superior Estuarium
Audience: Adult and youth community members, families, PK–12 students and teachers, regional visitors
Example of Partners:
City of Superior and Superior Museums
Great Lakes Aquarium
Northern Great Lakes Visitor Center
Superior Chamber of Commerce
UW–Madison Division of Extension NRI
UW–Superior

Capacity

The Reserve Education Coordinator leads the education program, with support through student internships and a part-time employee, dependent on available funding. With the completion of the Lake Superior Estuarium, the classroom space houses onsite educational programming, while offsite educational experiences continue on regional school grounds and on the properties that are included in Reserve boundaries.

Program delivery

The following profiles of Reserve Education Programming provide details on how the Reserve currently enacts the Education Strategic Plan and the NOAA Education Strategic Plan. Future programs will respond to partner and community needs, and are not limited to those described here. Education Programming is supported by both the Coastal Training and Research and Monitoring programs. Each Education program is aligned to the goals and objectives of the Strategic Plans as described.

The Rivers2Lake education program

Rivers2Lake is both the TOTE program of the Lake Superior Reserve and the primary KEEP for students. The Rivers2Lake education program integrates Lake Superior into education as a foundation for engaging place-based learning, Great Lakes literacy, stewardship, and watershed restoration. Based at the Lake Superior National Estuarine Research Reserve with a community of many partners, the program provides teacher professional development through life-changing field experiences and bi-monthly year-long mentoring. Rivers2Lake engages students through outdoor and inquiry-based learning, and provides extended resources, opportunities, and year-long support to Rivers2Lake classrooms. The Rivers2Lake program aligns education efforts to the Great Lakes Literacy Principles.

NERRS STRATEGIC PLAN, EDUCATING COMMUNITIES

OBJECTIVE 2, STRATEGY 1: Increase application of Reserve-related conservation and stewardship concepts and activities into curricula, practices, and programs.

OBJECTIVE 2, STRATEGY 2: Support educators' ability to meet state science standards by providing access to reserve education materials.

NERRS STRATEGIC PLAN, APPLYING SCIENCE

OBJECTIVE 3, STRATEGY 2: Incorporate SWMP data and applications into system-wide education and training programs, including TOTE programs and Estuaries 101 curriculum.

River Talks

The River Talks is a free speaker series about the St. Louis River Estuary that takes place annually in Duluth and Superior. Wisconsin and Minnesota Sea Grant and the Lake Superior National Estuarine Research Reserve collaborate to invite researchers to speak, host, and promote the talks. River Talks takes place monthly following a science café model of informal talks in accessible public settings such as coffee shops.

NERRS STRATEGIC PLAN, EDUCATING COMMUNITIES

OBJECTIVE 1, STRATEGY 2: Inspire and motivate coastal residents to take action to reduce the impact of coastal hazards on their life and property.

OBJECTIVE 4, STRATEGY 2: Improve knowledge and appreciation of estuaries and coastal resources through Reserve interpretive exhibits, programs, and outdoor experiences.

River Rovers

River Rovers provides weekly early-childhood nature play and science investigation opportunities to children age 3 through 7, along the St. Louis River in Superior each summer. The popular reserve program is based on research demonstrating that immersive experiences in nature in early childhood are highly influential on stewardship activities in adulthood.

NERRS STRATEGIC PLAN, EDUCATING COMMUNITIES

OBJECTIVE 4, STRATEGY 3: Increase sustainability of Reserve facilities and access points and encourage communities and individuals to adopt and apply environmentally friendly practices.

Public events

Lake Superior Day, National Estuaries Day, Earth Day, and more. The Reserve partners with other regional organizations to provide community celebrations that promote connection to and stewardship of the St. Louis River and Lake Superior. In prior years, these celebrations have included citizen science and volunteer opportunities along the St. Louis River Estuary, media coverage that reaches television and print audiences, live music and games, presentations to citizen and student groups, and the opening of a temporary exhibit in our Estuarium building. All activities include presentations of Reserve-generated science.

NERRS STRATEGIC PLAN, EDUCATING COMMUNITIES

OBJECTIVE 1, STRATEGY 3: Engage individuals and communities and enhance their participation in activities that conserve, restore, and protect natural resources.

Conservation action education

In 2020–2021, the Reserve will introduce its first conservation action education programs, focused on individual behavior change with a benefit to the environment. Programs will happen in collaboration with the City of Superior, among other partners, and will help community members to address stormwater issues, marine plastics, climate change, or other key needs that emerge. Examples of programs might include a marine debris social marketing program that aims to keep trash out of the streets of Superior or a workshop that helps people build and plant rain gardens on their property.

NERRS STRATEGIC PLAN, EDUCATING COMMUNITIES

OBJECTIVE 1, STRATEGY 1: Provide "conservation action education" programs that increase coastal residents' awareness of the value of estuaries to mitigate the impacts of hazardous weather, changes in climate, and other environmental threats.

OBJECTIVE 1, STRATEGY 2: Inspire and motivate coastal residents to take action to reduce the impact of coastal hazards on their life and property.

Social media

The Reserve uses social media via Facebook, Flickr, and YouTube to share information about topics and events relevant to the St. Louis River, Lake Superior, and the Great Lakes. With an ever-growing audience, the Reserve is able to share local and national research with a broader geographic audience. More on social media and media efforts in general can be found in the Communications Plan section of this Management Plan.

NERRS STRATEGIC PLAN, EDUCATING COMMUNITIES

OBJECTIVE 1, STRATEGY 3: Engage individuals and communities and enhance their participation in activities that conserve, restore, and protect natural resources.

The Lake Superior Estuarium

The Reserve's Estuarium tells the story of the St. Louis River Estuary, the Lake Superior watershed, and the communities that line their banks. The exhibit hall provides opportunities for UW-Superior students and faculty and other partners with a fully equipped educational space on the waterfront. The facility is a highly visible resource for the public and an economic stimulus for the City of Superior through increased tourism opportunities.

NERRS STRATEGIC PLAN, EDUCATING COMMUNITIES

OBJECTIVE 4, STRATEGY 2: Improve knowledge and appreciation of estuaries and coastal resources through reserve interpretive exhibits, programs, and outdoor experiences.

OBJECTIVE 4, STRATEGY 3: Increase sustainability of Reserve facilities and access points and encourage communities and individuals to adopt and apply environmentally friendly practices.

Future needs and opportunities

Following designation and staffing in 2011, a market analysis and needs assessment was conducted as a means to initiate the Lake Superior Reserve education program. The following recommendations stem from that document and are available publicly on the Reserve website.[55]

K–12 Education Recommendations

- Produce interdisciplinary programs that meet core standards (including reading, math, science, and social studies) while connecting students and teachers to the St. Louis River Estuary and its watershed through direct experiences.
- Collaborate with teachers to seek funds for transportation and resources that aid direct connections to the estuary.
- Utilize SWMP data as a means of incorporating math, inquiry, and technology into classrooms.
- Provide programs that are accessible to multiple age groups, especially elementary-aged students and younger children.
- Work directly with administration, teachers, and students in classrooms and on school grounds to provide support for outdoor and environmental education and increase content related to the St. Louis River Estuary.
- Enhance and complement Superior School District's School Forest educational programming, drawing connections between the upper and lower watershed.
- Incorporate established NERR curriculum, research, and online resources whenever possible and appropriate.

Community Education Recommendations

- Provide direct experiences that connect participants to lands included in the Reserve whenever possible.
- Use technology and media as a gateway to encourage public use and awareness of the St. Louis River Estuary for community members who are unaware of this natural resource.
- Work with partners to improve access to and available information about the St. Louis River Estuary through maps, tours, trails, and onsite interpretation where appropriate.

- Community programs should emphasize the value of the St. Louis River Estuary from an ecological and economic perspective. Such values should be made relevant to participants' lives.
- Community programs should empower participants to participate in research and take stewardship action on behalf of freshwater estuaries through citizen science projects, Lake Superior NERR Education Strategic Plan 10 service learning, hands-on experience, and demonstration programs.
- Education programs might gain increased interest by emphasizing topics already important to St. Louis River Estuary users, including fishing, boating, and nature-based recreation.
- Lake Superior NERR should provide opportunities to use resources and equipment that enable further exploration of the Reserve, especially for community members who are economically disadvantaged or might not experience the Reserve otherwise.

Interpretive Center Recommendations

- Capitalize on the St. Louis River success story to provide an example of environmental restoration and protection through research, policy, and citizen action from historic times through the modern day AOC delisting process.
- Relate current NERR research to the continued successful protection of the SLRE as well as to the lives of interpretive center visitors.
- Provide vivid visual maps or displays of the land included in the Lake Superior NERR along with access information as a means of encouraging visitation and recreation on lands included in the Reserve.
- Incorporate artwork, interactive exhibits, and technology where appropriate to engage a variety of audiences.
- Include Reserve-related topics of special interest to Ojibwe people, especially wild rice, sturgeon, and Spirit Island and Wisconsin Point, from their perspective and in consultation with tribal representatives.
- Provide an open, accessible, and comfortable community meeting space to encourage engagement with the Lake Superior NERR.
- Retrofit existing buildings to function as demonstration exhibits for best management practices in stormwater management, climate change adaptation, and sustainable design in order to support education and CTP program objectives.

Capacity and opportunities

While highly valued by teachers, schools, and students, the Rivers2Lake program prioritizes a considerable investment of staff time with each participating teacher over a higher number of individuals reached through programming. Evaluations have demonstrated the effectiveness of this model, but other programs are therefore limited by staff capacity and time. Trained and experienced volunteers and a full-time education specialist could partially alleviate this constraint and allow for increased educational events at the Lake Superior Estuarium, experiential outdoor programs, afterschool programs, and further outreach to underserved youth and community members.

Staffing and maintenance of the Lake Superior Estuarium is evolving, but needs are highest in the summer season and during large events on Barker's Island, such as the Dragon Boat festival and Superior's Ice Festival. Student interpretive staff require adequate support and training. While weekends are the busiest time at the Estuarium year-round, full-time education staff are not always immediately available to provide assistance, resulting in occasional challenges for staff. Trained docents and volunteers could help support Estuarium staff during times of peak visitation. Evaluation of the educational effectiveness of the exhibits and community education programs can further direct the use of resources toward program improvement.

Several important emerging issues in the Lake Superior watershed would benefit from increased visibility, program content, and stewardship activity in the education program. Content related to climate impacts such as flooding, increased temperature and turbidity, and harmful algae blooms as well as climate-relevant remediation and mitigation strategies should be incorporated into Estuarium exhibits and KEEP/TOTE programs. In accordance with the Great Lakes Marine Debris Action Plan, conservation action education programming can support both marine debris prevention and removal in the St. Louis River Estuary and Lake Superior. The Reserve should continue to support partner efforts in elevating the profile of traditional ecological knowledge, an important means of understanding, connecting to, and restoring the St. Louis River.

Coastal Training Program

Mission

Lake Superior Reserve's CTP transforms coastal decision-makers into coastal leaders by providing skills training and collaborative learning opportunities that inspire thoughtful management of Lake Superior.

Objectives

The following objectives are defined for the CTP.

CTP OBJECTIVE I: Coastal decision-makers have access to new knowledge and skills that will elevate their management of coastal systems.

CTP OBJECTIVE II: Lake Superior coastal communities have increased their capacity to manage hazards and are planning for uncertain future conditions.

CTP OBJECTIVE III: Coastal decision-makers are empowered to act in the best interest of coastal and estuarine resources.

CTP OBJECTIVE IV: Coastal decision-makers capitalize on the Reserve's unique ability to operate across jurisdictions to address issues of coastal importance at both a local and regional scale.

Context

Geographic scope

The Lake Superior Reserve CTP works primarily within Western Lake Superior communities in both Minnesota and Wisconsin, and extends farther into Wisconsin along the South Shore and into Minnesota North Shore communities. As one of only two reserves on the Great Lakes, CTP aims to transfer knowledge and information regarding Great Lakes coastal community issues to its target audience of decision-makers. In order to be accessible to a range of stakeholders, training programming is offered in several locations throughout the region. Many programs are delivered at the Reserve's campus on Barker's Island, while others are held at partner locations and public venues. Larger events, such as the St. Louis River Summit, draw participants from across Minnesota and Wisconsin who conduct research and implement projects in Western Lake Superior communities. Intentional partnerships and connections over the next five years will focus specifically on extending the reach of CTP to a larger Wisconsin South Shore audience.

Although the Lake Superior Reserve boundaries are located solely in the Wisconsin waters and lands, Reserve activities have a multi-state reach, and implications of the Reserve's research, education, and outreach programming extend far beyond its mapped boundaries. The CTP plays a key role in providing multi-jurisdictional programming and developing collaborative capacity and leadership to promote thoughtful management of coastal resources.

A training in the Confluence Room at the Lake Superior Estuarium (Credit: Karina Heim)

Information gained since last Management Plan

In 2015, interviews with stakeholders were conducted by the CTP coordinator in order to introduce the available array of NOAA trainings and resources across the Reserve System, to identify what needs could be filled by the Reserve CTP and to understand how the CTP Coordinator might serve as a link between resources and decision-makers. The interviews revealed that decision-makers regard the Reserve CTP Coordinator, and other Reserve staff, as the following:

- Local experts and conveners of coastal management issues in the Lake Superior Basin
- Facilitators of community conversations about coastal science, issues, and threats
- Leaders for integrating social and natural sciences
- Support for local decision-making and capacity building
- A resource for applied research and how to incorporate research findings into decision-making
- A partner and expert for implementing projects in the Twin Ports area

In addition to the 2015 interviews, a gap analysis of programs was conducted as part of the 2012–2016 needs assessment and a survey of programmatic and informational needs was administered to the target audience in March 2017. The findings of that survey revealed that stakeholders are most concerned about climate change impacts, adaptation and resilience, water quality issues, overdevelopment of shorelines and habitat, erosion, and invasive species. They also identified financial constraints, organizational capacity, and social and cultural resistance to change as the largest barriers to making progress on coastal community issues in their work. Professional development opportunities that address how to work with the public to create behavioral changes, how to incorporate scientific research into policy development, and how to access data, graphics, and information were of highest interest to respondents. The most convenient training formats are online courses, webinars, demonstration programs and field trips, and seminars. Expert speakers, networking opportunities, informational materials, and certification are the most effective incentives for encouraging participation.

Target audience

Figure 4.1. Coastal decision-maker areas of influence

The target audience of the Lake Superior Reserve CTP are the community stakeholders whose decisions impact the Reserve's priority coastal issues—climate change, water quality and healthy ecosystems, and a strong community and sense of place. A "coastal decision-maker" is someone who plans, manages, or designs activities that impact the health of Lake Superior. There are coastal decision-makers operating across geographic and jurisdictional boundaries. Key coastal decision-makers include natural resource managers, community and land use planners, elected and appointed officials, municipal staff, environmental regulators, property developers, industry and commercial operators, consultant experts, and coastal researchers.

Many local and regional stakeholders in these decision-maker roles have been identified through the Reserve's involvement in the research and management community, partner organizations, and advisory board input. There is an ongoing need to evaluate CTP's extent and consider opportunities to reach new individuals and classes of decision-makers, while integrating the roles and responsibilities of partner programs and organizations. It is the charge of the CTP Coordinator to target training opportunities to an appropriate audience.

Priority issues

By delivering programs that fill a gap in the community and serving as a link between researchers, local government and professionals, CTP helps fulfill the vision and mission of the Reserve. Specifically, the Reserve CTP works to improve community understanding of Lake Superior coastal watersheds and estuaries, strengthen partnerships, and integrate research, education, and outreach in its programming. Coastal training opportunities support decision-making based in science to address the priority issues of climate change, water quality and healthy ecosystems, and a strong community and sense of place. Events and programs bring together diverse stakeholders from a variety of disciplines who can work together to make progress on these complex issues. Outreach efforts aim to disseminate evidence-based findings and information pertinent to science-based planning, management, and behavioral change.

Based on responses to the survey, Reserve management priorities, and NERRS-wide objectives, key focus areas of CTP programming over the next five years will include—

- **climate preparedness at the local and regional level**, including adaptation planning, and climate communication strategy.
- **improving habitat and water quality**, including quality control for habitat monitoring, informed decision-making for policymakers, and applied best management practice.
- **connecting land use decisions to coastal impact**, including evaluation of regulatory methods, place-based learning for elected officials, and watershed-based management.

- **making coastal information relevant, accessible, and meaningful**, including how to source locally relevant climate and coastal science, integration of Digital Coast and other online platforms, and building centralized data resources.
- **building collaboration and capacity across geographies**, including leveraging the Reserve's position to continue to host regional collaborative workshops and expanding outreach to communities outside of the immediate Twin Ports.
- **effective communication strategies**, including climate and risk communication best practice, project management, and meeting-facilitation skill-building, and training on communicating science to policymakers.
- **disaster planning and preparedness**, including increased engagement with emergency management community, hazard and risk assessment, leading regional resource inventory efforts, and mitigating risk in coastal management.
- **emphasis on social science**, including leadership in Twin Ports social science efforts, climate and health impacts and its application to policy, applied social science methods training, coastal placemaking and its impact on management.

Capacity

Staff

The CTP Coordinator directs and implements coastal training and programming. In the past, additional support for the program has come from the help of a part-time undergraduate student intern, an opportunity that will be revisited in 2019 by the CTP Coordinator as programming needs dictate. The Reserve Manager, Research Coordinator, Education Coordinator, Monitoring Coordinator, Financial Specialist and Reserve interns support the program as needed. With anticipated growth of CTP as well as the expected addition of a dormitory facility which may offer new space for programming, it is expected that the CTP Coordinator may require increased logistical and facilities-related support to meet the demands of a growing program with specific technology and space requirements. The UW–Madison Division of Extension NRI supports the CTP by providing graphic and web design, writing and editing, social marketing, and evaluation expertise as the budget allows.

Advisory group

The CTP advisory group is a stakeholder committee that offers guidance on emerging needs, strategic plan development, course development, and building a community network. In the absence of a CTP Coordinator, this advisory group has not been active in recent years, but since arriving in 2018, the CTP Coordinator has developed a new iteration of this advisory group with commitments from both new and former members, and will begin reconvening the group in fall 2019. Organizations currently represented on the CTP Advisory Committee are indicated in the "Partnerships" section. Meetings will be held a minimum of two times per year and focus on program strategies and decisions. Members will provide guidance and support to the CTP Coordinator on projects as needed.

Facilities and equipment

Thus far, CTPs have been held throughout the Twin Ports and along the South Shore of Lake Superior. The completion of the Lake Superior Estuarium and the Confluence Room on the Barker's Island campus in 2017 has provided a training space available for groups of up to 30 people, allowing for more efficient and cost-effective program planning. Large rooms are available for rent and small rooms at no charge on the UWS campus. In Duluth, partners have made space available at low or no cost. The Northern Great Lakes Visitor Center has been a key partner for making programs available on the Bayfield peninsula.

Recent technology upgrades at Reserve facilities (including video conferencing capabilities) as well as administrative support and easy access for water excursions are all investments that are expected to improve and expand CTP programming. As the demands on the Confluence Room space increase and diversify, additional investments in audio-visual technology (including a large presentation screen and individual microphones) will help to improve programming outcomes in that space. Trainings and programs will also utilize the Reserve's NOAA research vessel, the *R2512*, for on-the-water excursions.

Partnerships

Strong partnerships have historically guided and supported CTP, either through the offering of expertise, logistical support, joint funding, program participation, or all of the above. Core program partners include both Minnesota and Wisconsin Sea Grant programs and Coastal Management Programs, UW–Madison Division of Extension, as well as program support from NOAA's OCM and Digital Coast. Since the Reserve's establishment, close programmatic and advisory relationships have been forged between the Reserve and the City of Superior.

Ongoing relationships with core partners are characterized in the section below:

Sea Grant and Coastal Programs (MN and WI)

Continued CTP Advisory board presence is expected from these institutions. A shared coastal focus and NOAA affiliation has led (and will continue to lead) to joint programming, particularly as it relates to resilience and climate adaptation. Sea Grant and the Coastal Programs are key "connectors" to research, funding opportunities, training participants, and community groups and stakeholders.

NOAA OCM

The Reserve's CTP will continue to take advantage of the programming support offered through NOAA OCM, both through established Digital Coast training courses (and opportunities to build off those core courses) but also through piloting new programming with the support of learning services staff.

UW–Madison Division of Extension

The Reserve's state partner supports CTP administratively through access to tools, resources, and spaces that can be used to develop and administer training. Connections to Extension educators and the UW research community are critical for sourcing training expertise and developing science-based programming. Additionally, CTP works with Extension outreach professionals to develop training strategies, share networks across the state, expand programming reach, and collaborate on funding requests. The Reserve's organizational relationship to the NRI creates expanded opportunities to collaborate with subject matter experts as well as take advantage of Extension services related to evaluation, instructional design, and graphic design. There are several Extension representatives on the CTP Advisory Committee.

City of Superior

Historically the CTP Coordinator has worked closely with Superior municipal staff (most specifically with Environmental Services, Parks and Recreation, and Planning) to assess local training needs and opportunities to co-develop courses, tours, and connect with local officials. Municipal staff serve in an advisory capacity to CTP and the Reserve, and the CTP Coordinator is a member of several committees initiated by City of Superior staff.

Expanding partnerships

Many additional agencies, entities, and individuals advise and contribute to CTP programming, as shown in the chart below. Primarily, the ongoing relationships represent agencies or entities who have goals that overlap with or strengthen the CTP, and with whom ongoing consultation or joint programming creates new learning and added value to area coastal decision-makers.

CTP will continue to maintain relationships with its established partners through joint programming development and maintaining a presence at partner functions and initiatives. The CTP Coordinator will also pursue new connections to entities who may have a mutual interest in contributing to CTP outcomes. Building a stronger connection with Douglas County is a priority over the next five years.

Additionally, the CTP Coordinator will maintain involvement in regional collaborations like the Regional Stormwater Protection Team, who share water quality goals with the Reserve and whose memberships comprise many of the very decision-makers who influence the health of the estuary and Lake Superior.

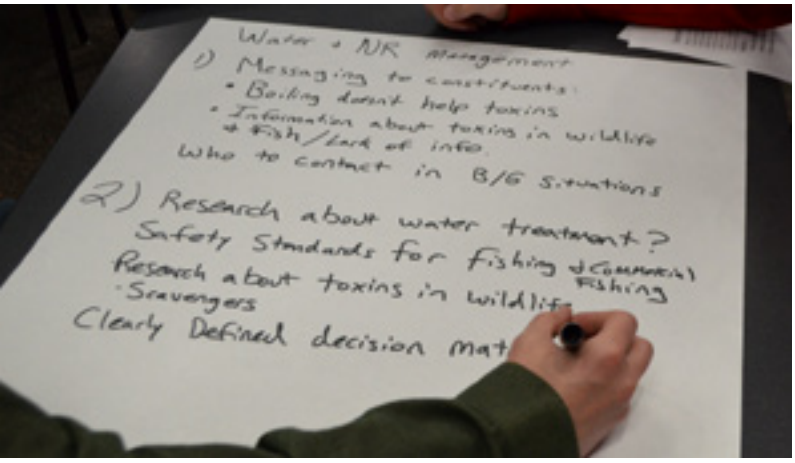
Core CTP Program Partners

City of Superior
Minnesota Coastal Program (DNR)*
Minnesota Sea Grant*
NOAA OCM
UW–Madison Division of Extension*
Wisconsin Coastal Program*
Wisconsin Sea Grant*

Ongoing and Developing Program Partnerships

AMI Consulting Engineers*
City of Duluth
Douglas County Land Conservation*
Fond du Lac Band of Lake Superior Chippewa
Harbor Technical Advisory Committee
Lake Superior Collaborative
Large Lakes Observatory
LSRI*
Minnesota Department of Health
Minnesota DNR
Minnesota Land Trust
MPCA
Natural Resources Research Institute (UMD)
Northern Institute of Applied Climate Science*
Regional Stormwater Protection Team
South St. Louis Soil and Water Conservation District
U.S. EPA
U.S. Fish and Wildlife Service
University of Minnesota Duluth
UW-Superior
Wisconsin Department of Health Services
Wisconsin DNR
Wisconsin Land+Water

*Indicates representation on Lake Superior Reserve CTP Advisory Committee as of 2019



Blooms and the Big Lake Workshop (Credit: Karina Heim)

Program delivery

Historic program emphases

Historically, the Reserve's CTP programming has focused training efforts on water quality and stormwater management, social science integration, wetland services, and regional collaboration. Key programming tracks have included the events and trainings described below.

Wetland evaluation

CTP initiated a NERRS Science Collaborative project to evaluate wetland ecosystems services in the Lake Superior watershed in Douglas County. Additional workshops and outreach brought information about wetland assessment and compensatory wetland mitigation to stakeholders.

Erosion control

A workshop series held in coordination with the City of Superior and targeted to contractors and consultants focused on erosion control requirements and best management practices to reduce runoff. An additional workshop offered training on the use of WinSLAMM, an urban water quality software program.

Stormwater BMP tour

The Reserve supported the implementation of a bus tour of Superior sites showcasing best practices for management of stormwater. This tour targeted elected officials, property owners, and citizens.

Process and communication skill-building

Trainings focused on project design and evaluation, effective communication of water issues, and an introduction to systems thinking each brought professional development opportunities specifically targeting coastal managers.

Integration of social science

The Reserve has played a leadership role in elevating the importance of social science to coastal management. Several collaborative workshop-style events applied an ecosystem services lens to the Twin Ports coastal issues. The Twin People and Places Forum led to the formation of the People and Places Workgroup, which is a collaborative of social researchers working in the Twin Ports area.

Planned programs and methodologies

Building up core training events and maintaining program continuity and growth will be a central CTP focus for the 2019–2025 period. Priority coastal issues and key professional development opportunities identified by respondents in the 2017 stakeholder survey will guide program development initially, and new initiatives and training delivery strategies will be developed iteratively through evaluation and informal assessment of stakeholders and partners. Some of the key training opportunities that are being developed since a new CTP Coordinator was hired in 2018 include infrastructure planning within extreme lake level conditions, preparedness for harmful algal blooms, science and emergency management collaboration, climate change health impacts, land use policy and process training for county officials, and coastal digital tools literacy for decision-makers.

Over the next five years, the CTP Coordinator will work to expand program delivery styles and establish an expanded concept of "training" that includes more collaborative learning opportunities and facilitation. The following goals will guide CTP program delivery:

Increase place-based (field trip) learning. By 2019, CTP will implement an on-the-water estuary orientation training designed specifically for elected and appointed officials.

Work toward developing the Reserve website as a portal for resources that inspire quality coastal management. CTP can respond to identified stakeholder needs by consolidating and simplifying disparate information relevant to local coastal management. Leverage the power of ArcGIS Online and other web applications to develop data and information portals that can be hosted on the Reserve website.

Increase cross-sector Reserve programming. Lake Superior Reserve's CTP works closely with the other Reserve sectors. Ideally, CTP efforts will highlight the work of other Reserve program sectors, align programming toward common Reserve outcomes, and gather valuable information about gaps and needs to inform the Education, Research, and Monitoring program activities.

Incentivize training participation. CTP will seek continuing education and/or professional organization credits for training attendance and offer unique and engaging event formats (including place-based learning).

Expand the function of CTP workshops beyond a traditional one-way "inform" training model. Training in the traditional sense will not always be the best way to engage decision-makers. When it comes to complex coastal issues, valuable learning opportunities come in the form of consensus-building and collaborative visioning or problem solving. CTP should capitalize on the Reserve's objective nonagency role to serve in a convening capacity where that can help to push coastal problem-solving forward. CTP may engage social science professionals in the design of facilitated events.

Elevate the profile of Reserve resources and the Barker's Island campus by making frequent use of them for CTP programming. These include the Estuarium and classroom, Reserve vessels, and eventually the new dormitory space on the Reserve campus. The dormitory will be a tremendous resource for CTP as it can be used to house guest speakers, visiting professionals, and/or training attendees.

Develop a multi-day climate resilience training event. This event will aim to bring different climate change communities of practice together and focus on demonstrating best practice and case studies of resilience. This event will have a regional attendee draw and will engage close program partners who share climate change objectives and outreach goals.

Explore web-based content delivery where appropriate. This will help to reach stakeholders, especially where distance learning may be appropriate.

Blooms and the Big Lake Workshop (Credit: Karina Heim)

Alignment with system-wide programs

Lake Superior Reserve's CTP aligns with and promotes specific Goals and Objectives from the NERRS 2017–2022 Strategic Plan.

LAKE SUPERIOR RESERVE
2018-2023 CTP STRATEGIC PLAN LANGUAGE

"Successful coastal training should **cultivate relevance and meaning** for decision-makers around priority coastal issues. To accomplish this, decision-makers need to be given an opportunity to **contextualize the knowledge and skills** delivered through CTP. Trainings should incorporate some element of ***demonstration*** that pulls training content out of the theoretical realm and into the real world."

NERRS 2017-2022 STRATEGIC PLAN LANGUAGE

GOAL: Enhance and inspire stewardship, protection, and management of estuaries and their watersheds in coastal communities through place-based approaches.

OBJECTIVE 1: Coastal practitioners will enhance resiliency of reserves and their watersheds by improving the protection and function of coastal habitats.

OBJECTIVE 2: Communities and individuals will have an enhanced connection to estuaries and coastal ecosystems in order to promote stewardship and care of the resource.

LAKE SUPERIOR RESERVE
2018-2023 CTP STRATEGIC PLAN LANGUAGE

"**Increase cross-sector Reserve programming.** Lake Superior Reserve's CTP works closely with the other Reserve sectors. Ideally, CTP efforts will highlight the work of other Reserve program sectors, align programming toward common Reserve outcomes, and gather valuable information about gaps and needs to inform the Education, Research and Monitoring program activities."

NERRS 2017-2022 STRATEGIC PLAN LANGUAGE

GOAL: Improve the scientific understanding of estuaries and their watersheds through the development and application of reserve research, data, and tools.

OBJECTIVE 3: Scientific, management, and educational audiences will know about and be able to effectively use reserve research, data, and products to understand the effects of climate and land-use change on estuaries, ecosystem services, and human well-being.

LAKE SUPERIOR RESERVE
2018-2023 CTP STRATEGIC PLAN LANGUAGE

"CTP empowers a broad range of coastal decision-makers by providing training that links directly to their roles and influence areas. These roles may involve regulatory authority, oversight of planning and management activities, project design responsibility, and the power to mobilize political, social or financial resources."

NERRS 2017-2022 STRATEGIC PLAN LANGUAGE

GOAL: Advance environmental appreciation and scientific literacy, allowing for science-based decisions that positively affect estuaries, watersheds, and coastal communities.

OBJECTIVE 3: Coastal decision-makers and environmental professionals will understand and effectively apply science-based tools, information, and planning approaches that support resilient estuaries and coastal communities.

LAKE SUPERIOR RESERVE
2018-2023 CTP STRATEGIC PLAN LANGUAGE

"An intended outcome of CTP is skills and knowledge application in practice. Context-building through demonstration-based trainings will help inspire and empower decision-makers to act, **as they establish that pragmatic responses are possible** in the face of real coastal challenges."

NERRS 2017-2022 STRATEGIC PLAN LANGUAGE

OBJECTIVE 4: The next generation of coastal professionals and environmental stewards will expand and be motivated through access to programs and facilities that facilitate research, resource management, and educational opportunities.

Evaluation

On an ongoing basis, the CTP Coordinator will assess the fit and effectiveness of programming by analyzing post-event evaluation metrics that relate to the value and usability of training materials. Based on responses, the CTP Coordinator will adjust audience targeting and/or programming accordingly.

The CTP Coordinator helps to ensure successful programming by targeting training opportunities to their appropriate audience. It is critical for the CTP Coordinator to build strong relationships with partners and stakeholders and stay connected with existing regional groups and initiatives prior to and during program design and delivery. Key program evaluation often occurs informally, through participant conversations and observation of events. The CTP Coordinator will strive to maintain a record of informal notes, observations and "lessons learned" from every event.

Post-event evaluations are required for all CTP events. At minimum, evaluations will include required NERRS metrics and reporting requirements; additional evaluation metrics may be added as needed to capture information specific to a particular event.

From 2018 to 2023, the following goals will guide CTP program evaluation strategy:

By 2023, CTP will conduct a follow-up five-year program needs assessment survey. The survey will be similar to the format of the 2017 stakeholder assessment and will gather data around gaps and changing needs of program stakeholders. The stakeholder survey will be sent electronically to CTP program partners, past program participants, and decision-makers who fall under the scope of the program's intended reach.

CTP will explore ways to streamline assessment with close program partners. This may include creating a combined metrics evaluation with Minnesota and Wisconsin Sea Grant programs, and/or other agencies who have required outcomes reporting.

Qualitative assessment will be valued. The CTP Coordinator will incorporate the results of open-ended assessment and interviews with partners and stakeholders into programming decisions.

Where possible, CTP will implement long-term monitoring for select training events, tracking outcomes around training or event impact six months to three years following the event. Long-term monitoring efforts should be applied to programming that features in-depth workshopping or ongoing series-based events, rather than short-duration or one-time trainings.

Future needs and opportunities

Nexus between needs and projected capacity next five years

A full-time staff person (the CTP Coordinator) implements the Lake Superior Reserve CTP. In reality, successful program delivery is an effort reliant upon strong external partnerships and additional support from Reserve staff. As the CTP program becomes more established during the 2019–2025 time frame, logistical and facilities support may become an important staff augmentation need for CTP and all core programs, especially with the anticipated completion of new dormitory building space and continued use of the *R2512* vessel for programming.

It is anticipated that over the next five years, as CTP continues to be built by the Coordinator who was hired in 2018, that 5 to 10 CTP training or workshop events will be delivered annually. This annual training delivery number may fluctuate based on the duration and size of the trainings, whether new curriculum is being introduced, whether they intend to reach new audiences or venues, the level of funding and resource support, and the number of partner organizations involved. Additionally, CTP may lead or participate in technical advisory and/or decision tool development as the need arises; currently, CTP may support one larger technical advisory effort per year, or three to four

smaller efforts. Ideally, by 2025 CTP will have built several workshop series lines that build off of previous trainings or bring several training events together around a particular subject matter.

Strong partnerships have historically guided and supported CTP, either through the offering of expertise, logistical support, joint funding, program participation, or all of the above. Core program partners include both Minnesota and Wisconsin Sea Grants and Coastal Programs, UW–Madison Division of Extension, as well as program support from NOAA's OCM and Digital Coast. Close relationships have been forged between the Reserve and the City of Superior through past joint programming efforts. Over the next five years, maintaining these core partnerships will be essential and foundational to successful CTP programming.

CTP can benefit from increased interaction with existing collaborative efforts, such as the Regional Stormwater Protection Team, the Lake Superior Collaborative. By maintaining involvement with these initiatives, CTP can expand its reach and proactively seek out gaps where new programming efforts would be beneficial.

In order to grow reach and programming, CTP will emphasize marketing and communication over the next five years. The marketing strategy includes maintaining a current contact database, delivering a bi-annual newsletter, hosting program-specific information on the Reserve's website, developing dashboards and other communication content to describe program impact, and enhancing the look and feel of programming materials. UW–Madison Division of Extension will support many of these marketing and outreach efforts as capacity allows.

CTP will continue to utilize the Lake Superior Estuarium to host workshops, meetings, networking events, seminars, and demonstrations. The CTP Coordinator will work with Reserve staff, interns, Friends of Lake Superior Reserve (FOLSR), and volunteers to support these efforts.

Limitations of program and opportunities

The CTP Coordinator role has experienced turnover and periods of vacancy since the Reserve's designation. As a result, foundational program infrastructure needs further development. Consistency in the Coordinator role will allow for programming to develop and grow, for partnerships to flourish, and for the program to establish a clear niche which in turn will aid in the ability to communicate the program to potential audiences and collaborators.

The St. Louis River Summit provides an opportunity to convene partners who work on the estuary and watershed. (Credit: UW–Superior)

There is a need to develop a communication strategy that serves to regularly inform program participants and coastal stakeholders about events happening within the program, at the Reserve, and elsewhere that may be relevant to coastal leaders looking for learning opportunities. Regular newsletters, past and future event descriptions on the website, and clear linkages to information and support tools online will all be explored in the coming years.

There are opportunities for CTP to bring training opportunities into existing initiatives or to enhance particular projects via the inclusion of targeted learning opportunities for coastal leaders. Grant-funded proposals become stronger with the additional element of decision-maker training as a component of their design. CTP will look to partner with Western Lake Superior coastal organizations submitting proposals for Great Lakes Restoration Initiative funding, Coastal Management grants, or other funding sources to include a training element into the project proposal. Additionally, CTP may be able to augment statewide efforts to reach specific coastal community audiences, such as the efforts of Wisconsin Land+Water (to reach county conservation officials) and state health departments conducting climate change public health outreach.

Reinitiating the CTP Advisory Committee is a priority for 2019, to guide and support program development. Building upon the groundwork laid by past efforts, the examples set by other successful coastal training models, and the energy of partnerships forged by common goals will help set the stage for successful program development and delivery from 2019 to 2025.

Lake Superior Reserve offices and laboratory in Superior, Wisconsin (Credit: Deanna Erickson)

ADMINISTRATIVE PLAN

Introduction

The Lake Superior National Estuarine Research Reserve administrative plan outlines the organizational relationships and human resources needed to fulfill the Reserve's mission. The Lake Superior Reserve's management framework enables coordination and cooperation among entities involved with Reserve programs and activities, ensures consultative decision-making, provides for compliance with applicable regulations, and integrates the Reserve's major program areas. Program areas administered by the Reserve include research, monitoring, education, coastal training, facilities and administration, and visitor and volunteer services.

Objective and Strategies

OBJECTIVE 1: Provide and enhance the administrative structure needed to fulfill the Reserve's mission and conform to federal and state law and University of Wisconsin agreements.

Strategies

Administrative

- Maintain an administrative structure that provides an effective and efficient process to formulate and implement policies and programs.
- Implement administrative and financial procedures and programs to ensure efficient management of Reserve personnel and funds.
- Provide an administrative structure that encourages the integration of education, research, monitoring, and stewardship.
- Review and evaluate all programs and the strategic plan annually, making adjustments as needed.
- Serve as community liaison for partnerships and collaborations while representing NERR System.

Staffing

- Provide adequate staffing to accomplish the full range of responsibilities of a reserve.
- Design and support workplace policies and programs that result in committed people fulfilling their professional potential as they accomplish their work with pride and enjoyment.

Financial

- Provide adequate funding to accomplish the full range of responsibilities of a reserve.
- Ensure long-term financial stability for carrying out the Reserve's research, monitoring, and education programs, including pursuing donor development opportunities.

Partnerships

- Build relationships and strengthen collaborations with existing partners and establish partnerships with additional organizations to further the goals of the Reserve.
- Build strategic relationships to improve the generation of social, economic, and cultural data necessary to support the Reserve's interdisciplinary programmatic objectives.
- Provide administrative support for greater multi-disciplinary, interdisciplinary, and transdisciplinary partnerships in support of the Reserve's mission and vision.
- Strengthen and maintain communication and collaboration between the RAB, programmatic advisory boards, and the Friends of the Lake Superior Reserve.
- Maintain and strengthen partnerships with volunteers to fulfill the Reserve's mission and conduct its programs.
- Support efficient, long-term management of estuarine and coastal ecosystems through cooperative relationships with the Reserve's signatory partners: WDNR, City of Superior, Douglas County, Wisconsin Sea Grant Institute, Fond du Lac Band of Lake Superior Chippewa, UWS, and Wisconsin Coastal Management Program.

Administrative Structure

Reserve management authority

The Lake Superior Reserve is a partnership between the National Oceanic and Atmospheric Administration (NOAA) and the State of Wisconsin. The University of Wisconsin–Madison Division of Extension administers the Reserve, as described in an MOU between NOAA and the University of Wisconsin–Madison Division of Extension (Appendix B).

UW–Madison Division of Extension, NRI – Roles and responsibilities

The Reserve is administered by the NRI, within the UW–Madison Division of Extension. The Reserve Manager reports to the NRI Director and works with Extension administrative and support staff to meet the NOAA award's state match requirements in support of program, finances, staff, and operations. The NRI director is the Principle Investigator for the Reserve's NOAA operational award and works closely with the Reserve Manager to implement the Reserve's programs. Reserve staff collaborate with county-based Extension staff as well as Extension's Natural Resource Educators, Master Naturalists, and other programs to integrate the Reserve's programs with NRI programming priorities.

NOAA/NOS/OCM and Ecosystems Division – Roles and responsibilities

NOAA OCM administers the National Estuarine Research Reserve System. The Reserve collaborates with NOAA's OCM through the Stewardship Division and Ecosystems and NERRS Programs. The Reserve Manager works directly with a NOAA OCM program liaison on matters pertaining to the Reserve's state–federal partnership, , operations grant funding, NERRS metrics reporting, and the periodic evaluation of the Reserve operations for compliance with federal requirements and the Reserve's management plan. Reserve staff work directly and regularly with NOAA sector leads for their programmatic areas as well as their counterparts across the NERR System. Reserve staff also collaborate with the NOAA liaison and regional NOAA partners to support and implement NOAA's Habitat Blueprint Focus Area and other agency initiatives, to coordinate efforts with fellow CZMA programs in Wisconsin and Minnesota and to communicate Reserve activities across the Great Lakes CZMA community.

UWS

UWS, a traditional liberal arts college located in the northwest corner of Wisconsin, was established in 1893 and joined the UW System in 1971. In addition to hosting the Reserve, it is home to the LSRI and the Transportation and Logistics Research Center. LSRI was created in 1967 with a mission focused on environmental research, environmental education, and public outreach for the Great Lakes region. Additionally, LSRI has an invertebrate taxonomy laboratory, analytical chemistry labs, aquatic animal culturing laboratory, and aquatic toxicology testing lab. LSRI staff collaborate closely with Reserve staff on research, sharing equipment and lab space. UWS owns two adjacent parcels of land, 78 acres total, on the South Shore of Lake Superior, which includes Dutchman Creek. This parcel of land was named the Nelson Outdoor Laboratory in 2007 and is used to enhance the instruction, research, and public service missions of the university. This land is located within the Reserve boundaries. Students majoring in UWS's natural sciences, social inquiry, communication, education, and other fields all have opportunities to participate in Reserve research, education, and outreach programs through classwork or as student staff. In addition to close collaboration with faculty and students on campus, the Reserve relies on the support of administrative staff in information technology, and facilitates and coordinates this collaboration through the Provost's office. UWS and UW–Madison Division of Extension share an MOU detailing the partnership support and roles underpinning the Reserve's physical operations (Appendix B).

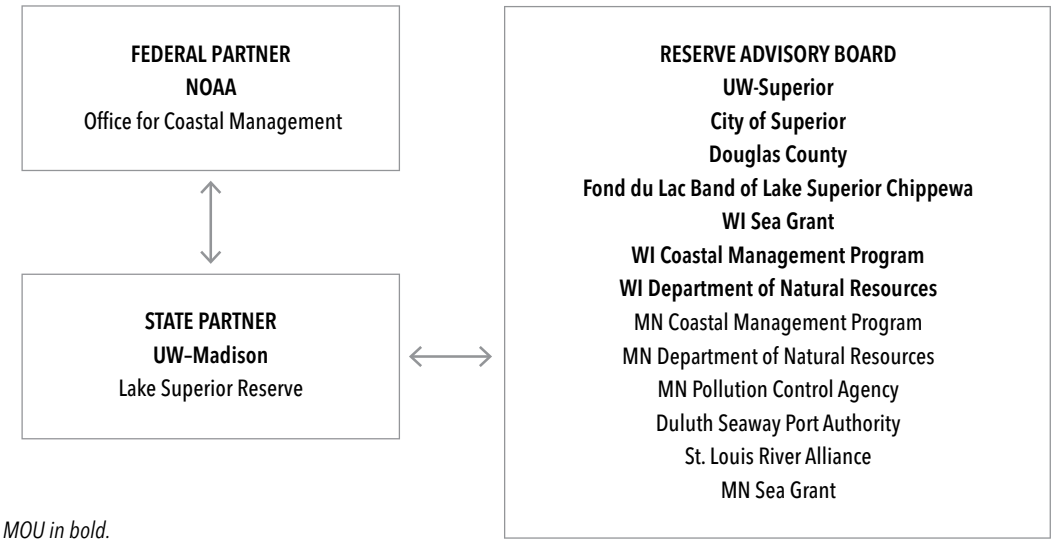
Organizational framework

In addition to UWS, a set of local, state, and regional partners with land dedicated as part of the Reserve's boundary and/or with long-term strategic interest in the Reserve, serve as core members of the Reserve's Advisory Board (RAB) under a multi-party MOU (Appendix B). The Reserve reports to NOAA, to Extension leadership, to UWS leadership and to the RAB, which reflects expanded organizational partnerships beyond this core group of signatories to the multi-party MOU.

RAB: Background, roles, responsibilities

The Reserve is required by NOAA to develop and maintain an advisory board charged with supporting the implementation of the Reserve's Management Plan. Initial RAB membership was composed of the landowning and strategic MOU partners. Over time, representatives from Minnesota were added to the RAB in an attempt to balance and reflect the facts that 1) the Reserve's watershed includes

Organizational Framework



Signatories to MOU in bold.

Figure 5.1. Lake Superior Reserve organizational framework

significant area in Minnesota and 2) there was support for the Reserve from Minnesota-based organizations and research institutions. In 2016, the RAB consisted of members of NOAA-affiliated programs in both states—Wisconsin and Minnesota Sea Grant, Wisconsin and Minnesota Coastal Programs, as well as UWS, the City of Superior, Wisconsin's Douglas County, WDNR, the Fond Du Lac Band of Lake Superior Chippewa, MPCA, the St. Louis River Alliance (SLRA), and the Duluth Seaway Port Authority (DSPA). Representation on the RAB was determined by high-level appointments and delegations from within each organization with representatives agreeing to a term lasting three years. Over the next five years, representation for RAB participation is expected to be sought from the City of Duluth, St. Louis County, the U.S. EPA's Mid-Continent Ecology Division laboratory and additional private sector representatives.

City of Superior

Superior, Wisconsin offers 96 miles of shoreline on which its citizens work, play, and learn. Superior's city leaders are proud of the community connection to the Lake and the St. Louis River, which goes back generations and involves historic shipbuilding and maritime-related industry. Superior leaders have actively protected large tracts of shoreline and inland property, most notably Wisconsin Point and the SMF. At the time of designation, Mayor Dave Ross was a member of the Board of Directors of the Great Lakes and St. Lawrence Cities Initiative, a collective of international community leaders representing eight states and two provinces, whose mission is the protection and restoration of the Great Lakes. With significant interest in the waters that surround Superior, citizens and leaders strongly supported the designation of the Reserve and in the fall of 2007, the Superior Common Council and the Douglas County Board of Supervisors formally resolved to support the establishment of the Lake Superior Reserve. In the last few years and following the historic 2012 Twin Ports flood, Superior has made significant advances in its stormwater management efforts. The mayor and the city council continue to support the Reserve, and the City's Director of Parks, Recreation and Forestry serves on the RAB. Through this relationship, the Reserve's research program has partnered with the city to address the invasive emerald ash borer, stormwater management, economic resilience, and ecosystem services, among other topics. The Reserve's education program works with the Superior School District and provides community education events through such things as the annual Lake Superior Day celebration. Finally, the Reserve's CTP partners with the city on such things as trainings and certifications for developers and builders in erosion management, for the research community on adopting an ecosystem services approach, and for regional resource managers on systems thinking. The Reserve also collaborated with the city on the Barker's Island rain garden and is actively exploring collaboration potential with the city's museums, especially the historic whaleback the Meteor.

Douglas County

Douglas County, located in northwestern Wisconsin, covers approximately 1,300 square miles and is bordered by Carlton County, Minnesota to the west, Burnett and Washburn Counties to the south, Bayfield County to the east, and Lake Superior to the north. Unique natural resource characteristics found in Douglas County include the following:

- Largest county forest in Wisconsin (3rd largest in United States)
- Largest municipal forest in Wisconsin (one of the largest in United States)
- Most "Land Legacy Sites" (sites in Wisconsin that are identified by the WDNR as critical to meeting conservation and recreation needs for the next fifty years) of any county in Wisconsin
- Most "Wetland Gems" (high-quality habitats identified by the Wisconsin Wetlands Association for their representation of wetland types that historically made up Wisconsin's landscape) of any county in Wisconsin

The Administrator of Douglas County has appointed one of the County Board of Supervisors members to the RAB, acknowledging that the county-owned property is included within the designated Reserve boundary. As stated in the Douglas County Land & Water Resource Management Plan, the county has three conservation-based goals: 1) protect and enhance surface waters and wetlands to preserve and restore their water quality, ecological functions, and recreational and scenic values; 2) protect and understand groundwater quality to supply clean water for drinking and recharging surface waters and wetlands; and 3) prevent the introduction and spread of aquatic and terrestrial invasive species to protect aquatic habitat and resource values through support and implementation of the Douglas County Aquatic Invasive Species Strategic Plan. The current County RAB member has been instrumental in supporting the renovation of the Reserve's Visitor Center and is a leading

proponent of the use of renewable energy projects with the Reserve's facilities to engage and educate the public. The Douglas County Land & Water Resource Management Plan to be implemented between 2010 and 2020 identifies the following as guiding principles:

- Uphold the protection of natural resources while considering the importance of the Douglas County economy.
- Utilize limited staff and financial resources efficiently.
- Facilitate partnerships and support efforts of other organizations where consistent with land and water resource priorities.
- Emphasize education to increase understanding of natural resource concerns and the methods to address these concerns and encourage beneficial changes in behavior.
- Restore and protect native habitats while meeting water quality objectives.
- Utilize information and recommendations in partner organization water quality and habitat management plans.

Fond du Lac Band of Lake Superior Chippewa

The Fond du Lac Reservation, established by the LaPointe Treaty of 1854, is one of six Reservations inhabited by members of the Minnesota Chippewa Tribe. The Fond Du Lac Band is headed by the Reservation Business Committee, which includes one chairperson, a secretary/treasurer, and three district representatives. The Fond du Lac Resource Management Division manages on- and off-Reservation resources, including the St. Louis River Estuary. Within the Division, the Environmental Program's Office of Water Protection manages water quality and wetland issues within Reservation boundaries. Fond du Lac has three "treatment-as-a-state" determinations under the federal Clean Water Act, which means the tribe has federally approved water regulations, including water quality certification standards for on-Reservation projects. Because of the connection Fond du Lac has within the Reserve boundary, representatives from the Fond Du Lac serve on the RAB. The Reserve's research program collaborates with Fond Du Lac on wild rice, water quality, invasive species, habitat restoration, and more. The Reserve's education program is directly engaged with the Fond Du Lac Tribal College and Ojibwe School and the CTP's workshops and initiatives regularly engage Band members. Fond Du Lac also has staff assigned to the Reserve's programmatic advisory committees on research and education.

University of Wisconsin – Sea Grant Institute

The Sea Grant College Program, administered by NOAA, is a national program of research, outreach, and education dedicated to scientific inquiry for the practical use and conservation of the nation's oceans, Great Lakes, and coastal resources. Administered at the UW Aquatic Sciences Center by the Wisconsin Sea Grant Institute in Madison, the program's funds are awarded on a competitive, peer-reviewed basis to public and private universities and colleges in Wisconsin. Research competitions are held biennially, supplemented by annual national strategic investment competitions. Outreach is conducted statewide through the Wisconsin Sea Grant Advisory Services Program and the Madison-based communications office. The Advisory Services program is organized around subject area specialists, four of whom also have a responsibility to provide general support to a multi-county area through field offices located on various University of Wisconsin campuses (UWS; UW-Green Bay; UW-Manitowoc; UW-Milwaukee). The 2014–2017 Wisconsin Sea Grant Strategic Plan is centered on four focus areas: Healthy Great Lakes Coastal Ecosystems, Sustainable Fisheries and Aquaculture in the Great Lakes Region, Resilient Great Lakes Communities and Economies, and Environmental Literacy and Workforce Development in the Great Lakes Region. Together with the Minnesota Sea Grant, Wisconsin Sea Grant regularly conducts a regional call for research proposals that support the work of the Reserve.

In addition to collaboration on research program developments and related, the Reserve has a unique partnership with Wisconsin Sea Grant, which also has representation on the RAB. The two organizations share a common administrative support staff member and two Sea Grant staff are housed at the Reserve office: a science writer and a climate and tourism outreach specialist. Wisconsin Sea Grant has continuously supported Reserve operations and programs through financial-sharing mechanisms, collaborative program developments in research and education, and in the development and implementation of workshops and trainings for coastal professionals and decision-makers. An example of this was the April 2016 Ecosystem Services Pilot Workshop. Sea Grant staff serve on the research, education, and coastal training advisory committees. Finally, the Reserve partners with Wisconsin Sea Grant and Minnesota Sea Grant on the community education science café program, The River Talks as well as the annual St. Louis River Summit. Future collaborative

initiatives under discussion include a structured fellowship program with the Reserve as well as increased social science research and interdisciplinary work.

Wisconsin Coastal Management Program

The Wisconsin Coastal Program, in the Department of Administration, is another NOAA-affiliated and networked program that coordinates state, regional, and local agencies to improve Great Lakes coastal management. The Coastal Program supports the management, protection, and restoration of Wisconsin's coastal resources, and works to increase public access to the Great Lakes. Like the Reserve, this program is funded under the CZMA, which grants the two programs a strategic partnership unlike others. At the national level, the NERRS and Coastal Programs are represented on the NOAA Coastal Roundtable. In light of this strategic relationship, the Coastal Program Director serves on the RAB and Coastal Program staff serve on the Reserve's coastal training advisory committee. This special relationship provides a statewide perspective on coastal management issues in an advisory role to the Reserve Manager, and supports the Reserve's initiatives alongside an integrated national network of ocean and coastal management programs.

These are the current Wisconsin Coastal Program's goals:

- Improve the implementation and enforcement of state statutes, policies, regulations, and programs affecting the Great Lakes.
- Improve the coordination of activities undertaken by federal, state, and local governments on matters affecting key coastal uses and areas.
- Strengthen the capacity of local governments to undertake effective coastal management.
- Advocate the wise and balanced use of the coastal environment.
- Inform the public about coastal issues and increase opportunities for citizen participation in decisions affecting the Great Lakes.

As fellow CZMA programs, the Reserve and Coastal Programs share financial mechanisms allowing for efficient use of federal funds to meet community needs and program objectives. The Reserve's research and education programs support the Coastal Program's restoration and management efforts with the city and county along the St. Louis River, within the estuary, and along the coast of Lake Superior. Reserve staff are engaged in regional education and outreach initiatives with the Coastal Program collaborating on and supporting such NOAA programs as the Great Lakes Marine Debris Action Plan. Finally, Reserve staff support Coastal Program efforts through local networking with public and private sector, tribal representatives, decision-makers, researchers and managers, and others, assisting in complex restoration, management planning, and project implementation in places such as Wisconsin Point, which is within the Reserve's boundary and a restoration focus of the NOAA Habitat Blueprint Focus Area. Future collaborative initiatives under discussion, alongside with Wisconsin Sea Grant, is the potential of a structured fellowship program with the Reserve.

WDNR

The WDNR is dedicated to the preservation, protection, effective management, and maintenance of Wisconsin's natural resources. It is responsible for implementing the laws of the state and, where applicable, the laws of the federal government that protect and enhance the natural resources of Wisconsin. It is the one agency charged with full responsibility for coordinating the many disciplines and programs necessary to provide a clean environment and a full range of outdoor recreational opportunities for Wisconsin citizens and visitors. WDNR provides a representative on the RAB and is a landowner within the Reserve boundaries with properties on the Red River Breaks and Wisconsin Point. Of strategic interest, and relevance for this Management Plan, WDNR is interested in ultimately adding Clough Island, a property acquired from TNC, to the Reserve boundary. The Reserve has partnered on research and management planning efforts for WDNR to advance this process by providing a limited-term staff position to prepare Clough Island management materials for WDNR. The Reserve collaborates with WDNR staff on research and monitoring needs within the AOC, the river, and surrounding riparian habitat including topics such as emerald ash borer and other invasive species and wild rice. Reserve and WDNR staff collaborate in AOC work groups and in support of the Binational Program management plan. Finally, WDNR staff are engaged on the Reserve research and coastal training programmatic advisory committees and regularly included in workshops and trainings facilitated by the CTP.

Minnesota Department of Natural Resources / Coastal Program

The Minnesota Coastal Program, embedded within the Department of Natural Resources, is a CZMA-affiliated program and the counterpart to Wisconsin's Coastal Program. Sharing objectives and strategies with both the Reserve and Wisconsin Coastal Program, the Minnesota Coastal Program was invited to send representatives to the RAB in recent years to help the Reserve better understand and meet the needs of Minnesota residents within the coastal watershed and to strategically partner on Great Lakes coastal management. The Reserve's research and education programs support the Coastal Program's restoration and management efforts with the City of Duluth, St. Louis County, and along the Minnesota side of the St. Louis River, the estuary, and along the "north coast" of Lake Superior. Reserve staff collaborate with Minnesota Coastal Program staff on such things as the Great Lakes Marine Debris Action Plan, education and outreach events, and workshops for coastal decision-makers. Minnesota Coastal staff participate in the Reserve's People & Places Work Group, which focuses on enhancing interdisciplinary collaboration with the social sciences, arts, and humanities. Finally, Reserve staff support Coastal Program efforts through networking with public and private sector, tribal representatives, decision-makers, researchers, and managers, and others, assisting in complex restoration, management planning, and project implementation within the AOC. The Coastal Program's goal is to preserve, protect, develop, and where possible, restore or enhance coastal resources along Minnesota's North Shore of Lake Superior.

Minnesota Sea Grant College Program

The counterpart to the Wisconsin Sea Grant Program, the Minnesota Sea Grant Program was invited to formally join the RAB in recent years, rounding out the range of bi-state-affiliated NOAA programs. Minnesota Sea Grant is based at the University of Minnesota Duluth (UMD) and works in partnership there with the UMD Large Lakes Observatory. Minnesota Sea Grant's mission is to facilitate interaction among the public and scientists to enhance communities, the environment and economies along Lake Superior and Minnesota's inland waters by identifying information needs, fostering research, and communicating results, by 1) conveying the needs of communities, industries, and management agencies to university scientists, and 2) promoting the best and most current science regarding Lake Superior and inland lakes to resource users, managers, and policy-makers. Minnesota Sea Grant also funds research and education projects on a competitive, peer-reviewed basis, and like Wisconsin Sea Grant, ensures that regional calls for research proposals support the work of the Reserve. Reserve staff work directly with Minnesota Sea Grant staff on research, monitoring, education, and outreach needs across a range of topics: climate adaptation, invasive species, habitat restoration, and coastal hazards, among others. Staff from Minnesota Sea Grant participate in the People & Places Work Group to improve interdisciplinary collaborations benefiting coastal science, management, and policy development. Minnesota Sea Grant partners with the Reserve and Wisconsin Sea Grant on The River Talks and actively collaborates in support of the annual St. Louis River Summit. Sea Grant staff serve on the Reserve's research and coastal training advisory committees and the Reserve Manager serves on the Sea Grant Advisory Committee.

DSPA

The DSPA is a public agency created by state statute in 1955 to expand and improve facilities at the Port of Duluth-Superior in anticipation of the opening of the St. Lawrence Seaway in 1959. Two years later, with $10 million in public funding, the Port Authority created the 120-acre Clure Public Marine Terminal, the port's only general cargo facility. The Port of Duluth-Superior is the largest tonnage port on the Great Lakes and continues to rank among the top 20 ports in the United States, handling an average of 38 million short tons of cargo and hosting nearly 1,000 vessel visits each year. Like port authorities and harbor commissions worldwide, the DSPA mission is to generate domestic and international trade, advance regional industrial development, and advocate for maritime industry interests in legislative initiatives. The Port Authority also owns and manages multiple waterfront properties, including the Clure Public Marine Terminal, Garfield Docks C & D, Erie Pier, and an industrial park near the Duluth International Airport. DSPA operates a designated Foreign Trade Zone at both its terminal and the Airpark.

The DSPA was formally invited to the join the RAB in recent years and is an important community partner for the Reserve's research, education, and outreach programs. Reserve staff collaborate with the DSPA on the annual St. Louis River Summit, and the Reserve's CTP in particular has offered trainings and workshops of import to the DSPA staff and partners in the maritime industry, including on the topic of ecosystem services.

MPCA

The MPCA was invited to join the RAB in recent years and is an important community partner charged with resources protection, restoration, and management. In 1967, a growing awareness of the environment's fragile nature led the Minnesota Legislature to create a new state agency, one with a unique challenge and a demanding responsibility: to protect the air, waters, and land of the state. The Minnesota Legislature gave authority to the MPCA to begin controlling pollution problems in the state three years before the first Earth Day and the creation of the U.S. Environmental Protection Agency (EPA). The MPCA has made Minnesota a national model for environmental protection. The mission of the MPCA is to protect and improve the environment and human health. MPCA staff monitor environmental quality, offer technical and financial assistance, and enforce environmental regulations. The agency finds and cleans up spills or leaks that can affect human health and the environment, develop statewide policy, and support environmental education. The results are obvious: the air, land, and water are cleaner now than they were 40 years ago, in spite of a growing population and rising industrialization. These results were possible because the agency partnered with the state legislature, the U.S. EPA, local governments, industry, environmentalists, educators, and the public. Collaborating with Reserve staff, MPCA staff support the annual St. Louis River Summit, coordinate and collaborate on various AOC-related research and monitoring activities, and sit on the Reserve research advisory board.

SLRA

The SLRA is a local nonprofit organization that is working to oversee activities and practices that are helping to restore, protect, and enhance the St. Louis River. The SLRA originated as a Citizen Advisory Committee formed to assist Minnesota and Wisconsin state agencies develop a Remedial Action Plan for the St. Louis River AOC. Created in 1996 as a nonprofit, the St. Louis River Citizens Action Committee's (SLRCAC) primary focus and efforts were to foster communication between public and tribal agencies, industry groups, and community stakeholders in the implementation of the Remedial Action Plan. In 2009, the SLRCAC began doing business as the SLRA. Alliance members include individuals, families, businesses, organizations, local, and tribal governments—all helping support the mission of the SLRA: to protect, restore, and enhance the St. Louis River. In recent years, the SLRA was invited to join the RAB and has been a strong strategic partnership with Reserve staff in educational and outreach programming in particular. The SLRA has an important piping plover project on Wisconsin Point, which is within the Reserve boundary. And the SLRA is a partner in the Wisconsin Point restoration efforts underway with support from the Reserve and NOAA partners. Each year, the SLRA is also an important partner with the St. Louis River Summit.

Future RAB members and new partners

The terms of membership on the RAB is three years and while the core membership is not expected to change, it may benefit the organization to add new members over time, perhaps developing a rotational model of representation. Current partners that would be beneficial to add to the RAB in some fashion include the City of Duluth, St. Louis County, the UMD's Natural Resources Research Institute, the UMD Large Lakes Observatory, the U.S. EPA's Mid-Continent Ecology Division Office of Research and Development (ORD) and the Northern Great Lakes Visitors Center in Ashland, Wisconsin. Additional, future partners and representatives ought to be considered from the healthcare sector and the business sector including such examples as Essentia Health and Fraser Shipbuilding.

EPA-GLTED

The U.S. EPA-GLTED and their Mid-Continent Ecology Division lab in Duluth joined the Reserve in a MOU executed in April 2015 (Appendix B). This MOU states the partnership's goal of creating a framework "to better understand how cooperative logistics or the exchange of information, techniques and products can help more effectively carry out" respective missions. This information exchange will "focus on, but not be limited to, researching the relationships between environmental, economic and socio-cultural conditions in and near the St. Louis River Estuary of Lake Superior." This MOU partnership focuses on the EPA-GLTED team working on Sustainable & Healthy Communities and Safe & Sustainable Waters—research programs national in scale, but heavily invested in locally. The goal behind this MOU was to increase the ability of both parties to join in projects of mutual interest that benefit the communities of western Lake Superior and includes collecting, analyzing, and disseminating information among other actions. The EPA and the Reserve partner in facilitation of the annual St. Louis River Summit and following the execution of this MOU, have built a working relationship on the concept of advancing ecosystem services approaches and related social valuation in western Lake Superior.

U.S. Coast Guard (USCG), Marine Safety Unit, Duluth

The USCG in Duluth has a Memorandum of Agreement (MOA) (Appendix B) with the Reserve through approval by UW–Madison Division of Extension and UWS, to support their Continuity of Operations planning in the region. In the early summer of 2019, the USCG approached the Reserve with a need for a facility that could serve as a mustering station and site of operations during disaster response and recovery. It was determined that the Reserve's Confluence Room inside the Estuarium met the USCG requirements and the location also provided access to the dock. The agreement stipulates that the USCG may operate around the clock out of this facility for a period of no more than thirty consecutive days.

University of Minnesota Duluth's Natural Resources Research Institute

The Natural Resources Research Institute (NRRI) approached the Reserve in 2018 to partner in support of Motus, a global monitoring network tracking migratory species. With the important bird migratory corridor in western Lake Superior, NRRI was attempting to build a radio array to cover the entire western Lake Superior coastline. The Reserve partnered with NRRI, developing an MOU (Appendix B) and allowing them to install a permanent Motus array on top of the Lake Superior Estuarium for these purposes. The live data from that array is available to the public via the Motus Wildlife Tracking System website.[56]

Current Staffing and Needs

The Reserve core staff currently consists of a Reserve Manager, Research Coordinator, Monitoring Coordinator, Education Coordinator, CTP Coordinator, and a part-time SWMP technician hired through UW–Madison Division of Extension. The CTP Coordinator's position is paid for by Extension funds and contributes to part of the match requirements of the NOAA award. The Education Specialist position has been funded part-time since 2013 with external grants awarded to support the Rivers2Lake education program.

The Reserve benefits from shared support for a financial specialist position in collaboration with Wisconsin Sea Grant. With two Sea Grant staff housed at the Reserve, this staff member supports both Sea Grant and Reserve staff business operations. This includes scheduling, invoicing, purchasing, and related activities, and increasingly more of the grants management and business-office support.

Reserve staff actively mentor students and present them with hands-on learning experiences in all operational areas of the Reserve whether lab, field, community education, outreach, or other. Student staff are budgeted into each operational award for the Reserve. Undergraduate and graduate students can be employed in support of all sectors and, typically, each Reserve core staff member has at least one student worker or intern throughout the year. The research and monitoring intensive summer field season leads to multiple student employees during this season. The Reserve supports career development and training for students and has participated in one student exchange, sending an undergraduate to Kachemak Bay NERR in Alaska to carry out comparative work from that underway in Lake Superior.

In addition to a budgeted amount for student workers hired through UW–Madison Division of Extension each year, the Reserve receives students with work study awards and other scholarships supporting them in upper-level scholarship or capstone research projects. The Reserve provides salaries for student workers or interns. Students from UWS, UMD, the College of Saint Scholastica, the Lake Superior College, and Northland College, among other regional campuses, have contributed to Reserve efforts. Graduate student engagement has occurred through programs at UW–Madison, UMD, Michigan Technological University, University of Wisconsin–Green Bay, and the University of Colorado Boulder.

The Reserve has laid the groundwork to host and support two new student fellowship positions in 2019. The Lake Superior Freshwater Fellowship is an immersive, and multi-disciplinary opportunity for undergraduate students to independently craft and conduct research under the guidance of a Reserve mentor. The Margaret A. Davidson Fellowship, an inaugural initiative of the NERRS in 2019, will offer graduate students enrolled in an M.S. or Ph.D. program the opportunity to conduct estuarine research within a NERR. After developing and submitting statements of management priority to NOAA in 2018, the Reserve will be considered a placement site for a Margaret A. Davidson fellow in 2020. Both fellowships are open to students from a wide range of disciplines and include a significant mentorship commitment from Reserve staff.

Future Staffing Needs

Staff size has remained constant since designation, but with time all core Reserve programs have grown, and new facilities have been added. Core staff continue to expand their reach and programming, but successful programmatic expansion in the future will require staff augmentation, particularly in the following areas. Each area of need is aligned with the goals and objectives that it supports.

Facilities management and logistical support

With the completion of the Estuarium in 2017, and the anticipated construction of new facilities in the future, the Reserve footprint has increased. There is a need for logistical support and management for facilities and technology, guest services, and vessels, especially in regards to supporting increasing square footage and visitor use of Reserve buildings. These needs could be explored through strategic partnerships and contractual arrangements, and the engagement of FOLSR. (Reserve Goals VI; Facilities and Construction Objectives 1, 2)

Stewardship

Although UW–Madison Division of Extension does not own land within the Reserve, there are opportunities to collaborate with landowning partners to strategically support the Reserve mission and objectives. The public land within the Reserve boundaries is owned by state or local agencies. In some cases, partner funding and/or administrative capacity constraints highlight a need for increased stewardship in the St. Louis River Estuary. Such needs could be met through dual-funded positions with Reserve partners, contractual arrangements to meet specific tasks, or the strategic engagement of FOLSR, all of which could build capacity to accomplish stewardship goals. (Reserve Goals I, V; Stewardship Objectives 1, 2; Education Objective 3)

Volunteer coordination

Targeted volunteer efforts can expand core Reserve programming and contribute to the goals of strengthening community and increasing sense of place in the watershed. Well-organized volunteer efforts may also alleviate staff time constraints and expand capacity in a cost-effective manner. Partnership with the Wisconsin Master Naturalist Program can expand capacity for volunteer training and recruitment. In the future, the FOLSR may also be able to coordinate volunteer activities along with Reserve staff and, at times, in partnership with other regional volunteer networks. (Reserve Goals II, V; Volunteers Objective 1)

Education programming capacity

A full-time education specialist can support the continued expansion of program capacity and reach. Since designation, the Reserve has seen a steady increase in educational programs. There is a need for regular public programming at the Lake Superior Estuarium as well as community action education programs, as identified within this document and in the 2015–2035 NOAA Education Strategic Plan. This position can also provide sustained support for the Rivers2Lake education program, a foundational component of the Reserve's educational efforts. (Reserve Goals III, V, VI; Education Objectives 1, 2, 3)

Other anticipated staffing needs

The Reserve's research program would benefit from a social science research coordinator to collaborate with the research program by providing social, cultural, or economic research expertise and support for interdisciplinary efforts. In particular, with the regional call for more ecosystem services work and the Reserve's partner community calling for more social science, this additional staff position would be of great assistance. It would very likely benefit the Reserve to hire an IT/data/ Geographic Information System (GIS) coordinator at least on a part time basis. This type of position could be developed in a shared model with regional partners, but given the expectations for the Reserve to house estuarine data and serve as a regional information repository, a staff position tasked with managing data would be a welcome addition.

While reserves operate within limited budgets, several mechanisms are regularly used to increase staff capacity in the NERRS system. Nonprofit Friends groups may conduct fundraising to support Reserve positions or may host positions that directly support Reserve activities. State partners may increase financial support for staff in order to meet overlapping research, education, or stewardship objectives. State agencies and regional partners may also host positions within a Reserve or contribute to shared positions that expand the capacity of both the Reserve and the partner agency or organization.

Lake Superior Reserve Organizational Chart

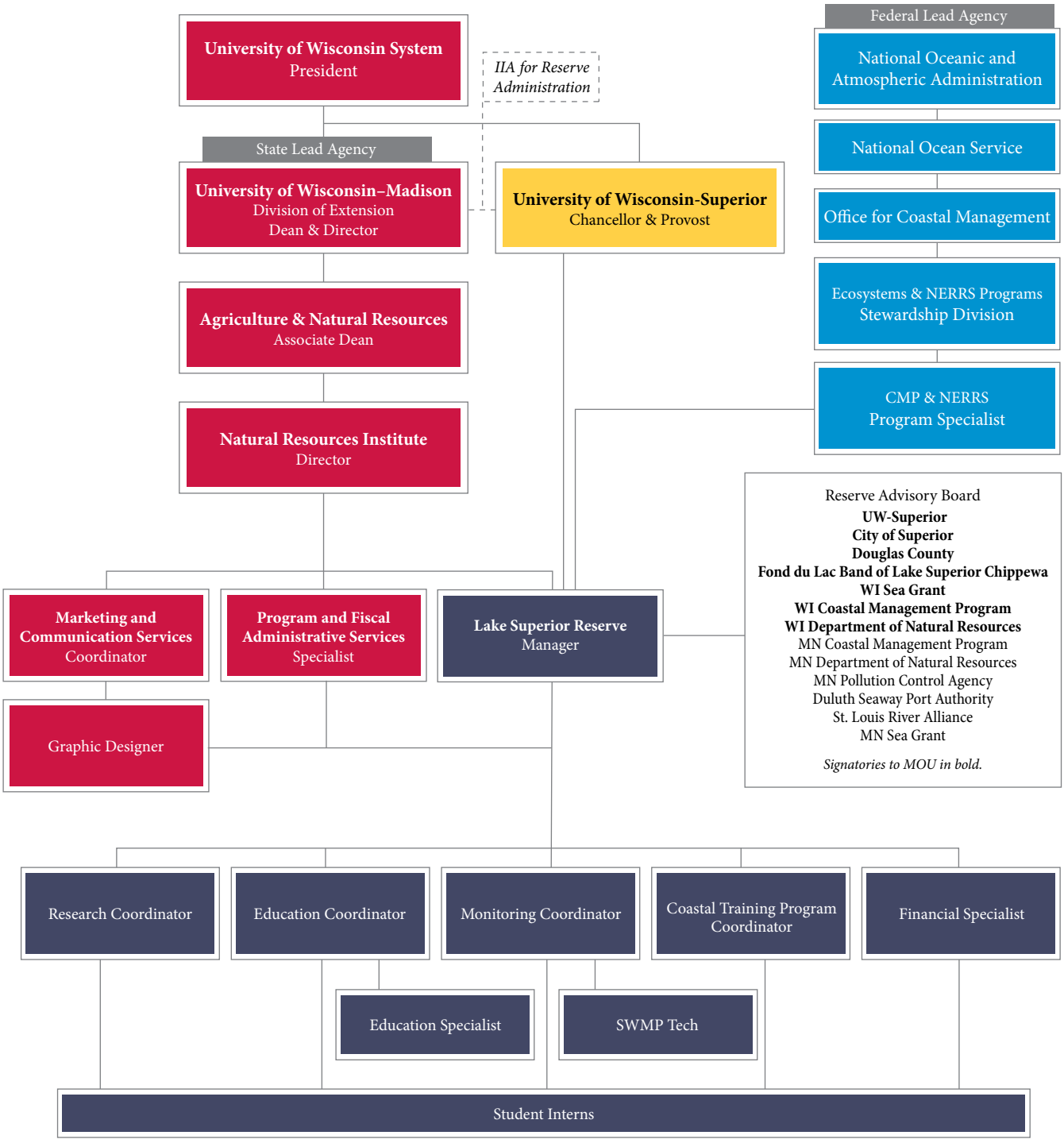


Figure 5.2. Lake Superior Reserve organizational chart showing staffing structure as of 2019

Volunteer Roles and Responsibilities

Friends of the Lake Superior National Estuarine Research Reserve (FOLSR)

FOLSR intends to take on both tactical and strategic objectives in support of the Reserve. Among these are raising funds, recruiting and coordinating volunteers to support Reserve operations, and obtaining equipment to support Reserve operations.

FOLSR, established in early 2017, plays a role in supporting the strategic and tactical objectives for the Reserve. FOLSR is a membership-based, nonprofit, nonstock corporation (State of Wisconsin) devoted to supporting the mission and operation of the Lake Superior National Estuarine Research Reserve with 501(c)(3) nonprofit status. FOLSR is a participant in a three-party MOU of mutual benefit between the Reserve, University of Wisconsin–Madison, and UWS. FOLSR is governed by a Board of Directors led by an Executive Committee of four officers. FOLSR has adopted policies to guide its ongoing operations. In 2018, FOLSR established insurance to protect FOLSR and its directors. FOLSR adopted a strategic plan in 2018 designed to guide the organization for at least three years. As of the writing of this document FOLSR is meeting to develop a tactical operational plan for calendar 2019. This process includes consultation and cooperation with Reserve staff to inform FOLSR programs and initiatives that will support the Reserve mission. More information about membership and the work of FOLSR can be found at www.folsr.org.

The purpose of this section is to provide an overview of the mission and status of FOLSR and describe potential activities it will pursue to support the Reserve.

FOLSR shares a vision of a healthy coastal environment with the Reserve and is dedicated to the vision that Lake Superior coastal watersheds and estuaries are understood, valued, and thriving. FOLSR supports the mission of the Reserve in improving the understanding of Lake Superior's coast and estuaries by addressing issues affecting the watershed through integration of research, education, outreach, and stewardship. Following its bylaws, FOLSR will pursue activities that include raising funds, contributing volunteer efforts, and building membership in support of the nonfederal match requirements, and for other Reserve programs, facilities, and operations. FOLSR will also cooperate and coordinate with the efforts and spirit of the National Estuarine Research Reserves Association.

FOLSR intends to take strategic activities in support of the Reserve. Among these are raising funds, recruiting and coordinating volunteers to support Reserve operations, and obtaining equipment to support Reserve operations. In particular, some objectives for which FOLSR may be able to provide assistance include the following:

- Solicit volunteers to support the Estuarium and Reserve boat operations.
- Operate a gift shop to raise funds for Reserve programs.
- Sponsor Reserve events, such as conferences, seminars, and various other public events.
- Solicit financial support from the community.
- Solicit the donation of goods, real property, and services that support the Reserve mission, or that can be sold, with funds obtained going to support the Reserve mission. Examples include vehicles, equipment, software, graphics design and communication services, etc.
- Recruit and coordinate volunteers for activities that will support the Reserve mission.
- Conduct advocacy efforts in support of the Reserve mission.
- Develop significant funding proposals and requests to further larger initiatives in support of the Reserve mission.
- Recruit active FOLSR members and engage them in productive activities in support of the Reserve.
- Conduct fundraising events.
- Pursue partnerships and collaborations with other organizations to support the Reserve mission.
- Facilitate engagement of students from local educational institutions in supporting the Reserve mission.

Vessel and Vehicle Plan

In the last part of 2016, the Reserve saw the development of a new arrangement between the NOAA's National Ocean Service/OCM and NOAA's Oceanic and Atmospheric Research/Great Lakes Environmental Research Lab (GLERL) to provide the Reserve with a vessel equipped for research and educational missions. This tackled a significant operational gap with the Reserve's current and future research and education programmatic growth. At a community workshop focused on vessel needs and opportunities in western Lake Superior facilitated by the Reserve's CTP Coordinator in the winter of 2015, the community identified the lack of vessels for educational programming as a major gap in this region with partners expressing interest in the development of a shared fleet. Subject to periodic review and approval within NOAA, the agency now supplies a Class I vessel (the *R2512*), fully equipped, for Reserve-identified operators to use for research and education. In exchange for a structured $25,000 reduction in the Reserve's annual operational award per Special Award Conditions, NOAA GLERL maintains ownership, performs major maintenance, and trains Reserve staff and identified operators under NOAA's Small Boat Program. This training includes NOAA science, technical training, risk management, and maritime skills. Under this arrangement, NOAA assumes liability for incidents that occur while the operator is acting within the scope of the agency mission (research and education). In turn, the Reserve provides winterization and marina housing and ensures all operators are trained to meet NOAA's Small Boat Program requirements. In addition to securing a vessel for Reserve use, NOAA GLERL's Marine Superintendent is working with the Reserve on a long-term vessel strategy and engaging western Lake Superior partners in the development of a shared fleet strategy in support of research and education. This shared fleet strategy and Reserve-specific long-term vessel strategy are envisioned to occur within the time frame of this Management Plan. Additionally, the Reserve also owns and operates a flat-bottomed vessel, the *RD Browne*, with a capacity of eight and an outboard motor for shallow water research operations.

The NOAA-owned research vessel, the R2512. (Credit: Lake Superior Reserve)

Communications Plan

The communications plan is designed to support the mission and vision of the Reserve. Sharing science with the general public in a meaningful way is a priority. The Reserve also serves as a community source of information, announcing successes and opportunities through both traditional and social media channels to foster a sense of place and environmental literacy.

All staff members engage in communication to promote their programs and achieve the goals and objectives outlined in the Management Plan. Staff collaborate closely with the Marketing and Communications Service Unit in the Division of Extension NRI to ensure professional, consistent, and effective messaging and materials. During the time frame for this Management Plan, the Reserve will also be completing a whole program strategic communications plan through a contract with experts at ROCA Communications. Employing best practices, outreach, and communication about the work of the Reserve will benefit Lake Superior's estuaries and coastal systems by fostering greater awareness, collaboration, and stewardship behaviors.

Objectives and strategies

OBJECTIVE 1: Increase access to scientific, social, and educational information to raise awareness about Lake Superior estuaries and the communities on their shores.

Strategies:

- Enhance opportunities for shared learning, research, and partnership by promoting Reserve work throughout the UW System and the NERRS network.

- Deliver information through a variety of media, including publications, brochures, videos, social media, advertisements, communications, and events, with messages that reach the appropriate audience.
- Maintain an accessible presence on the web through the use of a regularly updated website that acts as a user-friendly clearinghouse for Reserve research, programs, and facilities.
- Use multi-media platforms including video, photography, and social media to share stories of the Reserve's work, the St. Louis River, and the Lake Superior watershed.
- Use communication practices and styles that are clear and understandable to the intended audience.

Measures:

1. An increase in the reach of Reserve communications, which may include website visitation or social media presence evaluated according to the number of posts and level of visitor engagement.

OBJECTIVE 2: Design and implement a marketing strategy for the Lake Superior Estuarium that responds to partner and community needs.

Strategies:

- Collaborate with the City of Superior, Superior Chamber of Commerce, Travel Wisconsin, and Visit Duluth to promote the Lake Superior Estuarium.
- Use cost-effective advertising to promote the Lake Superior Estuarium and programs as needed.

Measures:

1. Development of a marketing strategy for the Lake Superior Estuarium.
2. Delivery of Lake Superior Estuarium materials to promotional agencies and media outlets across the Twin Ports that include Lake Superior Estuarium hours, programs, and events.

Target audiences

Each program has identified target audiences for programming, outreach, and communications strategies. As programs expand, new audiences will be identified and engaged. Communication tactics and measurements will be tailored to reach relevant audiences for each program, opportunity, event, or research findings. Such audiences include the following:

Education

- Formal PK–12 educators, students, and administrators
- Undergraduate and graduate students
- Adult and youth community members
- Regional visitors
- State and federal legislators

Research and Monitoring

- Federal, First Nations, and State Natural Resource Managers
- State and federal agencies
- NOAA/NERRS
- Granting agencies
- Community partners
- Municipalities
- Research community

Coastal Training

- Municipal and county land use planning and permitting staff
- Consultants who advise local government and private clients on planning issues
- Staff from state regulatory agencies
- Tribal biologists and resource managers
- Professionals who are connected to the planning field
- Researchers and practitioners in social science and health fields
- Emergency responders and disaster planning professionals
- Community partners
- Elected officials

Because the Reserve receives public funds, another critical audience is state and federal legislators. Reserve research, outreach, training, and educational program outcomes and impacts are shared with both state and federal elected officials. These communications are done in coordination with the University of Wisconsin's government and legislative affairs staff and the National Estuarine Research Reserve Association.

Approach

The core messaging themes of the communications plan are oriented toward the Reserve's priority coastal issues: changing climate, water quality and healthy ecosystems, and strengthening community and sense of place. These themes also support the integration of research, education, outreach, and stewardship. Messaging should be consistent so as to reinforce the vision and mission of the Reserve.

Multiple methods are employed to support the communications objectives and strategies. A detailed marketing plan will be developed in collaboration with partners and the NRI Marketing and Communications Services Unit in order to identify the relevant audiences for particular campaigns, intended outcomes and desired actions, and the strategies used to achieve them.

A database of current contacts and a promotional and editorial calendar will be developed as internal tools to support successful media and communications delivery. Database media contacts will include such entities as local and regional radio stations and print media, Friends of the Lake Superior Reserve, RAB organizations and strategic partners, including the Great Lakes Sea Grant Network, NOAA's Great Lakes Environmental Research Laboratory, the Great Lakes Observing System, and the National Estuarine Reserve Research Association. The calendar will serve as a shared resource among staff and partners to create a timeline for the development and release of marketing materials and campaigns.

External communications raise awareness of Reserve programming at key times, such as the opening of the Lake Superior Estuarium, summits and events, and scientific publications and reports. Methods and materials may include the following:

- A monthly e-newsletter
- Promotional print publications, such as brochures, leave-behind publications for congressional staff, event publications, and Summit proceedings
- Reserve website, kept up to date with news and events
- Continued development of a social media following
- Public presentations and interviews
- Publications in academic journals and the popular press, as well as technical reports and white papers

Measurement and evaluation

The effectiveness of the communications plan is assessed according to the strategies and associated measurements outlined above. Success will be measured relative to the type of interaction with the audience and the desired change. Marketing plans will be updated and adapted in response to evaluation of marketing efforts, expanded target audiences, and new media outlets.

Information Technology (IT) Plan

GIS and IT are important to achieving the Lake Superior Reserve mission. Significant improvements can be made to current capacity and capabilities, including some basic modern office software and operational applications, which would improve staff productivity and effectiveness. In addition, access to these capabilities would yield enhanced engagement with target audiences. The Reserve also needs to respond to expectations from the broader community that it will act as a "hub" for a wide variety of data and resources. Staff also can improve their efforts by having access to modern GIS capabilities and appropriate data.

Current situation and proposed solutions

Staff spend significant time formatting data to meet reporting system requirements. This process could be greatly improved by a tracking system that generates reports automatically. The current contact information organization system is also inefficient. A system that can easily be queried and contains demographic characteristics would help to produce required reports. Staff also have no structured system to manage volunteer data but anticipate a strong need as volunteerism grows.

The application of modern GIS capabilities will also advance staff productivity. For example, by collecting both location and subject data in the field simultaneously, GIS mobile applications capture research data more effectively by eliminating time spent on transcribing and formatting data from field sheets into digital analysis tools. The Reserve also currently possesses GIS data and maps that lack an organizational system, though the work on the Site Profile is beginning to address this lack. Data needs to be appropriately and easily accessible to staff and the broader community. In addition, many useful and available GIS datasets (layers) need be acquired to meet staff research needs.

Several spatial datasets need to be utilized to support the Reserve mission. Some of these datasets exist, but not of the quality or spatial extent or currency needed. These include land use and land cover, bathymetry, and surface elevation. Temporal snapshots of these data are also needed, at appropriate capture frequency. Other spatial datasets are important for characterizing the area of interest and modeling existing processes and the impacts of future actions, alternative policies, and climate change. Examples of these datasets range across ecosystem services and

include habitat, water flow; demographics, economics, social and cultural beliefs, values, needs, wants; substrate, water circulation, wetlands, wild rice habitat, sediment data, sediment deposition zones, erosion, impervious surfaces, climate data, pipeline locations, storm water and sewerage sheds, point and nonpoint sources of pollution, and more.

The Reserve is poised to fulfill a specific community resource need identified by Reserve partners. A "hub" of valuable data and resources that the public can easily access, use, and contribute to, is critical for facilitating multiple partner project planning, fostering research collaboration, and engaging communities. Some valuable resources include tabular and spatial data, research project details, and area contact information. This resource will not solely be a well-stewarded data repository, but also an active directory and reference catalog, linking users to outside authoritative resources. It will require the incorporation of appropriate metadata and basic capabilities to visualize, query, analyze, and produce finished presentation products. This resource "hub" will fulfill the expectation of the community for the Reserve to be an access point for all pertinent data related to the St. Louis River Estuary and surrounding watersheds.

Near-term plan

To build out the technological systems needed to increase efficiency and create a resource "hub" as described, the Reserve will pursue several near-term activities. The Reserve needs to engage with UW–Madison, UW–Madison Division of Extension, UWS, and UW System IT staff to arrange professional GIS/IT support. This support must consist of 1) day-to-day IT needs of staff, 2) acquiring GIS tools and data to meet Reserve objectives, 3) establishing and stewarding the resource "hub," and 4) training for staff to efficiently use new resources, technology, and data. To accomplish these goals, the Reserve will explore convening a steering committee to help identify, prioritize, and advise on IT and GIS efforts. It is likely that the Reserve's Site Profile will simultaneously provide a mechanism, venue, and architectural structure upon which to build core Reserve data, GIS, and information into a publicly accessible platform.

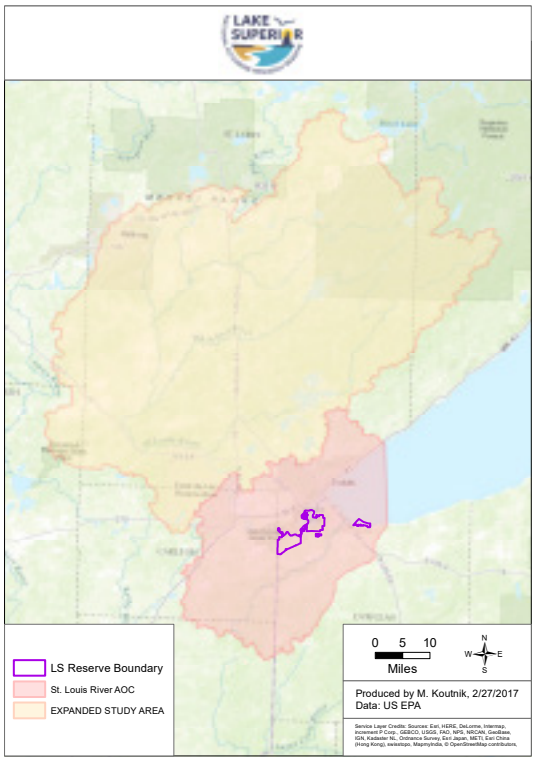
Rivers2Lake teachers Val Poynter and Kat Nistler help researcher Kait Reinl sample algae. (Credit: Deanna Erickson)

RESOURCE PROTECTION PLAN

Restoration Activities

The St. Louis River AOC (see Map 6.1), located on the western arm of Lake Superior and including the twin port cities of Duluth, Minnesota, and Superior, Wisconsin, was listed as one of 43 Great Lakes AOCs in 1987.[57] The Lake Superior Reserve is encompassed by the AOC boundary. Several habitat protection and restoration projects that have been completed across the AOC since its designation also protect Reserve resources. These efforts include the protection of 6,500 acres of geologically sensitive habitat in the St. Louis and Red River Streambank Protection Area, colonial waterbird habitat creation at Wisconsin Point and protection of more than 4,500 acres in two Wisconsin SNAs within the Pokegama River watershed.[58]

The majority of the BUIs listed for the St. Louis River AOC are due to historic habitat loss from the extensive filling of wetlands and dredging of shallow aquatic habitat, and releases of waste materials that contaminated the sediments and water in the estuary.[59] The states are responsible for implementing Remedial Action Plans to remove the impairments and delist the St. Louis River as an AOC.



Map 6.1. St. Louis River Area of Concern (Appendix A)

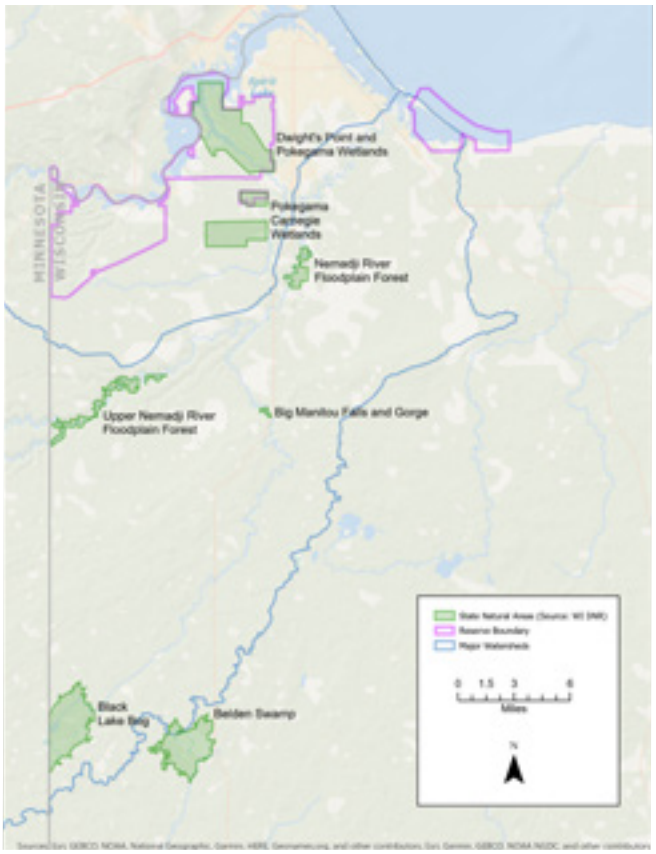
The 2020 St. Louis River AOC Remedial Action Plan anticipates delisting the AOC sometime after 2025.[60] Action items leading to BUI removal may include restoration and remediation projects, monitoring and assessment projects, and stakeholder engagement processes. Most of the actions included in the 2020 Remedial Action Plan focus on the St. Louis River below Fond du Lac Dam, Crawford Creek, and the Nemadji River watershed, as they represent those portions of the AOC most impacted by historical actions.[61] These areas are all within the targeted watershed boundaries of the Reserve.

Management Authorities

The Lake Superior Reserve consists of existing public property, which has an established system of authorities and management plans to ensure the protection of estuarine and watershed resources. No new authorities have been proposed since the designation of the Reserve. This section describes the existing protection, restoration, and manipulations of estuarine resources in the St. Louis River Estuary.

The land within the Reserve boundaries is entirely publicly owned and is protected by authorities specific to each of the landowners. These authorities provide the required long-term protection of the Reserve's estuarine resources necessary to ensure a stable environment for research. The water area within the boundaries is protected by state and local laws governing recreational and commercial uses and public access. The Lake Superior Chippewa retain treaty rights in their ceded territories. Specifically, these are off-reservation hunting, fishing, and gathering rights in lands the Anishinabe ceded to the United States in the Treaties of 1836, 1837, 1842, and 1854. These rights, which the Anishinabe have always had, were reserved by the bands and guaranteed by the United States to ensure that the tribes could meet subsistence, economic, cultural, spiritual, and medicinal needs. None of these uses are inconsistent with the purposes of the Reserve, and will continue.

Two portions of the Reserve are designated SNAs (see Map 6.2). These SNAs protect outstanding examples of native natural communities and provide refuges for rare plants and animals.[62] Designation confers a significant level of land protection through state statutes, administrative rules, and guidelines. A higher level of protection is afforded by legal dedication of SNAs through Articles of Dedication, a special kind of perpetual conservation easement. Laws establishing the SNA Program are found in Wisconsin Statutes Sections 23.27, 23.28, and 23.29. Rules governing the use of SNAs are



Map 6.2. State Natural Areas in or near the Lake Superior Reserve (Appendix A)

found in Wisconsin Administrative Code, Chapter NR 45. The WDNR states that:

Public use of SNAs is channeled in two directions: scientific research and compatible recreation. Natural areas serve as excellent outdoor laboratories for environmental education and formal research on natural communities and their component species. A permit issued by the DNR is required to conduct studies or collect specimens on SNAs. Natural areas are not appropriate for intensive recreation such as camping or mountain biking, but they can accommodate low-impact activities such as hiking, bird watching, and nature study. As such, many SNAs contain few or no amenities such as parking areas, restrooms, or maintained trails.[63]

Surveillance and enforcement of properties within the Reserve are the responsibility of the respective landowners, as well as the community law enforcement departments of the City of Superior, Douglas County, Great Lakes Indian Fish & Wildlife Commission, UWS, and the WDNR. These agencies will continue to be responsible for enforcement in their respective jurisdictions. Both Lake Superior and the St. Louis River are subject to the protections of the public trust

doctrine as outlined in the State Constitution. The water areas of the Reserve are managed under this authority.

Landowner Policies and Regulations

Red River Breaks

The approximately 6,926-acre Red River Breaks portion of the Reserve contains the 6,703-acre St. Louis River Streambank Protection Area owned by the WDNR, including all adjacent islands and wetlands, and the area of the St. Louis River within Wisconsin's boundary. The St. Louis and Red River Streambank Protection Area was purchased to prevent erosion and protect the St. Louis River walleye spawning area based on a St. Louis and Red River Streambank Protection Area Feasibility Study[64]. The property is managed consistent with these purposes. There are no developed public access facilities on this property, although it is open for general low-impact recreational activities. The Streambank Protection Program is part of the Knowles-Nelson Stewardship Program for land acquisition. The WDNR also regulates and enforces the public trust doctrine in the water areas of the Reserve.[65]

There are no SNAs designated on the property.[66] Timber management is a low priority, but harvests are allowed outside the deferral areas, which include the Red River Breaks Boreal Forest, and Hardwood Swamp, St. Louis River Dry-Mesic Forest and the Fond du Lac Island Marshes. The management priorities for this property are to protect the rivers and their tributaries from siltation by bank erosion by not allowing motorized vehicles or intensive development. The restrictions on the allowable uses of this land include the following:[67]

- Alteration of vegetative cover or other natural features unless the department specifically approves the alteration.
- Planting or production of agricultural crops unless the department specifically approves the planting or production for wildlife management purposes.
- Mowing, grazing, or spraying the land with chemicals, except as necessary to comply with noxious weed control laws or to control pests on an emergency basis when such control is necessary to protect public health or unless the department specifically approves the mowing, grazing, or spraying.

Access to the protection area by land is extremely limited. Walk-in access is available from the south side of the property. The northern boundary of the property can be accessed by boat. The DNR operates a boat landing approximately 0.25 miles downstream in the Village of Oliver.[68] Recreation opportunities allowed include hunting, trapping, hiking, cross-country skiing, wildlife viewing, fishing, bird watching, swimming, berry picking, and canoeing.

Pokegama Carnegie Wetlands

The approximately 226-acre Pokegama Carnegie Wetlands SNA is located south of the SMF and is composed of two separate components. The Reserve boundaries include the smaller, northern component, which is owned and managed by the WDNR.

Allowable activities in the SNA include hiking, hunting, fishing, trapping, and skiing. Prohibited activities include horseback riding and rock climbing, and vehicles such as bicycles, ATVs, aircraft, and snowmobiles, except on trails and roads designated for their use. Collecting of plants (including fruits, nuts, or edible plant parts), animals, fungi, rocks, minerals, fossils, archaeological artifacts, soil, downed wood, or any other natural material (alive or dead) is not allowed. Camping and campfires are not allowed, nor is geocaching.[69]

This property is subject to a pipeline easement and is crossed by power lines along utility easements.

Pokegama Bay

The Pokegama Bay portion of the Reserve is approximately 6,723 acres, and it contains the SMF owned by the City of Superior and the area identified as Oliver Marsh owned by Douglas County.

Since the SMF's creation in 1949, it has evolved to become an important ecological, recreational, and open space natural resource for the City of Superior, and the region as a whole. In 1992, the city passed a referendum creating the Municipal Forest Protection Charter Ordinance:

The intent of this ordinance is to set aside and preserve for recreational and education activities and facilities, open for the participation and enjoyment of all citizens, the land and natural resources identified as the SMF. To protect this goal it is the intent of the ordinance to exclude conflicting activities and uses. No person shall engage in any of the following activities within the Municipal Forest:

a. Depositing any debris, garbage, rock, sand, soil or other materials;
b. Moving or removing sand, soil, clay, rock, or gravel;
c. Constructing any structure for use industrially, commercially, or as a residential dwelling;
d. Except that these prohibitions shall not be construed to prohibit the use or maintenance of any existing roads and trails for public recreational purposes.

Following the creation of the Charter Ordinance, the SMF Committee prepared a management plan to guide the preservation of this unique public resource. A system of paved and unpaved trails has been developed to accommodate public access to the forest. The paved Millennium Trail is 1.6 miles long and is designed for bicycling, inline skating, and walking. It is also wheelchair accessible. An outdoor classroom is located along the Millennium Trail for use by local schools and other groups for outdoor and environmental education programs. The unpaved trail system includes 16 miles of groomed cross-country ski trails and more than 12 miles of snowmobile, winter all-terrain vehicle (ATV) and ski trails, including a shared trail for snowmobiling, ATV riding, and skijoring (skiing with dogs). City permits are required for skiing and skijoring. Summer ATV use is only allowed on McClure's Landing Road. Unimproved boat access to Pokegama Bay is provided at a site along Billings Drive. See Appendix A for a map of the SMF trail system. Additional allowable uses of the SMF include archery target practice within the designated archery course, and archery hunting during the state archery hunting season. A state license and city permit are required for archery hunting.[70] Waterfowl hunting during state hunting seasons is allowed within the waters of the St. Louis River south of the Arrowhead Pier boat launch and within the city.

The 2,620-acre Dwight's Point and Pokegama Wetlands SNA is located entirely within the SMF.[71] It is a designated SNA established through agreement (Appendix B) between the WDNR and City of Superior. Public use is limited to hiking or cross-country skiing.[72] Vehicles may only access the area on designated trails, roads, and parking areas. Other activities such as horse riding, dog mushing, or dog skijoring are considered on a case-by-case basis for use on vehicle routes only. Hunting with firearms is prohibited and follows the rules of the SMF; bow hunting for white-tailed deer is allowed. The SNA can be used for research and education purposes, with permission from the city and WDNR.

Oliver Marsh is managed by the Douglas County Forestry Department. It is designated as "special use lands" under the state's County Forest Law, which recognizes the value of the land for conservation, rather than timber production.

Wisconsin Statute 28.11(4)(c)

If the department finds that the lands are not suited primarily for timber production and do not otherwise qualify for entry under par. 28.11(4)(b) but that they are suitable for scenic, outdoor recreation, public hunting and fishing, water conservation and other multiple-use purposes it shall make an order of entry designating such lands as "county special-use lands".

The Douglas County Forest Comprehensive Land-Use Plan further describes the management objectives for the class of properties called "Special Management Areas," which includes Oliver Marsh.[73] Public access and use of Oliver Marsh, as well as additional Douglas County lands adjacent to Wisconsin Point and the St. Louis and Red River Streambank Protection Area, are regulated by Douglas County ordinances.[74] Douglas County maintains a system of winter snowmobile and ATV trails, and summer ATV trails (Appendix 106). Winter trails are maintained within the SMF and along the southern boundary of the St. Louis and Red River Streambank Protection Area.

Within the SNA, purple loosestrife, carp, and river ruffe are known problem species.[75] Other management challenges include boundary identification, trail and road maintenance, parking area maintenance, preventing illegal dumping, wetland mitigation site management, ATV use, and maintenance of camping areas.

Wisconsin Point

The Reserve boundaries contain approximately 2,822 acres on Wisconsin Point, including areas of the 2,300-acre Wisconsin Point Management Area (WPMA) owned by the City of Superior, the WDNR, Douglas County, and UWS. Water portions of Allouez Bay and Lake Superior waters bordering the buffer area are also within the Reserve boundary at Wisconsin Point.

City of Superior ownership covers approximately 25 percent of the WPMA (571.9 acres), and includes the majority of the sand spit, Moccasin Mike Landfill, and several other small tracts. Over 70 percent of the WPMA is owned by Douglas County (1,619.4 acres). Other ownership interests

include the University of Wisconsin System, which owns and manages 60 acres near the mouth of Dutchman's Creek. The USCG formerly owned 18.2 acres near the end of Wisconsin Point; however, ownership and management of this property is transitioning to the Fond Du Lac Band of Lake Superior Chippewa. This portion of Wisconsin Point does not fall within the Reserve boundary. The State of Wisconsin also owns a small, nine-acre tract adjacent to the Fond du Lac Band property near the end of Wisconsin Point. These holdings account for less than two percent of the overall land base within the WPMA.

The City of Superior actively manages the city-owned lands on the Wisconsin Point peninsula as a public outdoor recreation area. Public use is governed by the City's municipal code and management responsibility is delegated to the Parks and Recreation Division. As outlined in the City's Master Park Plan (2010), Wisconsin Point is managed as an "open space" area. Open space is defined by the plan as

A parcel or area of land, or land and water, other than a dedicated canal, within the site and designed and intended for the use or enjoyment of residents living within the zone or development area. Common open space may contain such complementary structures and improvements as are necessary and appropriate for the benefit and enjoyment of the residents.

Lands outside of the open space boundary but within the WPMA are currently not actively managed as public recreational resources. While the public does utilize these lands for recreational purposes, no management framework or plan exists to guide public use and development in these areas. This is not to imply that unrestricted public use and access is permissible in these areas, however, as the decision to allow public access/use is left to the individual property owner. In some cases, legal instruments tied to property deeds such as restrictive covenants and easements may impact allowable uses. In August of 2007, the Douglas County Board approved a resolution (Resolution #64-07) creating a "grant of covenants" for several county-owned parcels within the WPMA. The resolution establishes a Conservancy Area to maintain and improve ecological and aesthetic values. The covenants restrict land uses, prohibit development, and limit land-disturbing activities to those which are consistent with the protection of the area's natural resources. However, the county reserves the right to allow the City of Superior to construct a paved, nonmotorized recreational trail through the Conservancy Area. The covenants also do not require the county to allow the general public to enter upon or use lands within the Conservancy Area.

The UWS owns and manages two parcels (61 acres) near the mouth of Dutchman's Creek. These parcels were designated as the Nelson Outdoor Laboratory in 2007. By virtue of an existing operating agreement, this area is to be used to enhance the instruction, research, and public service missions of the university. An unimproved public access site located at the mouth of Dutchman Creek is used for swimming and beach access, and can be used as a canoe or kayak launch. Activities at the Nelson Outdoor Laboratory are governed by local ordinances and state administrative rules as well as UWS campus regulations. These lands are also subject to UW System use and conduct provisions as defined in UW System Administrative Code Chapter 18.

The federal government formerly owned and managed 18.2 acres near the end of the Wisconsin Point peninsula. This property houses two dwellings, communications equipment, a maintenance garage, and a dock that were part of a former U.S. lighthouse station built in 1913. In 2018, this property was purchased by the Fond du Lac Band of Lake Superior Chippewa and is undergoing transfer to federal trust land.

Outdoor recreation in the WPMA consists of nonmotorized, land-based activities such as hiking, bicycling, swimming, birdwatching, picnicking, and wildlife viewing. The location of the resource along the coast of Lake Superior affords many additional opportunities for water-based recreational activities such as swimming, boating, and paddle sports. City of Superior rules and regulations state that motor vehicle traffic and parking is prohibited between the hours of 11:00 p.m. and 4:00 a.m., including any parking areas, beyond Lot #1, and also all of Moccasin Mike Road and Lakeshore Drive, except during the spring smelt run season as defined by the Parks and Recreation Department; glass beverage containers are prohibited; fires may not be started closer than 10 feet from the nearest plant life; camping is not allowed between the hours or 10:30 p.m. and 5:00 a.m. except during the spring smelt run; and horseback riding is not allowed.

The city manages Wisconsin Point as a recreational area of the city parks system. Limited daytime use of the park is permitted, as well as nighttime fishing for smelt (during which time camping is also allowed). Waterfowl hunting is allowed from the waters of Lake Superior and Allouez Bay, which surround Wisconsin Point. Archery hunting is allowed during the state archery hunting season. A state

license and city permit are required for archery hunting. Other allowable uses include waterfowl hunting within the waters of Allouez Bay and Lake Superior during state hunting seasons. Boating is regulated by state laws and by additional city ordinances that establish speed restrictions on Allouez Bay.

The Moccasin Mike Landfill is an operational 33-acre sanitary landfill site within the WPMA boundary, which is estimated to reach full capacity around 2025, at which point it will be closed. The site is currently closed to public recreation.

The Moccasin Mike Wetland Preservation Area is based on conservancy agreements (in perpetuity) established between City of Superior and Douglas County, and agreed upon by U.S. Army Corps of Engineers (USACE) and WDNR. The area was set aside for preservation to compensate for the loss of wetlands resulting from development in Superior (wetland mitigation). Lands are permanently preserved through conservancy agreement and restrictive covenants preclude future development. Lands were excluded for the construction of a future nonmotorized recreational trail.

There are a number of ongoing projects and management activities within the WPMA that affect human use and access to specific areas.

Piping plover habitat:

- **Shafer's Beach** – Longstanding efforts at Shafer's Beach to protect, improve, and restore piping plover nesting habitat to Wisconsin Point and the St. Louis River Estuary have shifted in recent years to promote the location as stopover habitat rather than nesting habitat for plovers. Shafer's Beach is located to the east near the base of Wisconsin Point. Easements were set up in 2010 and 2011 to protect this Douglas County property for piping plover habitat. Users are discouraged from accessing the plover project area during the nesting season. Douglas County, the WDNR, the USACE, Wisconsin Sea Grant, and many other local partners have all been involved in evaluating the use of beach nourishment to widen the beach and make the existing habitat at Shafer's Beach more appealing to nesting piping plovers. This had been a priority action listed in the St. Louis River AOC Remedial Action Plan.[76] However, at this time the location is being pursued for stopover habitat only, not as nesting habitat.[77] Nesting habitat efforts at Wisconsin Point are now mainly focused on the Allouez Bay side.
- **Allouez Bay** – The Bird Sanctuary is a small property owned by WDNR near the end of Wisconsin Point on the bay side. This property was set aside in 1989 for piping plover. Through a partnership among the SLRA, U.S. Fish and Wildlife Service, and WDNR, this property is monitored and managed for piping plover habitat. Annually, the site is prepared for the nesting season. The beach is resloped to provide a gentle incline to allow plover's water access along the beach, and vegetation and driftwood is removed. This site is closed to the public during nesting season. In 2020, a piping plover habitat restoration project was completed using dredge materials to restore shoreline and piping plover nesting and foraging habitat along 1,700 feet of shoreline at the Bird Sanctuary.[78]

Native vegetation restoration:

Two seeding areas have been established in Allouez Bay to restore wild rice beds. Small protective exclosures have been installed to evaluate the browsing pressure from geese, muskrats, and carp.

Sensitive dune restoration and preservation:

The NOAA has partnered with the City of Superior, Wisconsin Department of Administration Coastal Management Program, and WDNR to pursue a dune restoration and access improvement project on Wisconsin Point. The project is listed as a priority in the St. Louis River AOC Remedial Action Plan and is necessary for delisting.[79] The City of Superior received a Wisconsin Coastal Management grant for the engineering phase of the Wisconsin Point Dune Restoration Project (now called the Wisconsin Point Restoration and Access Improvement Project), which commenced in 2016. In July 2017, it was announced that the project would receive additional Wisconsin Coastal Management funding to finance the construction phase. The Wisconsin Point Restoration and Access Improvement Project includes development of infrastructure to allow public access and protect the sensitive dunes as well as the historical sites on the point. Parking areas will be consolidated from more than 20 turnouts to approximately six parking areas, and the dunes will be restored and revegetated through the removal of invasive plant species and the incorporation of native plantings. ADA-compliant boardwalks will be installed over the dunes for beach access across the sensitive ecosystem. Also, specific stretches of shoreline along Allouez Bay will be stabilized. The majority of work on the construction phase of the project is expected to be completed in 2019.[80]

No statistical evidence exists to quantify visitor usage within the WPMA. To date, no formal visitor usage survey has been completed. Much of what is known about visitor usage and recreational demand is anecdotal in nature and qualitative. Vehicular traffic count estimates from the Wisconsin Department of Transportation indicate that the average daily traffic on Wisconsin Point Road is 250 vehicles per day and 390 vehicles per day on Moccasin Mike Road.

Soils within the project area are generally not well suited for development purposes. Ponding of water, shallow depth to water table, permeability, and shrink-swell properties severely restrict the ability of these soils to support building development, local roads and streets, and underground infrastructure.

Recreational development potential may also be limited due to soil conditions. Developed camping areas would likely not be supported due to saturation conditions, ponding, flooding, and slow water movement through the clayey soils. The sandy soils of Wisconsin Point would also be limited for this use. Project area soils are generally rated as "very limited" for the development of recreational paths and trails. The upland clays are subject to ponding and are highly erodible, especially along the steeper slopes. Clay loam soils adjacent to upland ravines may support limited trail development, except on the steeper slopes. Soil ratings area also generally classified as "very limited" for the development of picnic areas and playgrounds.

Invasive plants and noxious weeds pose a serious ecological threat and management challenge in the WPMA. While the list of plant occurrences on Wisconsin Point has been documented over time, a comprehensive survey of invasive species has not been completed. In 2011, a baseline survey of invasive plants on Wisconsin Point was conducted by the UWS.[81] Survey findings indicate that several invasive plant species are present on Wisconsin Point. Invasives are very problematic near the tip of Wisconsin Point and are encroaching on the sensitive dune habitats to the southeast of La Pointe Avenue and adjacent to most parking lots. The parking lots and trails serve as pathways for invasive species to reach the beach.

The Wisconsin Point Soil Stockpile Area is a former demolition landfill on the west side of Wisconsin Point Road, which was active until the 1980s. There is also an historic tree dump site on the east side of Wisconsin Point Road that is now closed/abandoned. These sites are actively decomposing and surfaces may be unstable for many years. Any land uses proposed for these landfill sites would require notification and approval by the Solid Waste Division of the WDNR. The site of a former (1950s–1970s) municipal solid-waste landfill has been clay capped and monitoring wells have been installed to detect leakage. Land development, agricultural uses, and other land-disturbing activities are prohibited on this site; however, limited, low-impact uses may be allowable, provided the cap material is not disturbed. Any future uses must be approved by the Solid Waste Division of the WDNR.

There are 35 acres of private in-holdings within the WPMA. While this Management Plan does not cover private holdings, these parcels could potentially complicate management in some portions of the WPMA. The ability of the public to access and use these properties is at the sole discretion of the property owners, and many of the parcels are located wholly or partially within wetlands.

Existing resource manipulations

Existing resource manipulations largely consist of utility facilities and corridors, and activities associated with the Port of Duluth-Superior.

Utility corridors

Buried petroleum product pipelines cross the St. Louis River in the vicinity of the Village of Oliver, and are located in corridors within the St. Louis and Red River Streambank Protection Area and the Pokegama Carnegie SNA. These pipelines are operated by Enbridge Energy Partners. An electricity transmission line corridor crosses the Pokegama Carnegie SNA, operated by American Transmission Company.

Railroads

A short segment of Burlington Northern railroad crosses the southwest corner of the St. Louis and Red River Streambank Protection Area. Many other railroads and rail yard facilities are located in the vicinity of the Reserve, due to the conglomeration of transportation and shipping facilities at the Port of Duluth-Superior. While not formally a part of the Reserve boundary, railroads are an important element of the landscape and are referenced here because of the history of train derailments and spills in this region within the St. Louis River watershed and in the coastal area. Reserve staff have responded to partner requests for support and information following such incidents. In addition, one

potential pathway for the movement of terrestrial invasive and non-native species is along the railroad tracks—a fact which is often discussed by researchers and managers in the region.

Port of Duluth-Superior

The lower St. Louis River Estuary has been highly modified from its presettlement form and function through the development of extensive port facilities and harbor improvements. The Port of Duluth-Superior is the largest and busiest port on the Great Lakes.[82] The USACE maintains a navigation channel that extends through the Superior Entry at the end of Wisconsin Point, through the harbor area, and upriver to Spirit Lake. The main channel is maintained to 27 feet to accommodate the largest cargo ships. Dredging has an obvious effect on the lower estuary, but this is limited mostly to the commercial and industrial areas of the port.

The 2016 Duluth-Superior Port Land Use Plan guides public and private land development in the working waterfront of the Duluth-Superior port.[83] The Port Land Use Plan supports four goals, one of which is to protect and enhance the economic, ecological, and recreational value of the harbor. It recognizes the value of critical aquatic and terrestrial habitat as part of the complex harbor system. Indirect impacts on the estuarine resources related to the port activities include aquatic invasive species, introduced and spread through water ballast in ships. Of the 87 non-native species introduced to Lake Superior since 1883, 35 percent arrived in ballast water. Significant non-native, invasive species include Eurasian ruffe, round goby, zebra mussel, quagga mussel, and spiny water flea.[84]

The Reserve boundaries are located upriver and outside the USACE project area; it therefore does not include the port outright. It is important, however, to reference the port in this Management Plan. The port is represented on the RAB, and is a frequent partner in research and educational programming. The Reserve frequently makes use of the Superior Entry adjacent to Wisconsin Point and the Reserve boundary includes a portion of nearshore Lake Superior.

Students in the River2Lake program paddle out into Pokegama Bay. (Credit: Lake Superior Reserve)

PUBLIC ACCESS AND VISITOR USE PLAN

Objectives

OBJECTIVE 1: Work with landowning partners to provide access for scientific research, education, and recreation to improve understanding and enjoyment of the Lake Superior watershed and to enhance a sense of place, while balancing the protection of Reserve resources.

OBJECTIVE 2: Develop programs that increase awareness of access opportunities and encourage responsible use of Reserve resources by all members of the community.

Current Access

Current public access sites and resources within the Reserve are highlighted in Table 7.1 for each component of the Lake Superior Reserve. More broadly, public access around the estuary and river for both the Wisconsin and Minnesota sides was highlighted in the publication of the NOAA-funded St. Louis River Public Access Guide, which was supported under the St. Louis River Estuary Habitat Blueprint Focus Area. Public access to the Reserve will be determined by, and compatible with, the public access policy of each of the agencies having title to the lands in question (i.e., UWS, City of Superior, Douglas County, and WDNR). Specific policies for access for education, stewardship, research, and monitoring will be determined through coordination with each of the Reserve partners and the RAB.

Tribal treaty rights, including access to ceded lands for hunting, fishing, and gathering are not changed or impeded in any way by the Lake Superior Reserve. Band members continue to exercise their usufruct rights on Reserve lands as they did before the designation, and management and enforcement of treaty resources will continue under tribal law.

St. Louis River Estuary access

The St. Louis River Estuary is a large system with various water access points in both Wisconsin and Minnesota.[85] The following locations are in or near the Reserve boundaries and offer a great introduction to the estuary.

Map 7.1. Map of Reserve public water access points

Wisconsin Point

Wisconsin Point and Allouez Bay are wild rice waters with no wake during June and July. There is access to Lake Superior, Wisconsin Point, and the mouths of Bear and Bluff creeks, as well as the southeastern portion of Park Point in Minnesota.

Pokegama Bay

Pokegama Bay contains wild rice and has no wake during June and July. An unimproved launch into the Pokegama River provides access to the river with further access to Clough Island at the mouth, where the river merges with the St. Louis.

Barker's Island

Barker's Island offers an improved launch, small beach, public dock, and access to Lake Superior and Superior Bay. Charter fishing operations leave from this location. The City of Superior offers free day docking on Superior Bay behind the Lake Superior Estuarium. Nearby Barkers Island Marina has 400 docks and is the largest marina on Lake Superior.

Docks

- The Arrowhead Fishing Pier and Boat Launch (Belknap Avenue, Superior, WI) is an NOAA-funded pier that offers great views of the middle estuary and Minnesota hillside.
- Chambers Grove (Fond du Lac neighborhood, Duluth, MN), a park restored in 2018, features a play area, boat launch, and fishing access.
- Munger Landing (Riverside neighborhood, Duluth, MN)

offers plentiful parking, an improved boat launch, portable restrooms, and a fishing dock across the River from Spirit Island and Clough Island.

Hiking

- Millennium Trail – A flat, 10-foot wide, out-and-back blacktop trail through tall pines in the SMF.
- Pokegama Trail – Primarily a mountain bike trail; these 6+ miles are designated multi-use.
- Superior Skiing/Skijoring Trails – The City of Superior grooms 26km of trail for skiing in the SMF. See the city website for trail locations and call the grooming hotline at (715) 395-7299 before you go.
- Waabizheshikana: The Marten Trail (Duluth, MN) – This five-mile gravel trail hugs the Minnesota shoreline in the upper estuary. Spot birds, wildlife, and even a shipwreck.

Overlooks

- Wisconsin Point – The beach at Wisconsin Point offers a panoramic overview of the Wisconsin and Minnesota shoreline.
- Ely's Peak – Access this steep overlook from the Superior Hiking Trail, which runs from Jay Cooke State Park to the Canadian border, on Duluth's Midway Road.

Red River Breaks

Access to the protection area by land is extremely limited. Walk-in access is available from the south side of the property. The northern boundary of the property can be accessed by boat. The WDNR operates a boat landing approximately 0.25 miles downstream in the Village of Oliver. A county-owned ATV trail provides access to the southern boundary of the property; however, snowmobile and ATV use is not permitted on the state-owned property itself. Access to the northern boundary of the property is typically by boat. The property can be accessed from a segment of the North Country National Scenic Trail, administered by the National Park Service, which crosses the southwest part of the property.

	Unimproved boat access	Vehicle access	Fishing	Wildlife viewing	Archery range	Deer hunting-bow	Deer hunting-gun	Small game hunting	Waterfowl hunting	Trapping	Wild edibles	Sand Beach	Cross country skiing	Hiking	Biking	Horseback riding	Snowmobiling	ATVs	Access for Ability impaired
Red River Breaks																			
WDNR (St. Louis and Red River Streambank Protection Area)			●	●		●	●	●	●	●	●		●	●					
Douglas County			●	●		●	●	●	●	●	●		●	●					
Pokegama Carnegie Wetlands																			
WDNR (Pokegama-Carnegie SNA)			●	●		●	●	●	●	●	●		●	●					
Pokegama Bay																			
City of Superior (SMF)	●	●	●	●	●	●		●	●		●		●	●	●	●	●	●	●
Douglas County (Oliver Marsh)						●	●	●	●										
Wisconsin Point																			
City of Superior	●	●	●	●					●			●		●					●
WDNR				●					●										
Douglas County						●	●	●											
UWS (Nelson Outdoor Laboratory)		●		●															

Table 7.1. Lake Superior Reserve public access and use

Pokegama Carnegie Wetlands

Very few SNAs have public facilities, but nearly all are open for a variety of recreational activities. Generally, there are no picnic areas, restrooms, or other developments. Parking lots or designated parking areas are noted on individual SNA pages and maps. Trails, if present, are typically undesignated footpaths. Horseback riding, rock climbing, vehicles (including bicycles), collecting plants, camping, campfires, and geocaching are not allowed in SNAs. Collecting for scientific research requires a permit issued by the WDNR.

Pokegama Bay

A map of the SMF existing trails and proposed improvements can be found on the City of Superior Parks, Recreation and Forestry website.[86] Allowable activities include hiking and mountain biking, archery hunting and use of the archery range, cross-country skiing, skijoring, snowshoeing, snowmobiling and use of ATV trails (winter months only), wildlife and plants, canoeing, kayaking and boating, and horseback riding, which is only allowed on Billings Drive and 42nd St. (riding on trails is not allowed). The outdoor classroom is located off the Millennium Trail (less than a mile from the trailhead and immediately west of the snowmobile trail) and features 15 six-foot benches (seats 45) and is handicap accessible.

Wisconsin Point

Motor vehicle traffic and parking is prohibited between the hours of 11:00 p.m. and 4:00 a.m. on Wisconsin Point Road, including any parking areas, beyond Lot #1, and also all of Moccasin Mike Road and Lakeshore Drive, except during the spring smelt run season as defined by the Parks and Recreation Department. Glass beverage containers are prohibited. Fires may not be started closer than 10 feet from the nearest plant life. Camping is not allowed between the hours of 10:30 p.m. and 5:00 a.m. except during the spring smelt run. Horseback riding is not allowed on Wisconsin Point. A trail map of Wisconsin Point can be found on the City of Superior website.[87]

The completion of the Wisconsin Point Restoration and Access Improvement Project, projected for 2019, will establish new infrastructure that improves public access to the beach area while simultaneously protecting sensitive dune areas. The project will also consolidate parking areas along the roadway, but will add more overall parking stalls.

In August of 2007, the Douglas County Board approved a resolution (Resolution #64-07) creating a "grant of covenants" for several county-owned parcels within the WPMA. The resolution establishes a Conservancy Area to maintain and improve ecological and aesthetic values. The covenants restrict land uses, prohibit development, and limit land-disturbing activities to those that are consistent with the protection of the area's natural resources. However, the county reserves the right to allow the City of Superior to construct a paved, nonmotorized recreational trail through the Conservancy Area. The covenants also do not require the county to allow the general public to enter upon or use lands within the Conservancy Area.

In 2018, the Douglas County board approved by resolution (Resolution #51-18) the granting of an easement to the City of Superior for extension of the Osaugie Trail. Currently, the only access to Wisconsin Point for pedestrians or bikers is along Moccasin Mike Road and Wisconsin Point Road, which have minimal shoulders and do not provide safe nonmotorized access. The Wisconsin Point Area Plan recommends the addition of a nonmotorized recreational trail linking the Tri-County Corridor/Osaugie Trail with Wisconsin Point Road. As of 2018, the City of Superior has initiated the exploration of a trail route, permitting procedure, survey, and delineation work, and cost estimates for a crushed concrete base trail. No trail construction plans have been approved or initiated as of yet.[88]

Research program access

The research program assists researchers (including undergraduate, graduate, and high school students) in accessing areas in the St. Louis River Estuary for research purposes. This includes access by boat, canoe, kayak, paddleboard, on foot, and by car. The Research Coordinator also assists researchers in selecting relevant sites based on the needs of the research project.

Education program access

The Rivers2Lake student programs and TOTE teacher professional development during the Summer Institute offer access to Pokegama Bay, Wisconsin Point, and Barker's Island. The unimproved boat launch at Pokegama Bay is regularly used for canoeing, and ecology and research lessons. Programming at Wisconsin Point includes canoe trips on Allouez Bay, visits to the Ojibwe cemetery site, dune study, and water quality comparisons between the Lake and the estuary. Barker's Island is used for lab tours for students and teachers, use of the Lake Superior Estuarium building for classes, public programs and teacher professional

development, and water quality monitoring and data collection with students on the docks. The River Rovers Early Childhood Nature Play Group meets at the Estuarium and takes place on Barker's Island, as well as occasionally in Billings Park in Superior. Community education and other public programs provide access through Wisconsin Point, Pokegama Bay, the Estuarium and Barker's Island. Occasionally the education program hosts canoe trips on the upper estuary and the Red River, which is in the Red River Breaks section of the Reserve.

Public Access Challenges and Improvements

The limited access to Red River Breaks makes it difficult to develop educational programming and to provide access opportunities on the property. Rustic improvements to the boat launch at Pokegama Bay would also make the location more accessible for researchers, students, educators, and the public. Directional and interpretive signage in all components of the Reserve would increase accessibility for visitors and community members.

Access improvements to the Wisconsin Point area along Dutchman's Creek, on parcels owned by the City of Superior, Douglas County and UW-Superior, may provide increased research and education programming opportunities in this unique coastal area. A proposed extension of the Bear Creek trail, initially constructed in 2019, would improve Reserve access here.

Other access improvements in the Dutchman's Creek and Wisconsin Point area may include amenities such as an outdoor classroom, rustic bathroom facilities, parking, interpretive signage and trails. Such amenities could provide support for undergraduate research and learning opportunities for students and faculty at UW-Superior, as well as K-12 students and community members where such use is congruent with landholder regulations, interests and constituent needs. Ecological restoration needs in this area could also be supported by the Lake Superior Reserve, as requested by landholding partners.

View of the SS Meteor Museum and Reserve office on Barker's Island. (Credit: Terry White)

FACILITY DEVELOPMENT AND IMPROVEMENT PLAN

Purpose of Facilities and Construction Philosophies

The Reserve offices, laboratory, and Lake Superior Estuarium in Superior, Wisconsin provide work space, research facilities, and a public venue for learning and collaboration among staff, partners, visitors, and residents. The facilities serve Reserve staff, Wisconsin Sea Grant staff, university students and interns, as well as our partners and the public. The Reserve site provides a gathering place and educational opportunities, and supports economic development through research and tourism in the City of Superior.

The Reserve buildings are owned by the Board of Regents of the UW System and administered operationally by the University of Wisconsin–Madison Division of Extension in partnership with the property title owner, UWS. The land under the facilities is leased from the City of Superior on a 40-year lease. Renovation of the Reserve offices and laboratory were funded through a NERRS Purchase Acquisition Construction grant from NOAA, with Extension and Wisconsin Sea Grant match.

In all construction, renovation, maintenance, and daily operation, the Reserve strives for energy efficiency, efficient use and reuse of materials, and recycling of used materials. As opportunities arise, the Reserve will explore water catchment systems in addition to the city-owned rain garden (adjacent to the Estuarium parking lot), and renewable energy options. The NERR System has developed design and energy efficiency guidance for all reserves. Adhering to these green building practices will be an important consideration for any future facility updates and construction, including the anticipated construction of a new dormitory building by 2025.

The State of Wisconsin has specific standards in place to ensure that all construction incorporates sustainable features. Reserve buildings comply with the State of Wisconsin Building Commission Sustainable Facilities Policy. Wisconsin Division of State Facilities Sustainable Facilities Standards must also be applied to all state construction and leased facilities, regardless of size or budget. The fundamental purpose of these standards is to improve the overall quality and usability of state owned

and leased facilities and to optimize monetary, material, environmental, and human resources. The Sustainability Standards provide a thorough set of detailed standards related to topics such as site requirements, water efficiency, energy, materials and resources, and indoor environmental quality which must be, and will be, followed during renovation projects.

Description of Current Facilities

The Lake Superior Reserve presently occupies two waterfront buildings on Barker's Island in Superior, Wisconsin. The buildings were purchased in 2011 by the UW System Board of Regents with funds obtained through an NERRS Purchase Acquisition Construction grant from NOAA, with UW-Superior match, and became part of the UWS campus. In a NOAA partnership, the Reserve offices include space for several Wisconsin Sea Grant staff in addition to Reserve staff and students.

Reserve offices and research laboratory

The Reserve's administrative building at 14 Marina Drive was renovated from its condition as a former restaurant between 2012 and 2014 and now includes six private offices, a reception area, meeting room, student workstations, and a 1,300-square-foot dockside laboratory. The waterfront facility is adjacent to the SS Meteor Museum, a land-bound historic vessel and National Historic Registry site operated by the City of Superior, and the Barker's Island Festival Park and Pavilion. Parking is free on Barker's Island, and the parking lots drain in part to an engineered wetland that was restored by the Reserve and the city in 2012–2013. The Reserve has one private secure dock and is adjacent to a city-owned public dock.

Laboratory space is available to visiting or partnering researchers. The following equipment is available in the Reserve lab, along with additional supplies for field work and analysis:

- SEAL AA3 AutoAnalyzer
- Milli-Q Direct 3 Type 1 water purification system
- Water Quality Sondes (YSI EXO)
- Fluorometer
- Autoclave
- Drying oven
- Analytical balance
- Drying oven
- Chemical hood
- Vacuum pumps, refrigerator, and freezer

Lake Superior Estuarium and Confluence Room

The Reserve's interpretive space and classroom are located at 3 Marina Drive, a former commercial space purchased by the UW System Board of Regents with the 2011 NERRS Procurement, Acquisition, and Construction (PAC) award. Through a separate PAC award with Extension match, the building was renovated and now includes a well-equipped classroom and exhibit space. Working with Wilderness Graphics Inc., an exhibit design contractor based in Tallahassee, Florida, staff and partners developed exhibits that tell the story of the St. Louis River, the estuary and Lake Superior. Two offices were built in the facility for use by visiting researchers and the Friends of the Lake Superior

The Reserve facilities are located on Barker's Island in Superior with ample free parking. (Credit: Google Earth)

Reserve. The exhibits are open to the public Wednesday through Sunday in the summer season and Friday and Saturday in the winter season and are primarily staffed by student interns. The Confluence Room classroom space includes a well-equipped classroom and meeting space and offices. The room is available for Reserve programs and partner use and can be reserved in advance by nonprofit, government, or business groups. It is not currently available for private events. The space has a capacity of 60 people when tables and chairs are used, and 128 people without furniture.

The building is next to the water with large windows that provide a view. Barker's Island, adjacent to major roads through Superior, is a well-visited waterfront destination and the Lake Superior Estuarium is considered by the city to be an important development with appeal to residents and tourists.

In the time period of this Management Plan, the Reserve will begin planning to update and augment the exhibits. Proposed elements include additional wayfinding, interactive components, and outdoor signage as well as content related to climate change impacts and mitigation. As the Lake Superior Estuarium continues operation, staff will be better able to gauge visitation rates and evaluate exhibit effectiveness to more directly meet the needs of our audiences.

Planned Facilities and Facility Upgrades

Reserve Offices

As the Lake Superior Reserve gains staff positions, available office space is becoming increasingly limited. The space currently houses six enclosed offices and eight open-office workstations for Wisconsin Sea Grant staff, full-time Reserve staff and student interns. Currently, the office reaches maximum capacity when two to five student interns seasonally join the full-time staff. At least two new staff members, the Margaret A. Davidson Fellow and a Stewardship Coordinator, are planned to join in 2021 without adequate space. The Reserve plans to continue to grow staff capacity. However, small scale renovations to the current office building could significantly expand enclosed office spaces by adding space within the current building footprint.

To further clarify these needs, the Reserve will assess renovation options with our partners at UW-Superior and UW–Madison, assess the feasibility of building modifications and if deemed appropriate, may seek to complete renovations within the timeframe of this management plan.

Dormitories

A dormitory is a standard reserve facility that Lake Superior Reserve currently lacks. By 2025, the Reserve aims to complete the construction of dormitory facilities to serve visiting researchers and students, seasonal interns, and guests including NOAA and NERR System partners. Space for such construction exists between the Reserve's current buildings, on a 0.2-acre parcel of land owned by the City of Superior. Funding for the construction of a dormitory facility will be pursued primarily through the annual Procurement, Acquisition, and Construction (PAC) award, potentially through multiple award cycles. Match funding opportunities will be sought through state partners (UW–Madison Division of Extension and UW System), with the possibility of additional support from an organized donor campaign, private or industry donations, and partner organizations that may use or benefit from this facility.

Inception phase

The inception phase is the first step in the four-part process for facilities projects outlined in the NERRS Sustainable Design Guidelines (2004). This phase includes site selection, project scope as it relates to green design, and an inventory of projected programmed spaces. In 2018, the Reserve completed, with the aid of a green building consultant, the inception phase and site survey work for the eventual construction of the dormitory building. The inception phase of the dormitory building incorporated input from Reserve staff, the director of the Division of Extension's NRI, and members of the RAB, and included outreach to the City of Superior Planning department.

The inception phase articulated both programmatic and building design prerogatives. Through the inception phase process, a Green Mission Statement for the new dormitory facility was developed:

> *The new dormitory building for the Lake Superior National Estuarine Research Reserve will, by its very form and function, demonstrate the ecological priorities of water conservation and management, renewable energy production and consumption, and environmental stewardship. Its design, construction, operation and presentation will exemplify resilient, ecologically responsible building appropriate for and*

responsive to the changing climate and changing circumstances of the region. The sustainable design features of this building will be visible, accessible and functionally practical for building visitors and managers alike.

In this early stage of the dormitory building process, aspirations for green priorities for the facility include the following:

- Net zero or net positive energy consumption.
- Energy efficient, ecologically appropriate design and construction to those who use and encounter the building and grounds.
- Minimizes contribution to climate change.
- Manages stormwater with innovative, onsite design and use of technologies.
- Manages water consumption and wastewater through appropriate design and technology
- Integrates and interprets sustainable design features of the project to further systems thinking, sustainable construction, and water management in Superior and beyond.
- Uses local, sustainably sourced materials and products.
- Incorporates green features that are accessible and understandable to building users and managers.

	Reserve dormitory space estimates	**Suggested space** (NERRS Standard Reserve Guidelines, 2004)
Bedroom	1,130	1,280
Bathroom (incl. private bath)	464	100
Common area/meeting space	280	300
Kitchen	100	150
Laundry	90	X
Shared office space	160	X
Mud room	100	X
Gear storage	120	X

Table 8.1. Dormitory space comparison

The inception phase identified preliminary space requirements and preferences for the dormitory facility. These include space to house 16 to 20 people in both shared and private spaces, shared and private bathroom facilities, a kitchen available for building residents, a mudroom and storage space to accommodate field work gear and researcher needs, and a common room. The target parcel of land on which this facility would be built represents the key remaining opportunity for the Reserve to build out its Barker's Island campus. As such, it was suggested that both additional office and meeting space be factored into the building design in response to anticipated seasonal and long-term growth in staff that place constraints on existing facilities and existing demand from programs, partners, and the community on the Confluence Room meeting space.

A public wing of the dormitory is a desired feature of this facility, to provide interpretive opportunities for visitors to learn about the green features of the building itself and draw visitors to the Reserve's existing facilities. Additional public components identified as desirable for the facility, such as a cafe dining area and outdoor gathering areas, will require further investigation during the design and planning phase as well as conversations with partners and funders.

The inception phase identified that architecturally significant elements to consider in the building design may include references to the maritime heritage of the community, conveyance of the ecological significance of the St. Louis River Estuary, and a harmonious compatibility with the two existing facility buildings.

In addition to the construction of onsite housing, the Reserve prioritizes the improvement of public access to boundary areas. This includes improving the canoe and kayak launches in partnership with the City of Superior located at Pokegama Bay and Woodstock Bay. Both are essential for Reserve programming and the latter provides the only water access point within the 4400-acre SMF, which is included as part of the Reserve's official boundary. Both locations are the sole launch sites in Wisconsin identified in the proposed National Water Trail and are unimproved, subject to erosion and illegal dumping.

Next steps and challenges

With the partnership between UW–Madison Division of Extension, NOAA, and consultant expertise, the next steps in pursuing dormitory facility construction include delineating appropriate project phasing, securing partnership agreements to move forward, and applying for PAC funding. Further project phasing and construction timing will be informed through the planning and

engineering process. It is expected that the dormitory construction will require five years following the award of a PAC grant. Prior to the completion of the dormitory, the Reserve will explore alternative solutions to provide short-term housing to all visiting researchers, graduate students, Davidson Fellows, and others whose work aligns with the mission of the Reserve. These alternative solutions may include a leased property, an arrangement with a local hotel, or an arrangement for dormitory space and access on the main UWS campus.

The selected site is currently zoned W-1 Waterfront Commercial, in which a dormitory facility is not an expressly permitted use. A land use application process will be required in order to pursue construction of a dormitory building with a chiefly residential purpose in this location. The Reserve has engaged the City of Superior Planning Department in early conversations about the project, and have been encouraged to pursue it with some initial guidance indicating that a conditional use permit process will be required.

Facilities Stressors, Gaps, and Needs

Climatic vulnerability

Site stressors and anticipated future climatic conditions will be a strong factor in determining the design of facility updates and new construction. There are climatic considerations that impact the Reserve's core facilities on Barker's Island in Superior. The Reserve campus site is in a very exposed location, making it susceptible to high winds and impacts from severe storms. While the Reserve's facilities are not located in a floodplain, the cumulative effect of high lake levels, storm surge, high winds, and seiche are just beginning to be understood in a new climate regime, and may contribute to site vulnerability under extreme conditions. Given this, a retrofitting design for the existing facilities may need to be developed in the next few years. Effects of climate change may include increasing wind speeds in this exposed location, increasingly severe storm events, and warmer temperatures which could translate to increased cooling costs in summer and decreased heating costs in winter.

Non-climatic vulnerability

The site, along with all Reserve facilities, is located on an island with one road connection to the City of Superior mainland. Under extreme conditions, the road may be unsafe or impassable, rendering the site inaccessible by vehicle. The existing infrastructure and utilities that serve Reserve facilities may be vulnerable due to lack of redundancy. The substrate on artificial Barker's Island is sand (the island was constructed from dredge materials), implying unique considerations for building construction and a substrate that is inherently vulnerable to erosion impacts.

Facilities maintenance and support

As the Reserve facilities have expanded, so have the demands for building maintenance, facility usage logistics, and equipment upkeep. New maintenance and management needs will follow the construction of a new dormitory facility. The Reserve will evaluate the needs for extended capacity for facilities maintenance, management, and logistical support *prior* to the completion of the dormitory building, and as staff, administrative, and financial constraints dictate.

View of Spirit Lake and Spirit Island from Clough Island (Credit: David Bowman)

LAND ACQUISITION PLAN

Introduction

The Lake Superior Reserve consists of lands in public ownership and Wisconsin waters. Potential additions to the Reserve boundaries may be considered. Any additions must be able to help fulfill the mission of the Reserve. Additions must also meet NOAA's boundary requirements outlined in the federal register (915 CFR § 921.31). As stated in the federal regulations (915 CFR § 921.33), boundaries of a Reserve site also may be adjusted to remove areas previously approved as within a Reserve site boundary but that no longer meet the needs or requirements of the Reserve.

Because the University of Wisconsin did not enter into agreement through the MOU to purchase land for conservation and stewardship, direct acquisition or purchasing of ecologically key land and water areas is not part of the strategic plan. Rather, the Reserve will work with landowning partners to identify additional areas that are important to the mission and goals.

Priority Values

Areas identified for inclusion in the Lake Superior Reserve boundaries will adhere to the values and criteria outlined for selection of the Reserve core and buffer areas.

Core area criteria include:

1. Vital to the function of the St. Louis River Estuary
2. Maintains a sufficient level of control to ensure the long-term viability of the Lake Superior Reserve for research and natural processes
3. Encompasses resources representative of the total St. Louis River Estuary system
4. Contributes to the preservation of a full range of significant physical, chemical, and biological factors essential to the diversity of fauna, flora, and natural processes occurring within the St. Louis River Estuary determined through:
    a. Lower St. Louis River Habitat Plan
    b. Wisconsin's Lake Superior Coastal Wetlands Evaluation
    c. SNA designation directly on the waters of the St. Louis River

Buffer area criteria include:

1. Ability to protect the core area and provide additional protection for species that rely on the core area
2. Located adjacent to, surrounding, or is essential to the integrity of the core area
3. Maintains a sufficient level of control to support the long-term viability of the Lake Superior Reserve for natural processes, as well as research and education

Collaborative process

The Lake Superior Reserve acquires area through its land-owning partners. The process for acquiring areas within the Reserve boundary will follow federal regulations which state that Reserve boundaries generally encompass two areas: key land and water areas (or "core area") and a buffer area (915 CFR § 921.11). State partners enter into a MOU with the Lake Superior Reserve.

Priority Acquisition Areas

Clough Island

The St. Louis River (SLR) Stream Bank Protection Area (SBPA) is located in northwest Douglas County near the cities of Superior, Wisconsin and Duluth, Minnesota and includes Clough Island and the area commonly called the Red River Breaks, which is currently included in the Lake Superior Reserve boundary. Clough Island is a 358-acre island in the middle of the St. Louis River Estuary. In 2005, the island was slated for development, but in 2010 TNC, in partnership with the Wisconsin DNR, acquired the site with the assistance of a one million dollar grant from the U.S. Fish and Wildlife Service (USFWS) National Coastal Wetlands Conservation Grant Program. The Wisconsin DNR provided $750,000 in matching funds for the acquisition through the Knowles-Nelson Stewardship Fund. Additional matching funds were pledged by the McCabe Chapter of the Izaak Walton League of America, Duluth Chapter of the Audubon Society, Western Skyline Preservation Alliance, Save Lake Superior Association, Twin Ports Bassmasters, Lake Superior Chapter of Muskies, Inc., and Friends of SMF. In 2011 TNC transferred ownership of Clough Island to the State of Wisconsin for long-term protection as a part of the SLR SBPA. Clough Island can be accessed via an unimproved boat landing on the south side of the island and in the winter it may be possible to walk to the island over the ice (if conditions permit). The boat landing nearest the Clough Island boat landing is on the Minnesota side of the St. Louis River Estuary at the Munger Landing near Clyde Street in West Duluth.

Map 9.1. Satellite image of Clough Island (Credit: Esri)

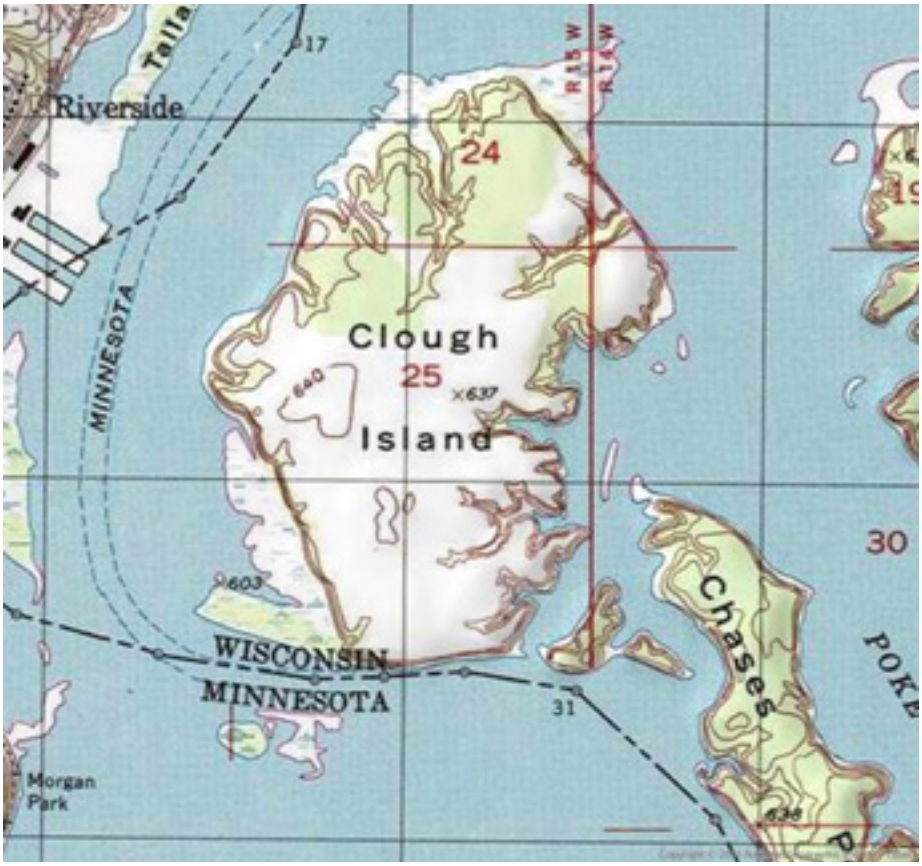
The scope of use and management of a state property is governed by its official designation. SBPAs are acquired and managed under the authority of Section 23.094 (2012 through Act 45), Wisconsin Statutes and Chapter NR 51.60-65 Wisconsin Administrative Code (WDNR 1996). The SBPA program was established in 1990 as a supplement to the traditional Fisheries Areas Program with the goals to protect and restore corridors along cool and cold-water streams to improve water quality and provide public access, particularly in those streams threatened by agricultural and urban runoff. The program purchases easements directly from landowners. In return for payment, the landowner allows public fishing and DNR management activities along the stream corridor on their property. The easement area is generally 66 feet of land from the stream bank on either side of the stream. Easements are perpetual and remain on the land even if it is sold or deeded to an heir. The SBPA program has been popular with landowners and anglers. Landowners can sell certain property rights and receive compensation as desired. In some cases, landowners get assistance from the DNR or local conservation clubs in restoring the stream corridor, allowing anglers access to

streams that provide high-quality recreational experiences. SBPAs are also open for traditional outdoor recreation activities such as walking, skiing, snow shoeing, nature study, berry picking, hunting, trapping, fishing, swimming, canoeing, kayaking, and other low-impact, nonmotorized uses that do not detract from the primary purpose of these properties.

Though a gem in the St. Louis River Estuary from a landscape conservation perspective, the habitat of Clough Island is highly disturbed, reflecting its past human land use history of logging, farming, and grazing. Clay cliffs surround much of the island and rise 20 to 30 feet to a broad, level red clay plain. The southern half of the island interior is an open landscape of approximately 100 acres of wet grasslands, sedge meadows, and shrublands that has generally recovered well from past farming and grazing. Blue-joint grass is common along with cool-season grasses (Kentucky bluegrass and timothy) while wetter areas contain native grasses and sedges of wet meadows. Shrub thickets are interspersed, becoming dense in places. The northern portion of the island is generally forested with young aspen mixed with conifers giving way to a narrow band of emergent marsh on the northern shore. A small but notable forested seep originates in the northwestern portion of the island. Dominated by black ash and a diverse ground layer of ferns, sedges and forbs, the seep feeds a small stream flowing north through a large ravine, into a sedge meadow and into the St. Louis River. Invasive shrubs (honeysuckle and common buckthorn) are locally dense, though some efforts at control were undertaken between 2013 and 2015.

Wetlands surround Clough Island, particularly on the northeast and southwest shores. Wetland types include Northern Sedge Meadow, Floating-leaved Marsh, and Submergent Marsh. Wetlands were fairly high in quality compared to other wetlands in the region, although purple loosestrife and invasive cattails were present in low numbers. Boreal Forest restoration efforts are currently underway at Clough Island and Pokegama Carnegie Wetlands SNA. Rat Island, directly to the west, also includes valuable wetlands and ash forests and could be added to the Reserve along with Clough Island.

Clough Island, the largest island in the St. Louis River Estuary, is accessible only by boat. A naturally occurring sandy beach exists on the southeast side of the island



Map 9.2. Topography of Clough Island (Credit: National Geographic Society)

allowing boat access. Near this landing site is a picnic table and an interpretive sign which was posted in 2014. Some footpaths exist on the island as well as the remains of cement foundations from the Whiteside and Alexander buildings. The Reserve and several other research and educational organizations, including the WDNR, SLRA, and the Boy Scouts of America have brought small groups of students and citizens to Clough Island for field trips and participation in a buckthorn removal project, tree planting, and wild rice planting. During the winter, ice cover on the estuary may allow illegal snowmobile access to the area which has caused some erosion on the steep, 20- to 30-foot clay cliff perimeter of the island. Bow hunting is currently allowed on Clough Island and waterfowl hunting on the water surrounding the island is permitted. There is a geocache site on the island.

Wisconsin Point

In 2017, the Fond du Lac Band of Lake Superior Chippewa regained ownership of property at the terminus of Wisconsin Point, on land adjacent to the City of Superior parcel included in the Lake Superior Reserve boundaries. If deemed beneficial by Fond du Lac Resource Management and the Fond Du Lac governing body, and congruent with NOAA policies, this culturally and ecologically significant place could be included in the boundary of the Lake Superior Reserve in future years.

Priority Areas Acquisition Strategy

A strategy, process, and timeline for incorporating Clough Island into the Lake Superior Reserve boundary will be established over the next five years in consultation with WDNR, the landowning partner, and the RAB.

A Regional and Property Analysis of the SLR SBPA, including Clough Island, was developed for the WDNR in 2015. The report was authored by staff at the Lake Superior Reserve and the WDNR Natural Heritage Inventory with the intention of supporting master planning within the Reserve boundaries, which encompasses nearly all of the SLR SBPA. Written in close collaboration with WDNR field and regional staff and with review by a WDNR planner, it represents a thorough analysis of the region and property. The process by which Clough Island will be included in the Lake Superior Reserve will take into account this review and will include an assessment of the educational, outreach, and research opportunities provided by the area.

ENDNOTES

1 The Area of Concern is an official designation by the US Environmental Protection Agency as defined by the UW–Canada Great Lakes Water Quality Agreement. This designation in the St. Louis River Estuary reflects a geographic area with significant impairment of beneficial uses as a result of human activities over time. The states of Wisconsin and Minnesota are partners with the US Environmental Protection Agency in removing impairments, restoring and delisting the 27 Areas of Concerns across the Great Lakes within the United States. The Reserve supports various efforts of the work groups, managers, scientists and restoration professionals in this effort. More information can be found here: https://www.epa.gov/great-lakes-aocs

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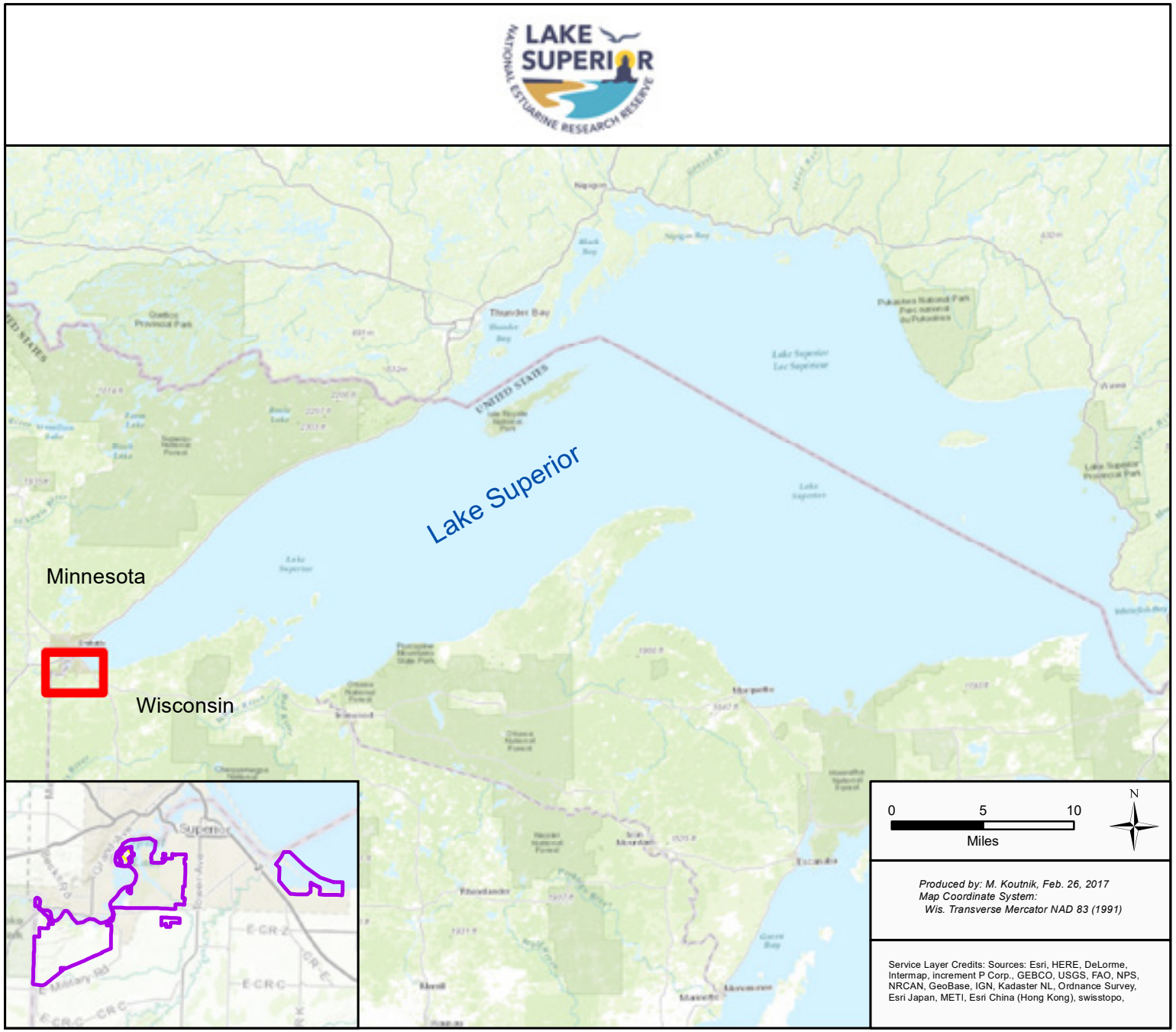
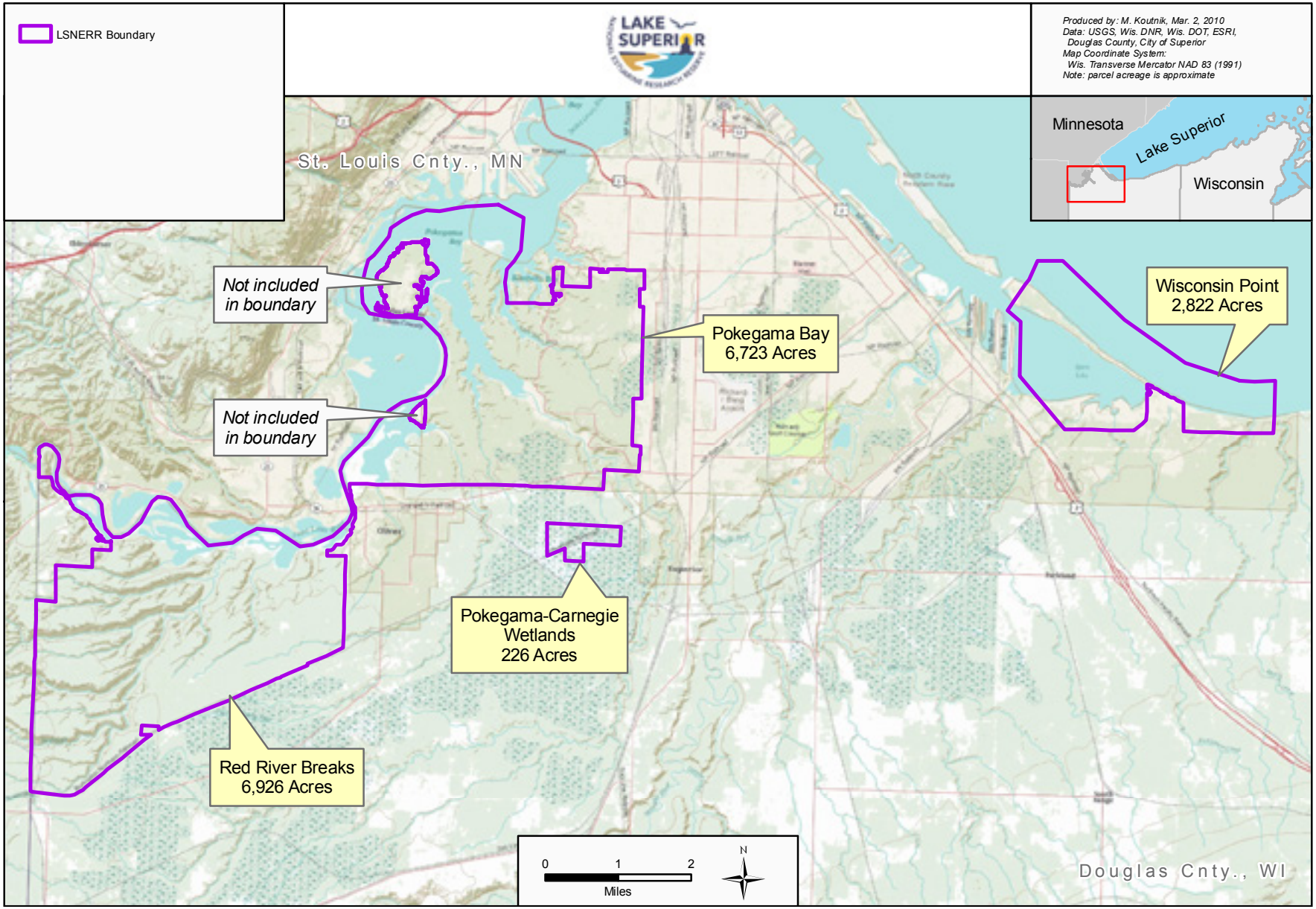
87 See http://www.ci.superior.wi.us/DocumentCenter/View/8852/Wi-Point-Edited-Map?bidId=

88 Minutes of November 13, 2018 Wisconsin Point Committee meeting.

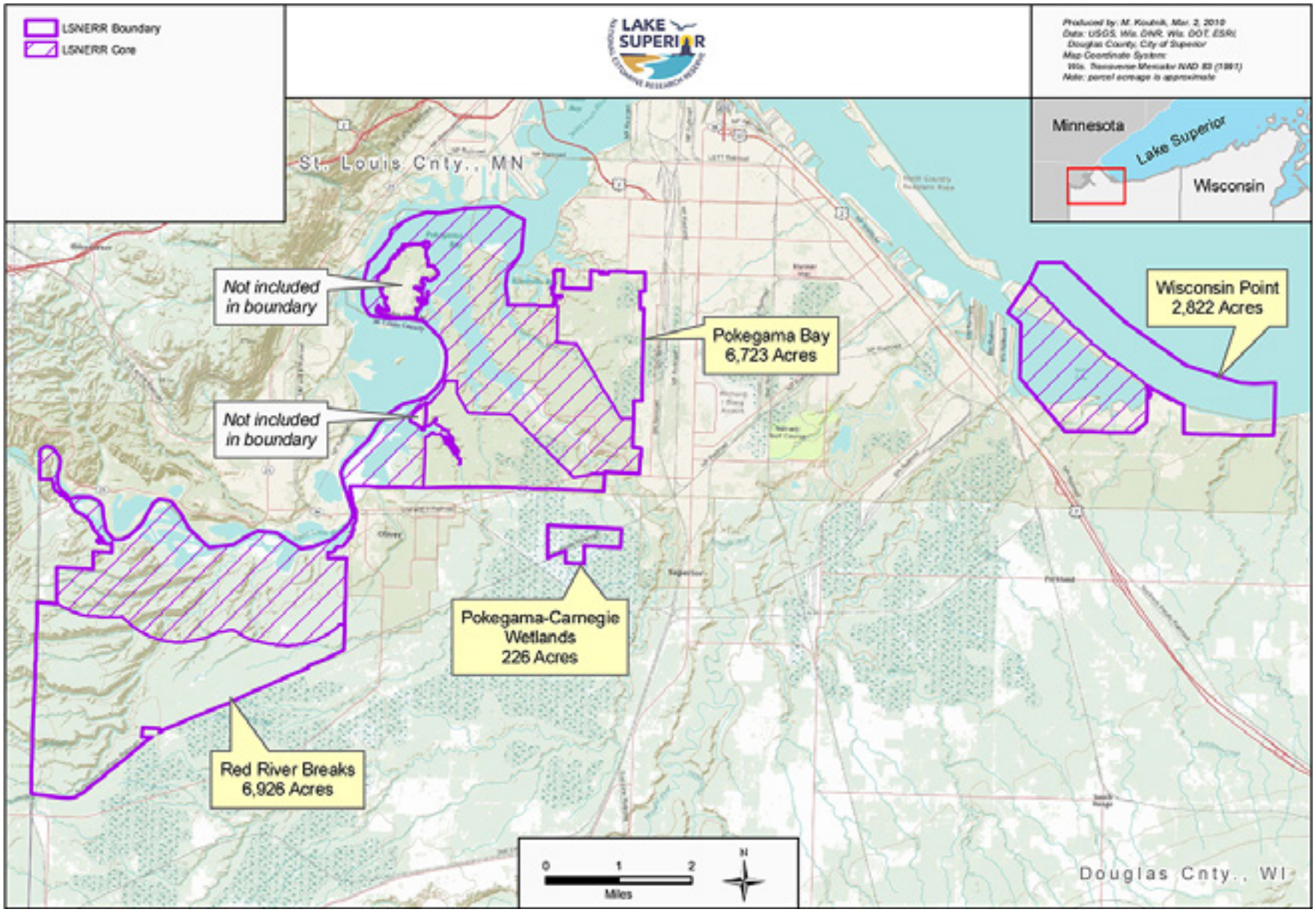
APPENDIX A



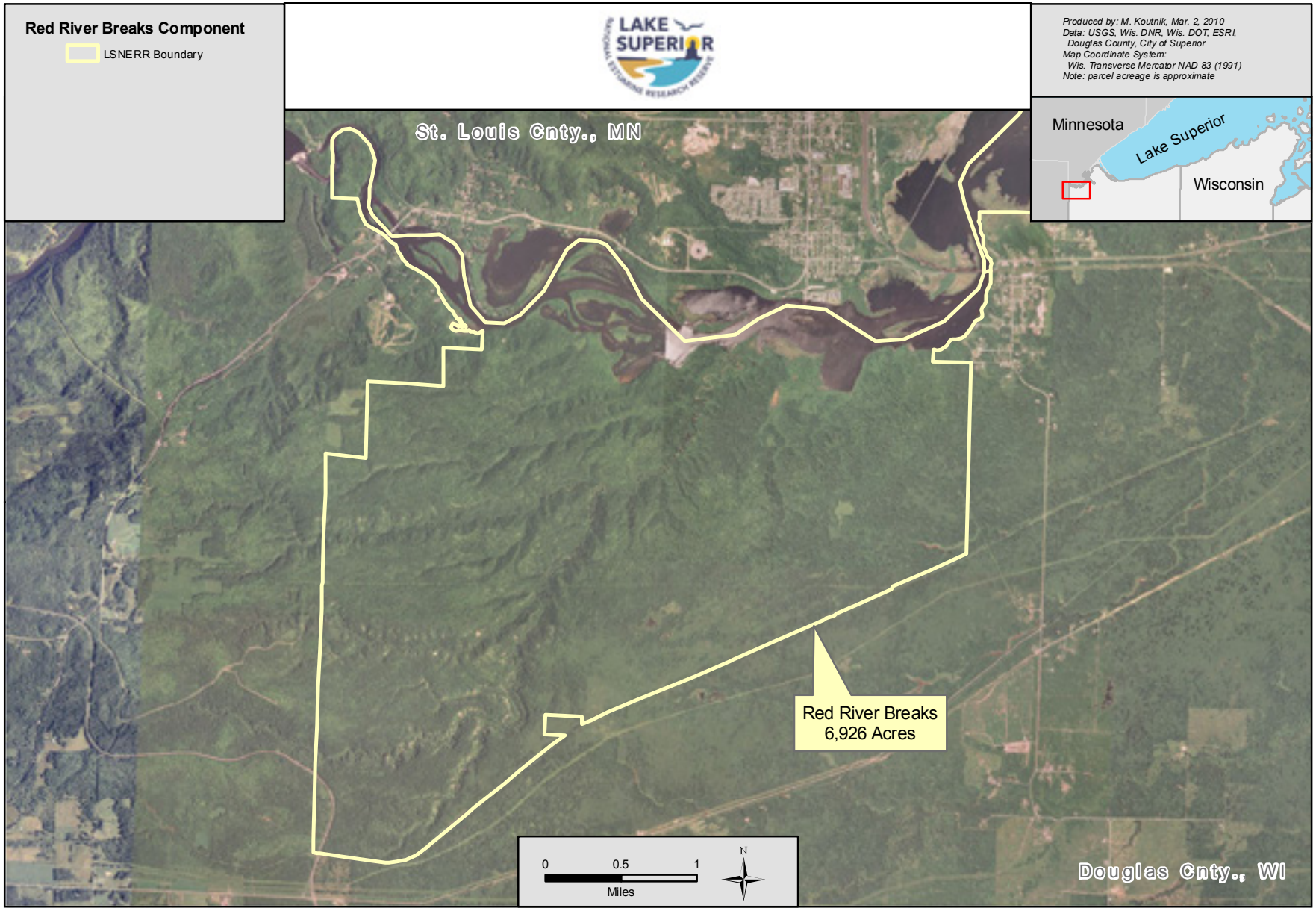
Map 2.1. Lake Superior Reserve boundaries relative to Lake Superior



Map 2.2. Lake Superior Reserve boundaries



Map 2.3. Lake Superior Reserve core and buffer areas

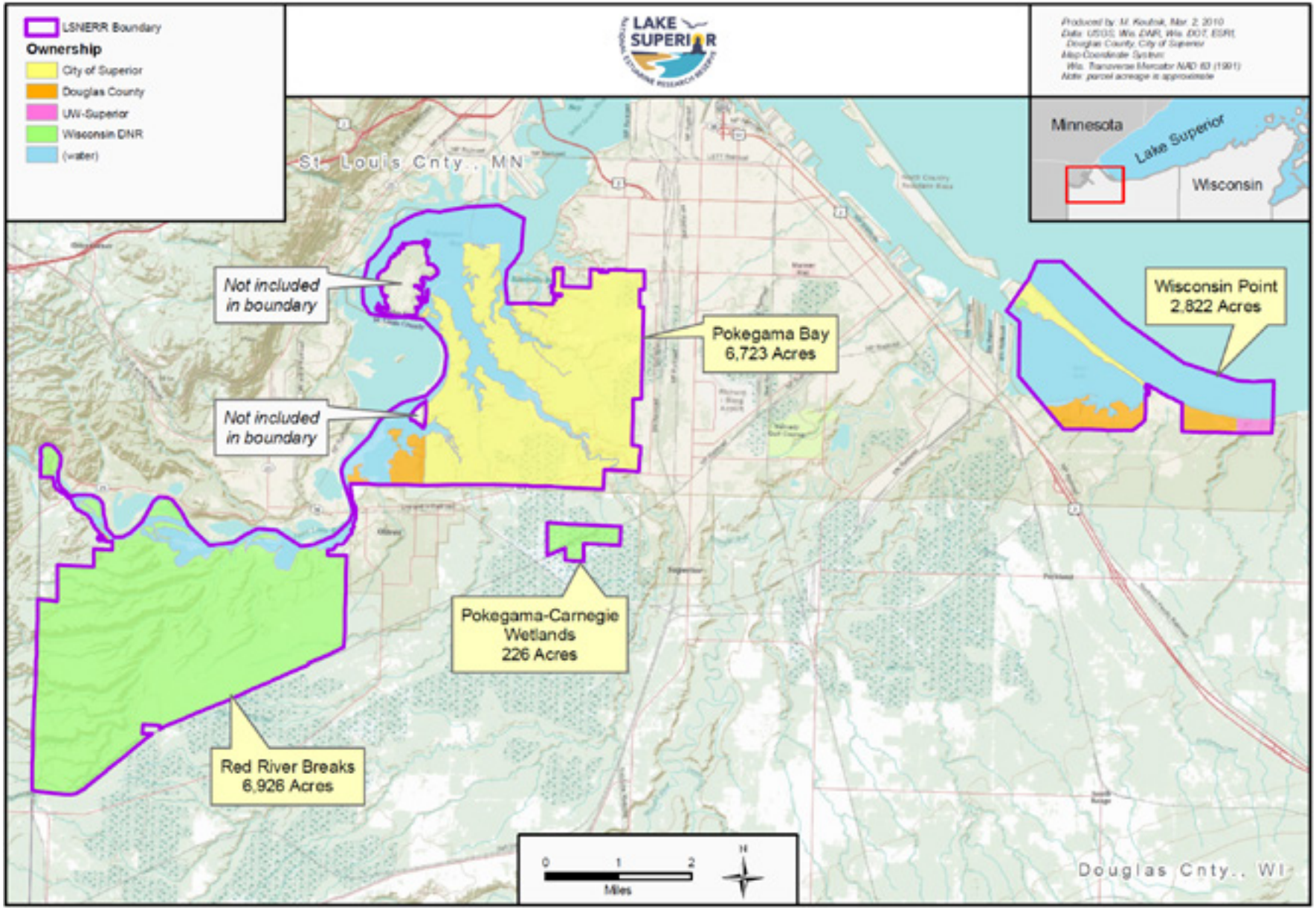


Map 2.4. Lake Superior Reserve Red River Breaks component

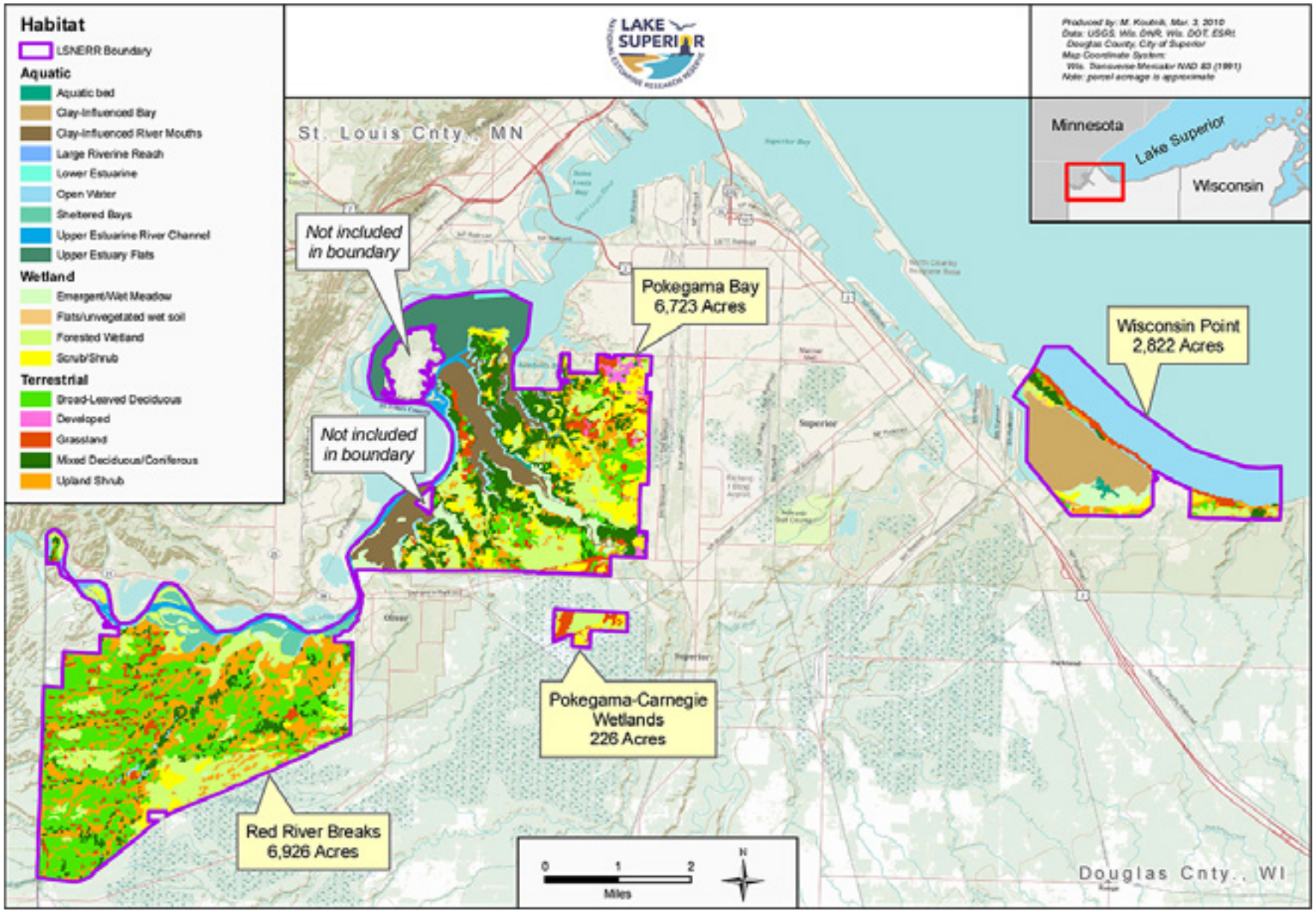
Map 2.5. Lake Superior Reserve Pokegama Carnegie Wetlands component

Map 2.6. Lake Superior Reserve Pokegama Bay component

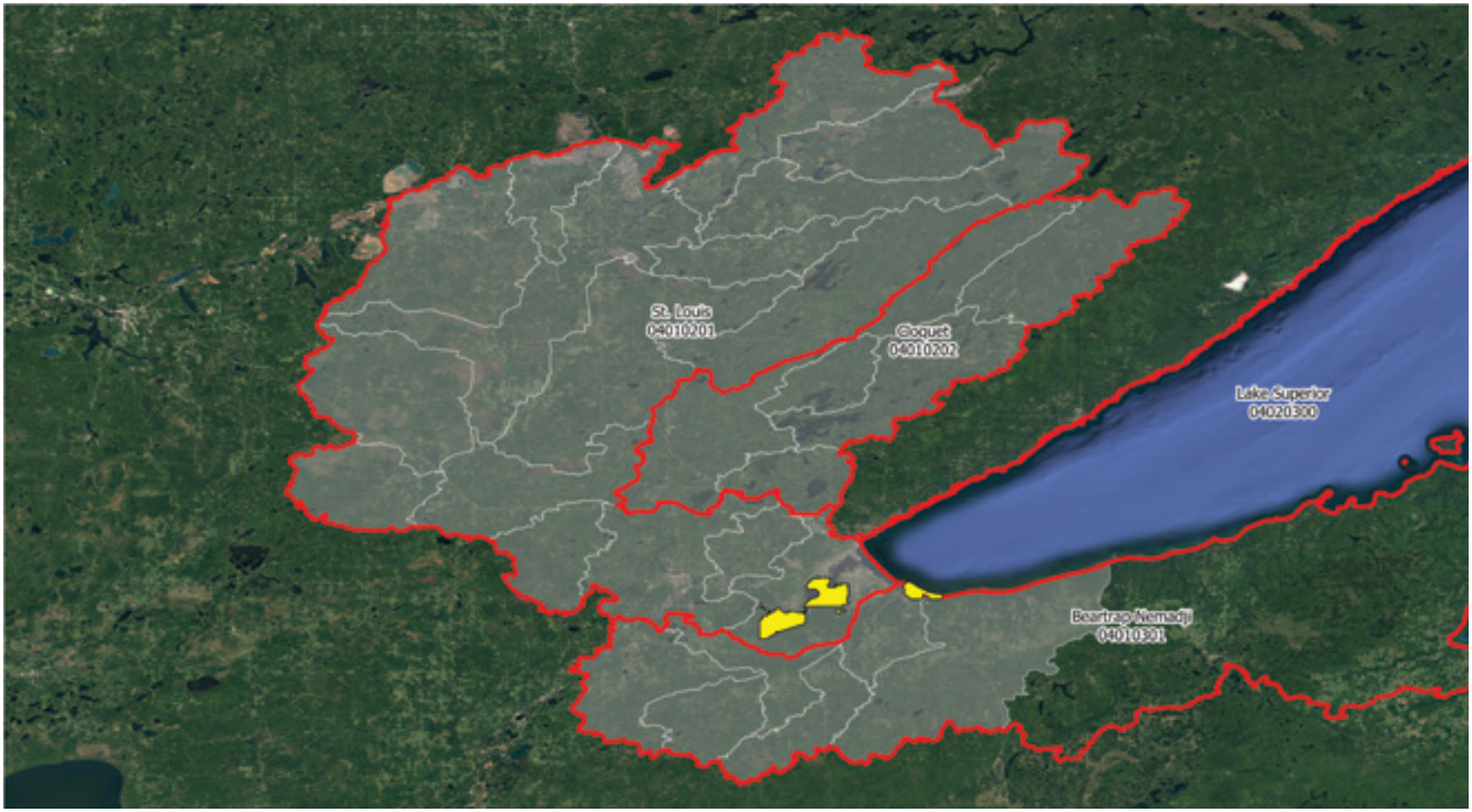
Map 2.7. Lake Superior Reserve Wisconsin Point component



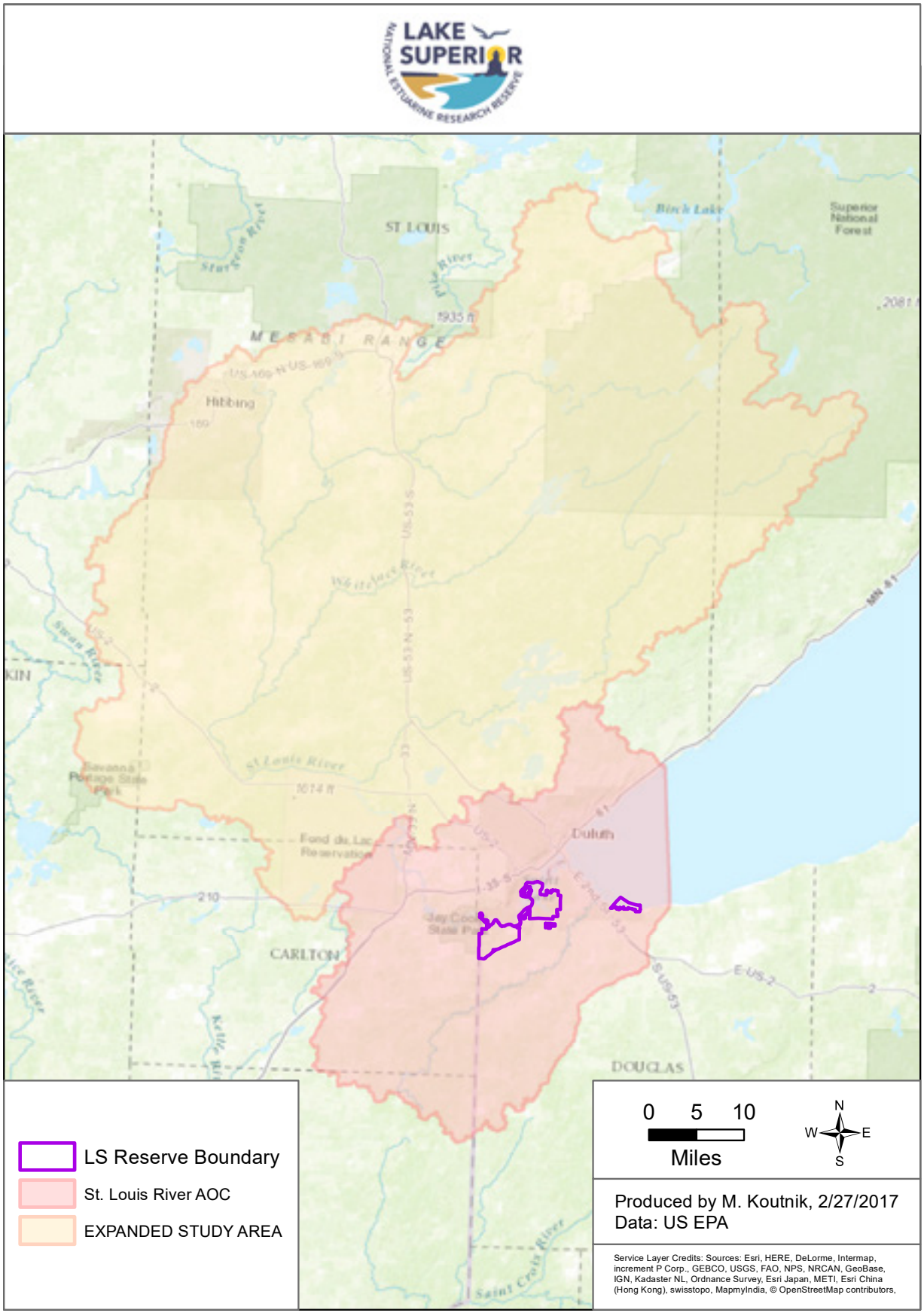
Map 2.8. Lake Superior Reserve ownership



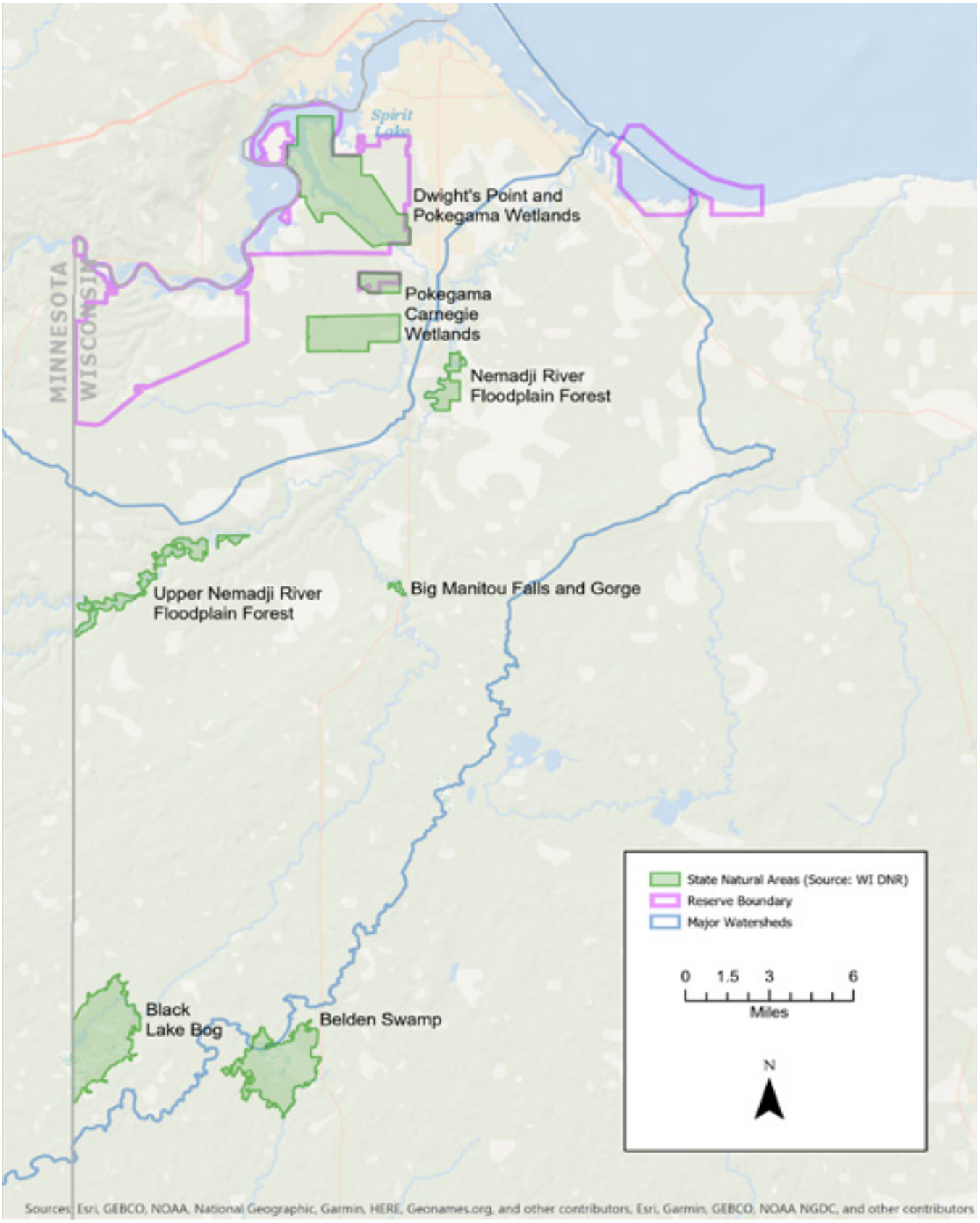
Map 2.9. Lake Superior Reserve habitat types



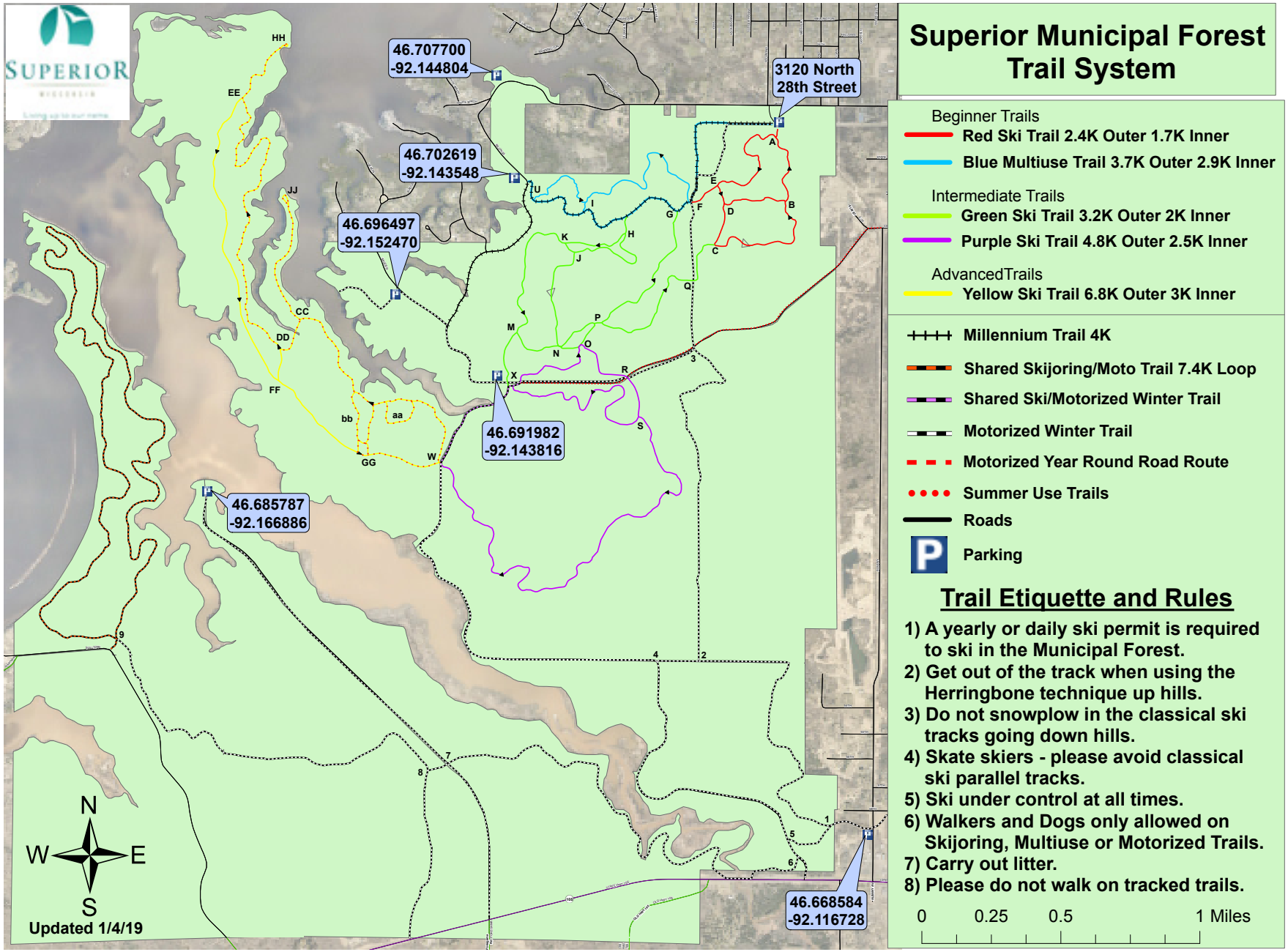
Map 2.10. Satellite image of targeted watershed boundaries (grey areas with red boundaries) and designated Reserve properties in yellow



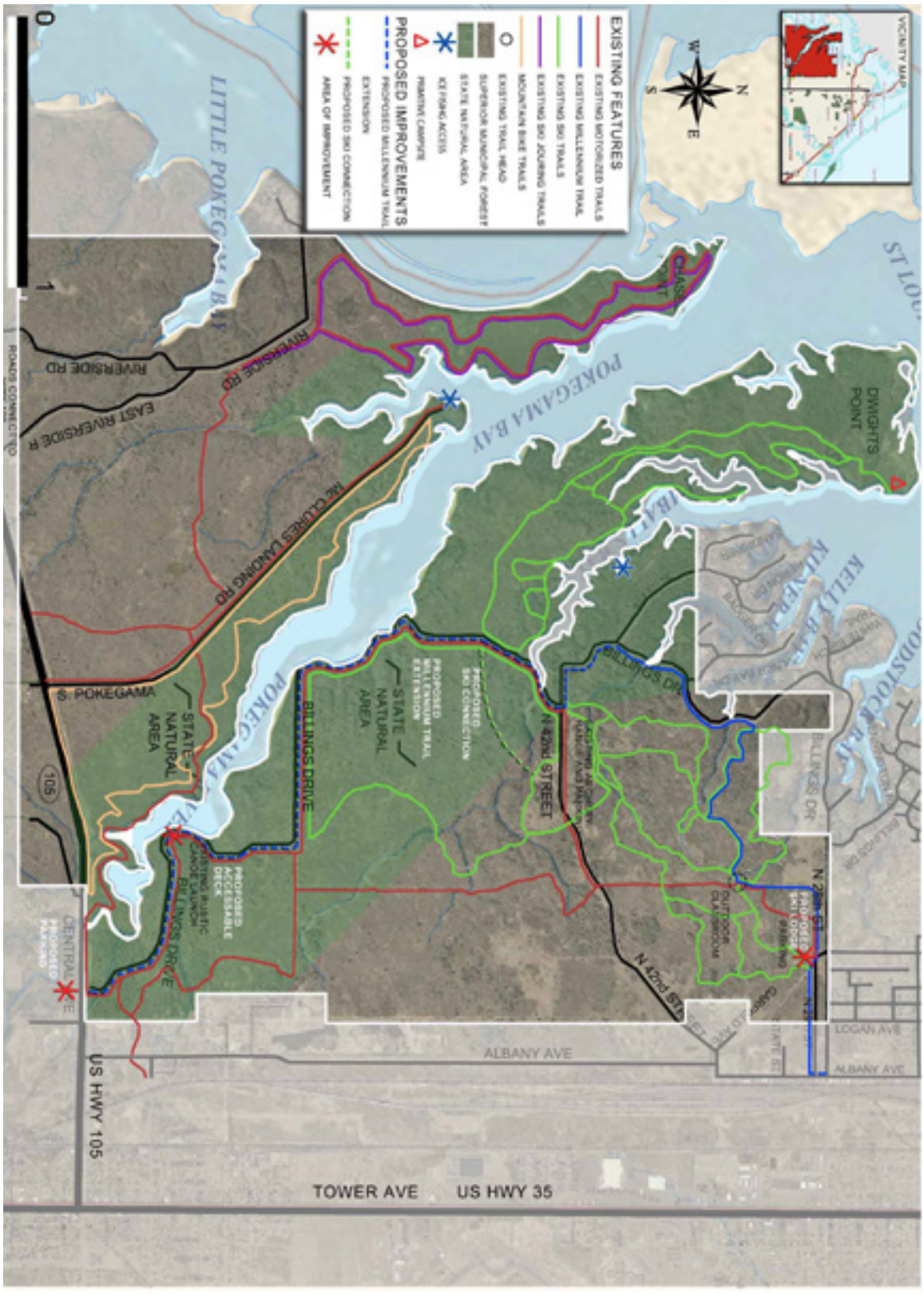
Map 6.1. St. Louis River Area of Concern



Map 6.2. State Natural Areas in or near the Lake Superior Reserve



Superior Municipal Forest Trail System



Superior Municipal Proposed Site Plan 2010

MOA-2021-063/12191

Memorandum of Understanding
Between the
National Oceanic and Atmospheric Administration and
The Board of Regents of the University of Wisconsin System
on behalf of the University of Wisconsin-Madison, Division of Extension
Detailing the State-Federal Roles in the Management of the
Lake Superior National Estuarine Research Reserve

This Memorandum of Understanding (MOU or agreement) establishes the framework for the cooperative management of the Lake Superior National Estuarine Research Reserve (LSNERR) in the State of Wisconsin, between the Board of Regents (BOR) for the University of Wisconsin System on behalf of the University of Wisconsin-Madison, Division of Extension and the National Oceanic and Atmospheric Administration, Office for Coastal Management (NOAA). This agreement supersedes the previous agreement between NOAA and the Board of Regents of the University of Wisconsin –System, University of Wisconsin –Extension (UWEX) regarding LSNERR made on October 13, 2010.

I. AUTHORITY

The authority for this agreement is the Coastal Zone Management Act of 1972, as amended (CZMA, 16 U.S.C. §§ 1451-65, 1461), and its implementing regulations at 15 C.F.R. Parts 921, 923.

II. BACKGROUND

A. The State of Wisconsin has determined the waters and related coastal habitats of the LSNERR provide unique opportunities for the study of natural and human processes to contribute to the science of estuarine ecosystem processes, enhance environmental education opportunities and public understanding of estuarine areas, and provide a stable environment for research through the long-term protection of reserve resources.

B. The State of Wisconsin has determined that the resources of the LSNERR and the values they represent to the citizens of Wisconsin and the United States will benefit from the management of these resources as part of the National Estuarine Research Reserve (NERR) System.

C. The BOR, as the agency designated by the Governor of Wisconsin, is responsible for maintaining, operating and managing the LSNERR in accordance with Section 315 of the CZMA, 16 U.S.C. § 1461, and acknowledges the value of state-federal cooperation for the long-term management and protection of the LSNERR in a manner consistent with the

purpose of its designation.

D. NOAA finds that the State of Wisconsin has satisfied the legal and procedural requirements for designation and, pursuant to its authority under Section 315 of the CZMA, 16 U.S.C. § 1461, and in accordance with implementing regulations at 15 C.F.R. Part 921, has designated the LSNERR.

E. The LSNERR management plan approved by NOAA describes the goals, objectives, strategies/actions, administrative structure, and institutional arrangements for the LSNERR, including this agreement and others. In consideration of the mutual agreements herein, NOAA and BOR agree to the following roles indicated in Section III of this agreement.

III. STATE-FEDERAL ROLES IN RESERVE MANAGEMENT

A. BOR Role in LSNERR Management

The BOR shall:

1. be responsible for compliance with all federal laws and regulations, and ensure that the LSNERR management plan is consistent with the provisions of the CZMA and implementing regulations;

2. ensure protection of the natural and cultural resources of the LSNERR, and ensure enforcement of the provisions of state law and regulations aimed at protecting the LSNERR;

3. ensure adequate, long-term protection and management of lands and waters included within the LSNERR boundary;

4. cooperate with NOAA to apply for and manage funds to support the LSNERR in accordance with federal and state laws, the LSNERR management plan, annual funding guidance from NOAA, and any other NOAA directives pertaining to LSNERR operations, research and monitoring, education and stewardship, and, as necessary, land acquisition and reserve facility construction;

5. conduct and coordinate research and monitoring programs that encourage scientists from a variety of institutions to work together to understand the ecology of the LSNERR ecosystem to improve coastal management;

6. conduct and maintain programs that disseminate research results via materials, activities, workshops, and conferences to resource users, state and local agencies, school systems, the general public, and other interested parties;

7. provide staff and endeavor to secure state funding for the manager,

education coordinator, and research coordinator;

8. secure facilities and equipment required to implement the provisions within the reserve management plan;

9. ensure adequate support for facilities operation and maintenance;

10. maintain effective liaison with local, regional, state, and federal policy makers, regulators, and the general public;

11. serve as principal contact for issues involving proposed boundary changes and/or amendments to the LSNERR management plan; and

12. cooperate with NOAA regarding review of performance pursuant to Sections 312 and 315 of the CZMA, 16 U.S.C. §§ 1458 and 1461, 15 C.F.R. § 921.40, and ongoing management plan approvals.

B. Federal Role in LSNERR Management

NOAA's Office for Coastal Management shall:

1. administer the provisions of the Sections 312 and 315 of the CZMA, 16 U.S.C. §§ 1458 and 1461, respectively, to ensure that the LSNERR operates in accordance with goals of the NERR system and the LSNERR reserve management plan;

2. review and process applications for financial assistance from the BOR, consistent with 15 C.F.R. Part 921, for management and operation of the LSNERR, and, as appropriate, land acquisition and facility construction;

3. advise BOR of existing and emerging national and regional issues that have bearing on the LSNERR and NERR system;

4. maintain an information exchange network among reserves, including available research and monitoring data and educational materials developed within the NERR system; and

5. to the extent possible, facilitate the allocation of NOAA resources and capabilities in support of reserve goals and programs.

C. General Provisions

1. Nothing in this agreement shall obligate either party in the expenditure of funds, or for future payments of money. Each party bears its own costs to implement this agreement. NOAA may provide Federal funding in accordance with the CZMA and any requirements of the U.S. Department of Commerce through financial assistance awards that are separate from this agreement.

2. A free exchange of research and assessment data between the parties

is encouraged and is necessary to ensure success of cooperative studies.

D. Other Provisions

1. Nothing in this agreement diminishes the independent authority or coordination responsibility of either party in administering its respective statutory obligations. Nothing in this agreement is intended to conflict with current written directives or policies of either party. If the terms of this agreement are inconsistent with existing written directives or policies of either party entering this agreement, then those portions of this agreement that are determined to be inconsistent with such written directives or policies shall be invalid; but the remaining terms not affected by the inconsistency shall remain in full force and effect. In the event of the discovery of such inconsistency, and at the first opportunity for revision of this agreement, the parties shall seek to amend or terminate this agreement in accordance with the provisions of section V of this agreement.

2. Any disagreement on the interpretation of a provision, amendment, or other matter related to this agreement shall be resolved informally at the lowest operating level of each party's respective organization. If such disagreement cannot be resolved, then the area(s) of disagreement shall be stated in writing and presented to the other party for further consideration. If agreement is not reached within thirty (30) days of presentation, then the parties shall forward the written presentation of the disagreement to their respective higher official for appropriate resolution.

IV. PROGRAM EVALUATION

In accordance with sections 312 and 315 of the CZMA, 16 U.S.C. §§ 1458 and 1461, and 15 C.F.R. § 921.40, NOAA will schedule periodic evaluations of BOR performance in meeting the terms of this agreement and the LSNERR management plan. Where findings of deficiency occur, NOAA may initiate action in accordance with the interim sanctions or withdrawal of designation procedures established by the CZMA and applicable regulations at 15 C.F.R. Part 921, Subpart E.

V. EFFECTIVE DATE, REVIEW, AMENDMENT, AND TERMINATION

A. This agreement is effective on the date of the last signature on this agreement and shall be in effect until terminated by either party.

B. This agreement will be reviewed periodically by both parties and may only be amended by the mutual written consent of both parties.

C. This agreement may be terminated by mutual consent of both parties or by unilateral termination by either party. Termination of this

agreement may provide grounds for NOAA (at its discretion) to withdraw designation of the LSNERR from the NERR system, pursuant to applicable provisions of the CZMA and its implementing regulations as described under 15 C.F.R. Parts 921 (Subpart E) and 923 (Subpart L). Section 315 of the CZMA, 16 U.S.C. § 1461, provides that NOAA may withdraw designation of a NERR if: 1) NOAA finds that any of the criteria for establishing the reserve no longer exist; or 2) a substantial portion of the research conducted within the reserve fails to meet NERR System guidelines. In making any decision to withdraw designation, NOAA will take into consideration factors set forth in 15 C.F.R. § 921.40.

D. If any clause, sentence, or other portion of this agreement shall become illegal, null, or void for any reason, the remaining portions of this MOU shall remain in full force and effect.

E. No waiver of right by either party of any provision of this agreement shall be binding unless expressly confirmed in writing by the party giving the waiver.

IN WITNESS THEREOF, the parties have caused this agreement to be executed.

PAYNE.JEFFREY.LYNN.1365833881 Digitally signed by PAYNE.JEFFREY.LYNN.1365833881 Date: 2021.03.25 14:46:27 -04'00'

Jeffrey L. Payne, Ph.D
Director
Office for Coastal Management
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

Date

DocuSigned by: Dan Langer 92796E26F6F7479...

Dan Langer
Assistant Vice Chancellor
for Business Services/Controller
University of Wisconsin-Madison
on behalf of the Board of Regents of the University of Wisconsin System

4/1/2021

Date

MEMORANDUM OF UNDERSTANDING BETWEEN UNIVERSITY OF WISCONSIN-EXTENSION, CITY OF SUPERIOR, DOUGLAS COUNTY, FOND DU LAC BAND OF LAKE SUPERIOR CHIPPEWA, UNIVERSITY OF WISCONSIN SEA GRANT INSTITUTE, UNIVERSITY OF WISCONSIN SUPERIOR, WISCONSIN COASTAL MANAGEMENT PROGRAM, AND WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Multi-party MOU

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding (MOU) serves to establish the contractual framework for coordination, cooperation, collaboration, and communication regarding the Lake Superior National Estuarine Research Reserve (Reserve) among the following eight parties (parties-in-interest): The University of Wisconsin-Extension (UWEX), a state institution of higher education and a component of the University of Wisconsin System serving as the state lead entity; City of Superior; Douglas County; Fond du Lac Band of Lake Superior Chippewa; University of Wisconsin Sea Grant Institute; University of Wisconsin Superior; Wisconsin Coastal Management Program; and Wisconsin Department of Natural Resources. Subject to the MOU's below-conditions, this MOU is a binding contract that is entered into by the parties-in-interest.

WHEREAS, the State of Wisconsin (Wisconsin) has received a grant (Grant) from the United States Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA) for the development and operation of the Lake Superior National Estuarine Research Reserve (Reserve), which includes portions of the St. Louis River Freshwater Estuary and adjacent lands, and

WHEREAS, the purpose of the DOC grant is to create new opportunities for coordinated coastal resource management, research, monitoring, stewardship, and public education (Program), and

WHEREAS, such Program has wide public support, as evidenced by the documented public support throughout the Reserve feasibility study, site selection process, site nomination, and designation process, and

WHEREAS, the parties-in-interest have evidenced support for such a Program through their approval of the 2008 Site Nomination Proposal for the Reserve,

NOW THEREFORE, in consideration of the mutual covenants and agreements contained in this MOU as well as the mutual benefits to be derived from implementing this Program, the parties-in-interest agree to the following:

1. The lands described in Attachment A (attached to this MOU and incorporated into this MOU by this reference) are designated as sites participating in the Reserve.

2. There is a program management plan (Plan) for the Reserve that provides a framework for conducting a specified Program on Reserve sites (Attachment B). Revisions of the Plan shall be developed by the Reserve staff and reviewed by an advisory board (Board) composed of the parties-in-interest, as defined in Article 5a. The Plan shall be reviewed every five (5) years and revised in consultation with the Board and NOAA.

3. Parties-in-interest agree to exert their reasonable best efforts to support the implementation of the Plan. Nothing in this MOU diminishes the independent authority or coordination responsibility of any party-in-interest in administering its respective

statutory and legal obligations. Nothing in this MOU is intended to conflict with current written directives or policies of any party-in-interest. If the terms of this MOU are inconsistent with existing written directives or policies of any party-in-interest entering into this MOU, then those portions of the MOU that are determined to be inconsistent with such written directives and policies shall be invalid; but the remaining terms not affected by the inconsistency shall remain in full force and effect. At the first opportunity for revision of this MOU, all necessary changes will be made by either an amendment to this MOU or by entering into a new superseding MOU, whichever is deemed expedient to the interest of all parties. Issues that arise that may be contrary to the terms or intent of the Plan will be brought to the Board for discussion and resolution by consensus or majority vote of its members. Should disagreement arise on decisions of the Board or in the interpretation of the provisions of this MOU, or amendments and/or revisions to the MOU, that cannot be resolved by negotiations at the operating level of each party-in-interest, the area(s) of disagreement shall be stated in writing by each party-in-interest and promptly presented to a unanimously approved mediator for non-binding mediation. If the parties-in-interest cannot agree on the choice of a mediator or if the mediation does not resolve the dispute to the unanimous approval of the parties-in-interest, the parties-in-interest are free to pursue any other legal remedies that are available or to terminate their participation in this MOU.

4. Multiple uses of Reserve lands are encouraged to the extent that such uses are compatible with the Program and its purpose as expressed in the Plan. The parties-in-interest having jurisdiction over the Reserve site (or sites) will exert their reasonable best efforts to ensure uses or levels of use are consistent with the goals of the Plan.

5. Management Structure

    a. Board membership. The Board shall be comprised of members from the parties-in-interest. The University of Wisconsin-Extension, City of Superior, Douglas County, Fond du Lac Band of Lake Superior Chippewa, University of Wisconsin Sea Grant Institute, University of Wisconsin Superior, Wisconsin Coastal Management Program, and Wisconsin Department of Natural Resources shall each have one representative on the Board. Board terms shall be of three years duration, commencing on January 1, 2011 and ending three years thereafter.

    b. Board role. The Board shall act on behalf of the agencies/entities having jurisdiction over sites comprising the Reserve and/or an operational interest in the Reserve. Members of the Board will serve without compensation from the Reserve. In addition, the purpose of the Board is to advise UWEX regarding implementation of the Plan. The Board shall review the Plan every five (5) years and shall advise UWEX regarding modification of the Plan.

    c. Board meetings. Board members will be provided notice ten (10) working days in advance of a meeting. Fifty percent (50%) plus one (1) members of the parties-in-interest present in person or by proxy shall constitute a quorum for transaction of business at all meetings of the Board. Each member of the Board will have one vote in decisions put before the Board. Decisions regarding advice to UWEX

shall be made by a majority vote of the Board members present at a meeting.

d. Program implementation. UWEX shall implement the Program by hiring and directing Reserve staff, supervising and coordinating implementation of the provisions of the Plan, and by receiving and acting upon the recommendations of the Board. The Reserve staff will be directly responsible for Program coordination with agency/entity representatives having jurisdiction over Reserve sites. UWEX's obligation to implement the Plan is contingent upon continued receipt of Grants for the purpose of operating the Program.

e. Advisory committees. The Board may create committees or subcommittees to provide technical information or linkage to the broader community pertaining to the three main missions of the Reserve Program: research, education, and stewardship. Members of committees or subcommittees will serve without compensation from the Reserve.

f. New Board members affiliated with new parties-in-interest may be added to the Board by a majority vote.

6. No projects shall be carried out on Reserve lands without the approval of the agency/entity having jurisdiction over such lands.

7. The Reserve staff, Board, and appropriate advisory participants, if any, shall confer regularly to ensure coordination between the Reserve Program and the broader goals and mandates of regional coastal management programs that affect the Reserve.

8. This MOU shall not be construed to preclude additional transfers of property among the parties-in-interest, or to preclude additions or subtractions of appropriate lands to Reserve sites.

9. This MOU shall continue on an on-going basis so long as the Reserve Program is funded and remains viable. This MOU may be amended or terminated by the parties-in-interest at any time by majority vote and by written amendment to all parties-in-interest. Nothing in this MOU shall preclude the partial or unilateral withdrawal of any of the parties-in-interest. In such an eventuality, it is understood that the lands of the withdrawing party-in-interest would be de-designated from the Reserve, and it is further understood that, should the withdrawing party-in-interest have received federal awards related to the Reserve Program, it will notify such federal agencies as required with respect to modification or termination of current or pending grants.

10. All parties-in-interest agree to exert their reasonable best efforts to cooperate with the Reserve Program so that it can achieve its mission to serve as a regionally-scaled scientific and educational resource to help promote and recover the ecological health of the St. Louis River Freshwater Estuary and to foster continued support and expansion of regional Great Lakes freshwater estuary research, education, and stewardship.

11. The parties-in-interest understand that UWEX's primary mission is education and ensuring that all Wisconsin people can access university resources and research and engage in lifelong learning, wherever they live and work. Consequently UWEX's activities under this MOU are designed to carry out that mission.

12. The manner of performance of UWEX's activities under this MOU shall be determined by UWEX. UWEX does not guarantee specific results. UWEX is free to continue similar research and educational activities on other projects. UWEX may discuss its activities under this MOU with other entities and individuals.

13. UWEX shall have the right to use, publish, and disclose data, information, or writings generated by UWEX activities under the Program.

14. Nothing in this MOU or subsequent financial assistance awards shall obligate any party-in-interest in the expenditure of funds, or for future payments of money, in excess of appropriations authorized by law.

15. The parties-in-interest agree to comply with all applicable federal, state, and local laws regulating ethical conduct of public officers and employees.

16. Each party-in-interest will comply with all applicable laws, regulations, and executive orders relative to Equal Employment Opportunity.

17. Each party-in-interest will comply with all applicable laws, regulations, and executive orders relative to Indian Tribal governments, their sovereignty, and their treaty rights.

18. Upon termination of this MOU, any equipment purchased by a party-in-interest for activities initiated in furtherance of this MOU will be retained by the respective party-in-interest, as permitted if purchased with third party or federal funds that made the initial purchase.

19. A free exchange of data and information among the parties-in-interest is encouraged and is necessary to insure the success of these cooperative activities.

20. This MOU is subject to availability of appropriated funds.

21. The parties-in-interest shall not be liable for any incidental, indirect, special or consequential damages arising out of or related to this MOU.

22. The parties-in-interest are not making any express or implied warranties of merchantability, fitness for a particular purpose, freedom of infringement, or any other warranties of any kind or nature.

23. This MOU shall be binding on the successors and/or assigns of the parties-in-interest.

24. This MOU shall be construed and enforced in accordance with the laws of the State of

Wisconsin, exclusive of its choice of law provisions, as well as any applicable United States federal laws and regulations.

25. If any clause, sentence or other portion of this MOU shall become illegal, null or void for any reason, the remaining portions of this MOU shall remain in full force and effect.

26. No waiver of right by any party-in-interest of any provision of this MOU shall be binding unless expressly confirmed in writing by the party-in-interest giving the waiver.

27. No party-in-interest shall be liable for delays in performing the MOU due to factors beyond the reasonable control of such party-in-interest.

28. Those provisions of this MOU which by their nature extend beyond termination or expiration of this MOU shall survive such termination or expiration.

29. This MOU may be executed in two or more counterparts, all of which together shall constitute one and the same document.

UNDERSTOOD AND AGREED

University of Wisconsin-Extension

By: _____

Name: _____

Title: _____

Date: _____

City of Superior

By: _____

Name: _____

Title: Mayor

Date: _____

By: _____

Name: _____

Title: City Clerk

Date: _____

Douglas County

By: _____

Name: _____

Title: _____

Date: _____

Fond du Lac Band of Lake Superior Chippewa

By: _____

Name: _____

Title: Chairwoman

Date: _____

University of Wisconsin Superior

By: _____

Name: _____

Title: _____

Date: _____

University of Wisconsin Sea Grant Institute

By: _____

Name: _____

Title: _____

Date: _____

Wisconsin Coastal Management Program

By: _____

Name: _____

Title: _____

Date: _____

Wisconsin Department of Natural Resources

By: _____

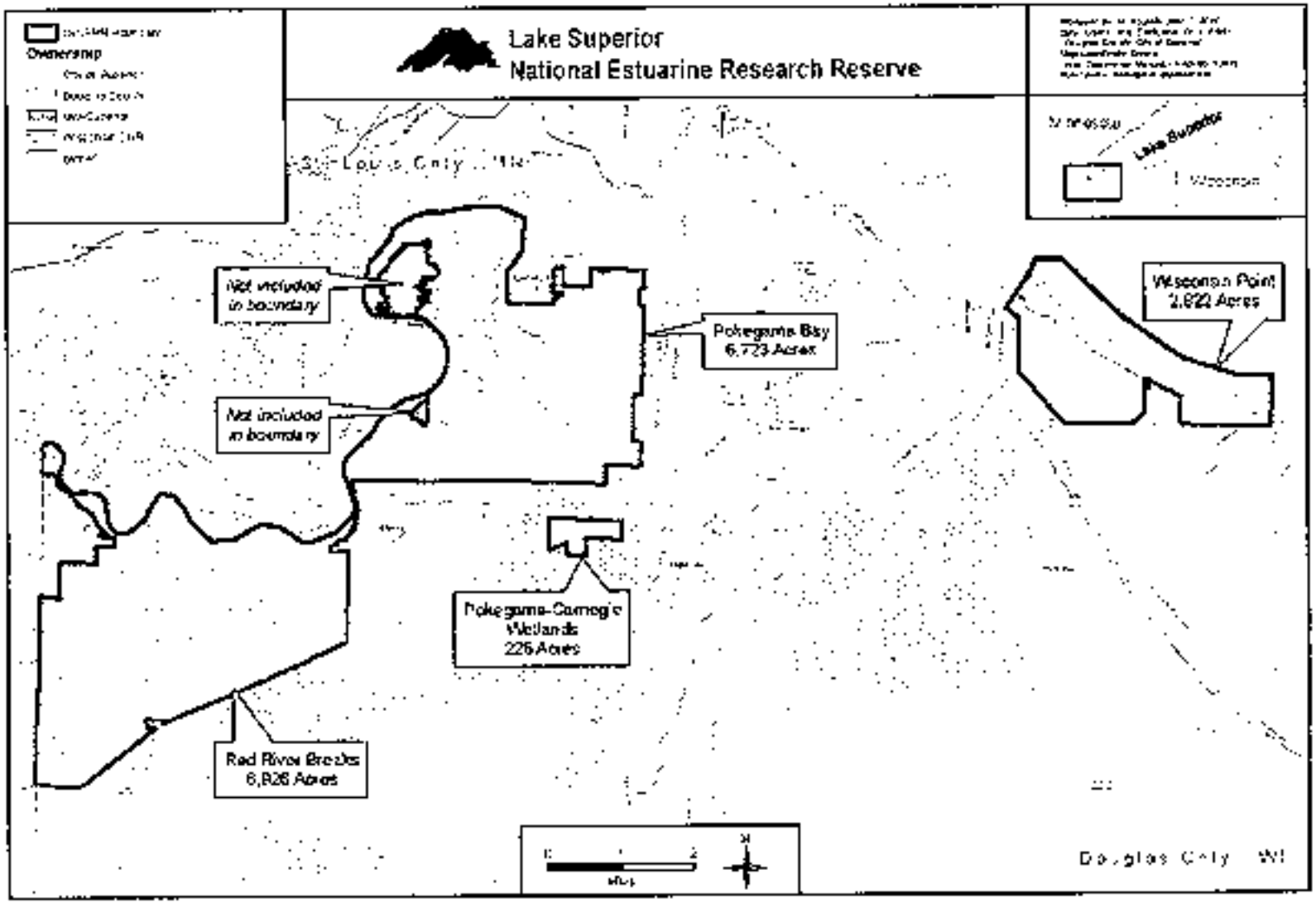
Name: _____

Title: _____

Date: _____

ATTACHMENT A

Properties Included in the Reserve



ATTACHMENT 8

The Lake Superior National Estuarine Research Reserve Management Plan

UNDERSTOOD AND AGREED

University of Wisconsin-Extension

By: Mark K. Doss

Name: Mark K. Doss
Controller

Title: _____

Date: AUG 25 2010

City of Superior

By: _____

Name: _____

Title: Mayor

Date: _____

By: _____

Name: _____

Title: City Clerk

Date: _____

Douglas County

By: _____

Name: _____

Title: _____

Date: _____

Fond du Lac Band of Lake Superior Chippewa

By: _____

Name: _____

Title: Chairwoman

Date: _____

University of Wisconsin Superior

By: _____

Name: _____

Title: _____

Date: _____

University of Wisconsin Sea Grant Institute

By: _____

Name: _____

Title: _____

Date: _____

Wisconsin Coastal Management Program

By: Jennifer Dowell

Name: Jennifer Dowell

Title: Dep. Secretary, Dept of Administration

Date: 9/3/10

Wisconsin Department of Natural Resources

By: _____

Name: _____

Title: _____

Date: _____

UNDERSTOOD AND AGREED

University of Wisconsin-Extension

By: _____

Name: _____

Title: _____

Date: _____

City of Superior

By: _____

Name: Dan Ross

Title: Mayor

Date: 9/13/10

By: _____

Name: Susi Kalan

Title: City Clerk

Date: 9/9/10

Douglas County

By: _____

Name: _____

Title: _____

Date: _____

Fond du Lac Band of Lake Superior Chippewa

By: _____

Name: _____

Title: Chairwoman

Date: _____

University of Wisconsin Superior

By: _____

Name: _____

Title: _____

Date: _____

University of Wisconsin Sea Grant Institute

By: _____

Name: _____

Title: _____

Date: _____

Wisconsin Coastal Management Program

By: _____

Name: _____

Title: _____

Date: _____

Wisconsin Department of Natural Resources

By: _____

Name: _____

Title: _____

Date: _____

UNDERSTOOD AND AGREED

University of Wisconsin-Extension

By:

Name:

Title:

Date:

City of Superior

By:

Name:

Title: Mayor

Date:

By:

Name:

Title: City Clerk

Date:

Douglas County

By:

Name: Andrew Lesh

Title: Administrator

Date: 9/23/10

Fond du Lac Band of Lake Superior Chippewa

By:

Name:

Title: Chairwoman

Date:

University of Wisconsin Superior

By:

Name:

Title:

Date:

University of Wisconsin Sea Grant Institute

By:

Name:

Title:

Date:

Wisconsin Coastal Management Program

By:

Name:

Title:

Date:

Wisconsin Department of Natural Resources

By:

Name:

Title:

Date:

UNDERSTOOD AND AGREED

University of Wisconsin-Extension

By: _____

Name: _____

Title: _____

Date: _____

City of Superior

By: _____

Name: _____

Title: Mayor

Date: _____

By: _____

Name: _____

Title: City Clerk

Date: _____

Douglas County

By _____

Name: _____

Title: _____

Date: _____

Fond du Lac Band of Lake Superior Chippewa

By: Karen R Diver

Name: Karen R. Diver

Title: Chairwoman

Date: 9/7/2010

University of Wisconsin Superior

By: _____

Name: _____

Title: _____

Date: _____

University of Wisconsin Sea Grant Institute

By: _____

Name: _____

Title: _____

Date: _____

Wisconsin Coastal Management Program

By: _____

Name: _____

Title: _____

Date: _____

Wisconsin Department of Natural Resources

By: _____

Name: _____

Title: _____

Date: _____

UNDERSTOOD AND AGREED

University of Wisconsin-Extension

By: _____

Name: _____

Title: _____

Date: _____

City of Superior

By: _____

Name: _____

Title: Mayor

Date: _____

By: _____

Name: _____

Title: City Clerk

Date: _____

Douglas County

By: _____

Name: _____

Title: _____

Date: _____

Fond du Lac Band of Lake Superior Chippewa

By: _____

Name: _____

Title: Chairwoman

Date: _____

University of Wisconsin Superior

By: Faith C. Hensrud

Name: FAITH HENSRUD

Title: INTERIM PROVOST

Date: 9-8-10

University of Wisconsin Sea Grant Institute

By: _____

Name: _____

Title: _____

Date: _____

Wisconsin Coastal Management Program

By: _____

Name: _____

Title: _____

Date: _____

Wisconsin Department of Natural Resources

By: _____

Name: _____

Title: _____

Date: _____

UNDERSTOOD AND AGREED

University of Wisconsin-Extension

By: _____

Name: _____

Title: _____

Date: _____

City of Superior

By: _____

Name: _____

Title: Mayor

Date: _____

By:

Name: _____

Title: City Clerk

Date: _____

Douglas County

By: _____

Name: _____

Title: _____

Date: _____

Fond du Lac Band of Lake Superior Chippewa

By: _____

Name: _____

Title: Chairwoman

Date: _____

University of Wisconsin Superior

By: _____

Name: _____

Title: _____

Date: _____

University of Wisconsin Sea Grant Institute

By: Robert W. Andren

Name: Anders W. Andren

Title: Director

Date: 9-20-2010

Wisconsin Coastal Management Program

By: _____

Name: _____

Title: _____

Date: _____

Wisconsin Department of Natural Resources

By: _____

Name: _____

Title: _____

Date: _____

UNDERSTOOD AND AGREED

University of Wisconsin-Extension

By: _____

Name: _____

Title: _____

Date: _____

City of Superior

By: _____

Name: _____

Title: Mayor

Date: _____

By: _____

Name: _____

Title: City Clerk

Date: _____

Douglas County

By: _____

Name: _____

Title: _____

Date: _____

Fond du Lac Band of Lake Superior Chippewa

By: _____

Name: _____

Title: Chairwoman

Date: _____

University of Wisconsin Superior

By: _____

Name: _____

Title: _____

Date: _____

University of Wisconsin Sea Grant Institute

By: _____

Name: _____

Title: _____

Date: _____

Wisconsin Coastal Management Program

By: _____

Name: _____

Title: _____

Date: _____

Wisconsin Department of Natural Resources

By: Al Shea

Name: AL SHEA

Title: Deputy Secretary

Date: 9/22/10

MEMORANDUM OF UNDERSTANDING
ON THE MUTUAL BENEFITS OF COOPERATIVE LOGISTICS
BETWEEN THE
U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT
MID-CONTINENT ECOLOGY DIVISION
AND THE
BOARD OF REGENTS OF THE UNIVERSITY OF WISCONSIN SYSTEM
UNIVERSITY OF WISCONSIN-EXTENSION
LAKE SUPERIOR NATIONAL ESTUARINE RESEARCH RESERVE

I. PURPOSE/OBJECTIVES/GOALS

A. PURPOSE

The U.S. Environmental Protection Agency (EPA), Office of Research and Development, Mid-Continent Ecology Division (MED) and the Board of Regents of the University of Wisconsin System, University of Wisconsin-Extension (UWEX), Lake Superior National Estuarine Research Reserve (LS NERR) enter into this Memorandum of Understanding (MOU) to create a framework with which to better understand how cooperative logistics or the exchange of information, techniques, and products can help more effectively and efficiently carry out their respective missions. The information exchange framework created under this MOU will focus on, but will not be limited to, researching the relationships between environmental, economic and socio-cultural conditions in and near the St. Louis River estuary (SLRE) of Lake Superior.

B. OBJECTIVES

The objective of this MOU is to share information on environmental research that assists Great Lakes coastal communities with decisions affecting the sustainability of coastal communities and their associated ecosystems. The information exchange framework will benefit the goals of EPA's Sustainable and Healthy Communities & Safe and Sustainable Waters Research Programs, the Management Plan of the LS NERR, and the education/outreach missions of UWEX. The framework will increase the ability of the LS NERR to partner on projects of mutual interest and benefit to western Lake Superior communities. The framework will be based on colloquial interactions among scientists but will take advantage of formal interactions at common venues.

C. GOALS

The goal of this MOU is to meet the operational needs of LS NERR and EPA to collect, analyze, and disseminate information related to the interconnected relationships between environmental and socioeconomic health. The goal can be achieved with efficient, effective, and on-going communication and interactions between EPA and LS NERR scientists.

II. BACKGROUND

EPA and LS NERR share the goal of assisting decision-makers and the public and working with them to share information and address environmental challenges. Research is intended to help people see connections between policy and management actions and the distributions of ecosystem services and

1

Mutual Benefits of Cooperative Logistics MOU

benefits. This MOU will facilitate cooperation between the EPA and LS NERR in order to leverage expertise and maximize the use of available resources.

The State of Wisconsin partnered with NOAA to designate portions of the St. Louis River estuary as a National Estuarine Research Reserve in 2010 under the Coastal Zone Management Act of 1972. Twenty-eight reserves have been designated. The LS NERR is the second reserve in the Great Lakes. It is administered by the UWEX and hosted by UW-Superior. The goal of this MOU is compatible with LS NERR's strategic need to form strong partnerships between Reserves, federal and state agencies, universities, and local partners.

The EPA's MED provides research leadership on ecotoxicology and freshwater ecology. Research projects intended to be subject to this MOU are part of EPA's Sustainable and Healthy Communities and the Safe and Sustainable Water Research Programs. These programs are developing the scientific tools and information needed to assist decision makers with integrating human health, socioeconomic, and environmental factors into decisions affecting community sustainability. Specific work is contributing to the understanding of the responses of biotic communities to environmental stressors. In the SLRE, and other coastal systems, stressors have resulted in the impairment of beneficial use of resources. Research goals include providing tools and information to further inform the environmental restoration and sediment remediation decisions.

Clearly, the missions of EPA MED and LS NERR are compatible in theme and scope. The exchange of information facilitated under this MOU will improve research outputs and positively impact outcomes of federal, state, and local decision-making.

III. AUTHORITIES

The EPA enters into this MOU pursuant to Section 104 of the Clean Water Act that encourages cooperative research investigation, training, and information sharing.

IV. ROLES AND RESPONSIBILITIES

While the information exchange framework created with this MOU is unfunded and non-binding, certain expectations have been agreed upon by the parties. Elements periodically will be reviewed and as necessary modified (see Section IX).

A. The EPA and LS NERR agree to share information on program-specific goals, approaches, and products in areas of mutual interest. Information sharing will be on-going and colloquial (i.e., peer-to-peer, interaction at common venues, etc.). EPA and LS NERR agree to meet formally in one joint meeting or seminar annually.

B. EPA intends to provide opportunities and facilities for its staff to meet with LS NERR scientists.

C. It is the intent of EPA and LS NERR that this agreement not involve the exchange of funds nor establish any obligation on the part of either party to make payment now or in the future to the other party.

D. EPA and LS NERR intend to share products from the collection, analysis, and reporting of information from the SLRE or other sites.

E. EPA and LS NERR scientists intend to discuss cooperative logistics regarding the collection and analysis of samples and data. However, the implementation of cooperative logistics, such as sharing sampling gear or analytical processing is outside of the scope of this MOU and must be covered by separate agreements.

F. EPA and LS NERR scientists intend to discuss cooperative logistics regarding the tools, data, platforms, venues, and information necessary to increase public awareness of environmental challenges and promote environmental stewardship, particularly in the SLRE. However, the implementation of cooperative logistics, such as joint outreach activities or data management, is outside of the scope of this MOU and must be covered by separate agreements.

V. LIMITATIONS

A. All commitments made in this MOU are subject to the availability of appropriated funds and the budget priorities of each party. Nothing in this MOU, in and of itself, obligates EPA, LS NERR, or UWEX to expend appropriations or to enter into any contract, assistance agreement, interagency agreement, or other financial obligation.

B. This MOU is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between the parties will be handled in accordance with applicable laws, regulations, and procedures, and will be subject to separate subsidiary agreements that will be effected in writing by representatives of both parties.

C. Except as provided in Section V paragraphs (A) and (B) and Section VII (INTELLECTUAL PROPERTY), this MOU is not legally binding and does not create any right or benefit, substantive or procedural, enforceable by law or equity against EPA, LS NERR, or UWEX, their officers or employees, or any other person. This MOU does not direct or apply to any person outside the LS NERR and EPA.

D. The parties agree that the use of EPA facilities or equipment and the presence of outside users at EPA facilities will be properly documented and subject to approval under separate agreements. Agreements for the joint use or loan of laboratory or field equipment must adhere to the regulations and policies of the owner of the equipment or facilities. This MOU only creates a framework for discussing and planning cooperative logistics. It does not require or obligate implementation by either party.

E. This MOU does not exempt either party from policies governing competition for assistance agreements or conflict of interest.

F. Parties may make factual statements to the public which describe collaborations or discussions conducted under this MOU. However, nothing in this MOU allows EPA to endorse the purchase or sale of LS NERR's products or services. LS NERR agrees not to make statements to the public in news releases, product brochures, on web sites or in any media that imply EPA endorsement of LS NERR products or services. Similarly, EPA agrees not to make statements to the public in news releases, product brochures, on web sites or in any media that imply LS NERR endorsement of EPA products or services.

G. One party may not represent themselves as an agent or spokesperson of the other party.

VI. PROPRIETARY INFORMATION

The exchange of information facilitated under this MOU may involve the disclosure of proprietary information by EPA or LS NERR. Proprietary information may include unpublished data or non-public information. Parties agree to clearly identify as such information disclosed in writing or orally. Parties agree not to disclose, copy, reproduce or otherwise make available in any form whatsoever to any other person, firm, corporation, partnership, association or other entity information designated as proprietary or confidential without consent of the other party except as such information may be subject to disclosure under the Freedom of Information Act (5 U.S.C. § 552), and EPA's regulations at 40 C.P.R. Part 2, or as otherwise authorized by law.

VII. INTELLECTUAL PROPERTY

The parties agree that technology, models, data, or products resulting or deriving from information exchanged under this MOU may be placed in the public domain and may be free for copying and distribution. The parties agree that any copyrightable subject matter, including but not limited to journal articles, training, educational or informational material or software, jointly created from the activities conducted under the MOU may be copyrighted by LS NERR or UWEX. LS NERR and UWEX hereby grants to the government a royalty-free, nonexclusive, irrevocable right to reproduce, distribute, make derivative works, and publish or perform the work(s) publicly, or to authorize others to do the same on its behalf.

VIII. POINTS OF CONTACT

The following individuals are designated points of contact for the MOU:

Mid-Continent Ecology Division, U.S. Environmental Protection Agency
Dr. Carl Richards, Director
6201 Congdon Blvd, Duluth, MN 55804,
Richards.Carl@epa.gov, Phone 218-529-5000

Lake Superior National Estuarine Research Reserve, University of Wisconsin-Extension
Dr. Erika Washburn, Reserve Manager
14 Marina Drive, Superior, WI 54880
Erika.Washburn@ces.uwex.edu, Phone 715-392-3141

IX. MODIFICATION/DURATION/TERMINATION

This MOU will be effective when signed by all parties. This MOU may be amended at any time by the mutual written consent of the parties. The parties will review this MOU annually to determine whether it should be revised, renewed, or cancelled. This MOU may be terminated by either party at any time by one party notifying the other party in writing 90 days in advance of the termination date.

X. APPROVAL

University of Wisconsin-Extension	**U.S. Environmental Protection Agency** **National Health and Environmental Effect Research Laboratory**
Margaret Erickson, Controller	Christopher S. Robbins, Deputy Director for Management
Date JUL 10 2014	Date 1/29/15

5

MEMORANDUM OF AGREEMENT (MOA)
Between United States Coast Guard Marine Safety Unit Duluth and Lake Superior National Estuarine Research Reserve Regarding Continuity of Operations

1. **PARTIES.** The parties to this Agreement are the United States Coast Guard (USCG) Marine Safety Unit (MSU) Duluth and, on behalf of the Lake Superior National Estuarine Research Reserve (LSNERR), the University of WI Board of Regents, dba. University of WI-Superior and the University of WI-Madison Division of Extension.

2. **AUTHORITY.** This Agreement is authorized under the provisions of U.S. Presidential Policy Directive 40 and the MSUDULINST 3010.15B Continuity of Operations, Policy & Planning (COOP).

3. **PURPOSE.** The purpose of this Agreement is to set forth terms by which MSU Duluth and the University of WI-Superior and University of WI-Madison Division of Extension on behalf of the LSNERR will provide adequate space, Wi-Fi and working conditions for the MSU of Duluth for no more than 30 consecutive days if the MSU requests to re-constitute at the LSNERR's Lake Superior Estuarium at 3 Marina Drive in Superior, WI.

4. **RESPONSIBILITIES.**

   a. U.S. Coast Guard
      i. MSU Duluth will request the ability to re constitute at the LSNERR, 3 Marina Dr. Superior, Wisconsin 54880
      ii. MSU Duluth will provide the LSNERR with as much notice as possible prior to requesting access to its facilities.
      iii. MSU Duluth will endeavor not to damage any property at the LSNERR, 3 Marina Dr. Superior, Wisconsin 54880 in the event of utilization of the facility.
      iv. In the event of COOP activation, MSU Duluth will not occupy LSNERR spaces for more than 30 consecutive days.

   b. Lake Superior National Estuarine Research Reserve
      i. The University of WI Superior and University of WI-Madison Division of Extension on behalf of the LSNERR agree for the LSNERR to provide running water, heating and/or cooling, and Wi-Fi capabilities for workstations.

5. **POINTS OF CONTACT.** The primary point of contact for the Coast Guard MSU Duluth affiles is the Junior Duty Officer at 218-522-0708. The primary point of contact for the Lake Superior National Estuarine Research Reserve Dr. Erika Washburn at 715-919-4461.

6. **LIABILITY.** The USCG's liability for actions taken pursuant to this MOA is as provided in the Federal Tort Claims Act ("FTCA"), at 28 U.S.C. § 2670. Under the terms of the FTCA, the USCG would be responsible for any damage or injury that is the direct and proximate result of the negligent act of USCG personnel, when acting in the scope of their employment. Neither party agrees to insure, defend, or indemnify the other.

MEMORANDUM OF AGREEMENT (MOA)
Between United States Coast Guard Marine Safety Unit Duluth and Lake Superior National Estuarine Research Reserve Regarding Continuity of Operations

7. **OTHER PROVISIONS.** Nothing in this Agreement is intended to conflict with current law or regulation or the directives of the United States Coast Guard, Department of Homeland Security or the Lake Superior National Estuarine Research Reserve. If a term of this agreement is inconsistent with such authority, then that term shall be invalid, but the remaining terms and conditions of this agreement shall remain in full force and effect.

8. **EFFECTIVE DATE.** The terms of this agreement will become effective on July 31, 2019.

9. **MODIFICATION.** This agreement may be modified upon the mutual written consent of the parties.

10. **TERMINATION.** The terms of this agreement, as modified with the consent of both parties, will remain in effect for one year or until July 31, 2020. The agreement may be extended by mutual written agreement of the parties. Either party upon 60 days written notice to the other party may terminate this agreement.

APPROVED BY:

Frances M. Smith
Commander, U.S. Coast Guard
Captain of the Port

8/19/2019
Date

Maria Cuzzo, Interim Provost &
Vice Chancellor of Academic Affairs
University of Wisconsin-Superior

8/9/19
Date

Dan Langer
Assistant Vice-Chancellor,
University of Wisconsin- Madison

8/13/19
Date

SITE LICENSE AGREEMENT

THIS SITE LICENSE AGREEMENT ("Agreement"), made this 18th day of September, 2018 ("Effective Date") by and between Regents of the University of Minnesota through its Natural Resources Research Institute ("NRRI") having an address of 5013 Miller Trunk Highway, Duluth, MN 55811, and Regents of the University of Wisconsin through its Lake Superior National Estuarine Research Reserve ("Licensor") having an address of 3 Marina Drive, Superior, WI 54880.

WITNESSETH:

WHEREAS, Licensor is the owner of a parcel of real property described in Exhibit A attached hereto ("Premises");

WHEREAS, NRRI is seeking a license to use a portion of the Premises for the purpose of locating, installing and operating certain equipment for the purpose of avian research; and

WHEREAS, Licensor is willing to grant NRRI a license for such purposes upon the terms and conditions set forth in this Agreement.

NOW, THEREFORE, for and in support of avian research and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, Licensor and NRRI, intending to be legally bound, hereby acknowledge and agree as follows:

1. Site License. Subject to the terms and conditions of this Agreement, Licensor hereby grants to NRRI, for the Term of this Agreement, a non-exclusive license to access the Premises and to use a portion of the Premises as described on Exhibit A (the "Licensed Site") to locate, install, deinstall, maintain, operate and repair at NRRI's cost and expense, certain equipment described on Exhibit A hereto (the "NRRI Equipment") and to collect data from the NRRI Equipment. The NRRI Equipment and all data collected by the NRRI Equipment shall remain the exclusive property of NRRI.

2. Term and Renewals. The term of this Agreement shall commence on the Effective Date and end on June 30, 2021 (the "Term") unless sooner terminated as set forth in Section 3 of this Agreement or extended by the mutual written agreement of the parties hereto.

3. Termination.

3.1 Events of Termination. Notwithstanding any provision to the contrary herein, this Agreement may be terminated as follows:

3.1.1 immediately upon written notice by either party to the other upon a default of any covenant or term hereof by the other party, which default is not cured within fourteen (14) days of receipt of written notice of default to the other party (without, however, limiting any other rights of the parties pursuant to any other provisions hereof); or

3.1.2 by NRRI by notice to Licensor or removal of the NRRI Equipment at any time without cause.

4. Notices. All notices hereunder shall be in writing and shall be deemed effective when (a) delivered in person, (b) delivered by private courier (with confirmation of delivery), (c) transmitted by email (with confirmation of receipt) or (d) upon receipt as evidenced by the return receipt after being deposited in the United States mail, first-class, registered or certified, return receipt requested, with postage paid, and addressed to the persons and at the address identified below (or any other address that the party to be notified

Site Licence Agreement

may have designated to the sender by like notice). For notices of termination, such notices shall be effective as set forth above in this Section 4 or such later date as stated in the notice of termination.

If to Licensor, to:

Lake Superior National Estuarine Research Reserve
3 Marina Drive
Superior, Wisconsin 54880
Attn: Erika Washburn, Reserve Manager
erika.washburn@ces.uwex.edu

As indicated in Exhibit A.

If to NRRI, to:

Natural Resources Research Institute
University of Minnesota Duluth
5013 Miller Trunk Highway
Duluth, MN 55811
Attn: Alexis Grinde, Research Program Manager
agrinde@d.umn.edu

5. Miscellaneous. This Agreement, including Exhibit A hereto, contains the entire understanding with respect to the subject matter hereof and may not be amended except by a written agreement duly executed by both parties hereto. This Agreement may be executed in counterparts, each of which shall constitute an original. The parties hereto agree that digitally scanned or facsimile copies of the signature of a party shall be binding upon that party.

6. Indemnification and Insurance.

6.1 NRRI agrees to defend, indemnify and hold harmless Licensor from any claims, injuries, damages and loss, including costs and attorneys' fees, arising from or related to the activities of NRRI's employees, officers, consultants, contractors and agents on the Premises, except to the extent such injury, damage or loss is the result of the willful or negligent act or omission of Licensor, its agents, employees or representatives.

6.2 NRRI agrees to keep in force during the Term comprehensive general liability insurance, including coverage for bodily and personal injury, property damage, and contractual liability, with limits of not less than $1,000,000 each claim and $3,000,000 each occurrence.

6.3 Notwithstanding anything to the contrary in this License, NRRI's liability is limited to the extent of its insurance coverage pursuant to the Minnesota State Tort Claims Act, Minn. Stat. § 3.736, and other applicable law.

IN WITNESS WHEREOF, the parties have caused this Agreement to be duly executed effective as of the Effective Date.

LICENSOR

By _____
(Signature)

Name Margaret Erickson
(Typed or Printed)

Title Controller
(Typed or Printed)

REGENTS OF THE UNIVERSITY OF MINNESOTA THROUGH ITS NATURAL RESOURCES RESEARCH INSTITUTE

By _____
(Signature)

Name Rolf T. Weberg
(Typed or Printed)

Title NRRI Executive Director
(Typed or Printed)

By _____
(Signature)

Name Rob Waksdahl
(Typed or Printed)

Title Interim Vice Chancellor for Administration & Finance
(Typed or Printed)

IN WITNESS WHEREOF, the parties have caused this Agreement to be duly executed effective as of the Effective Date.

LICENSOR

By _____
(Signature)

Name Margaret Erickson
(Typed or Printed)

Title Controller
(Typed or Printed)

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Title NRRI Executive Director
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By _____
(Signature)

Name Rob Waksdahl
(Typed or Printed)

Title Interim Vice Chancellor for Administration & Finance
(Typed or Printed)

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(Signature)

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(Typed or Printed)

Title Controller
(Typed or Printed)

REGENTS OF THE UNIVERSITY OF MINNESOTA THROUGH ITS NATURAL RESOURCES RESEARCH INSTITUTE

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(Typed or Printed)

Title NRRI Executive Director
(Typed or Printed)

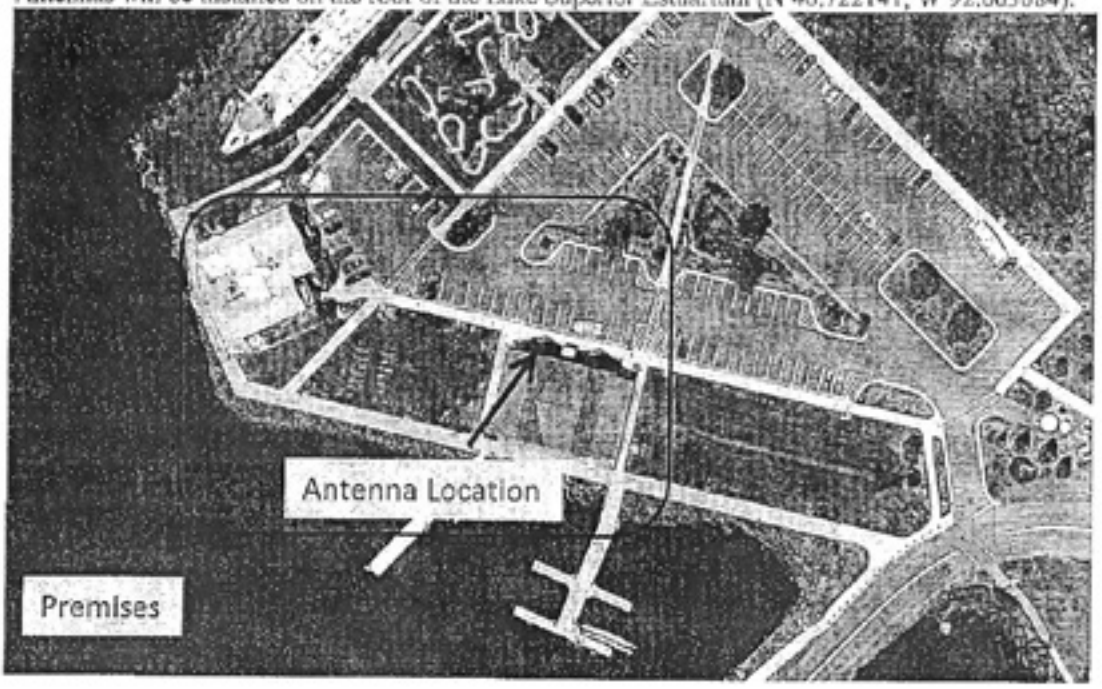
By _____
(Signature)

Name Rob Waksdahl
(Typed or Printed)

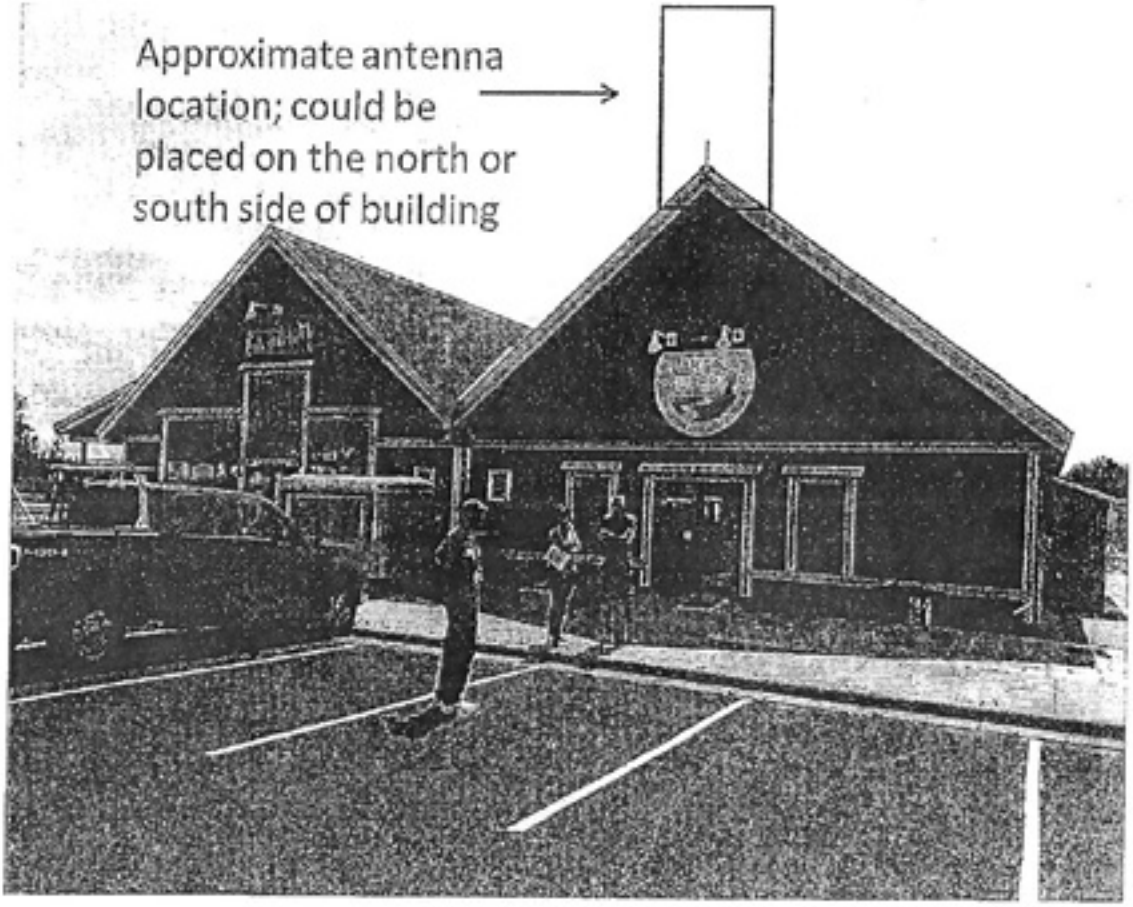
Title Interim Vice Chancellor for Administration & Finance
(Typed or Printed)

Exhibit A

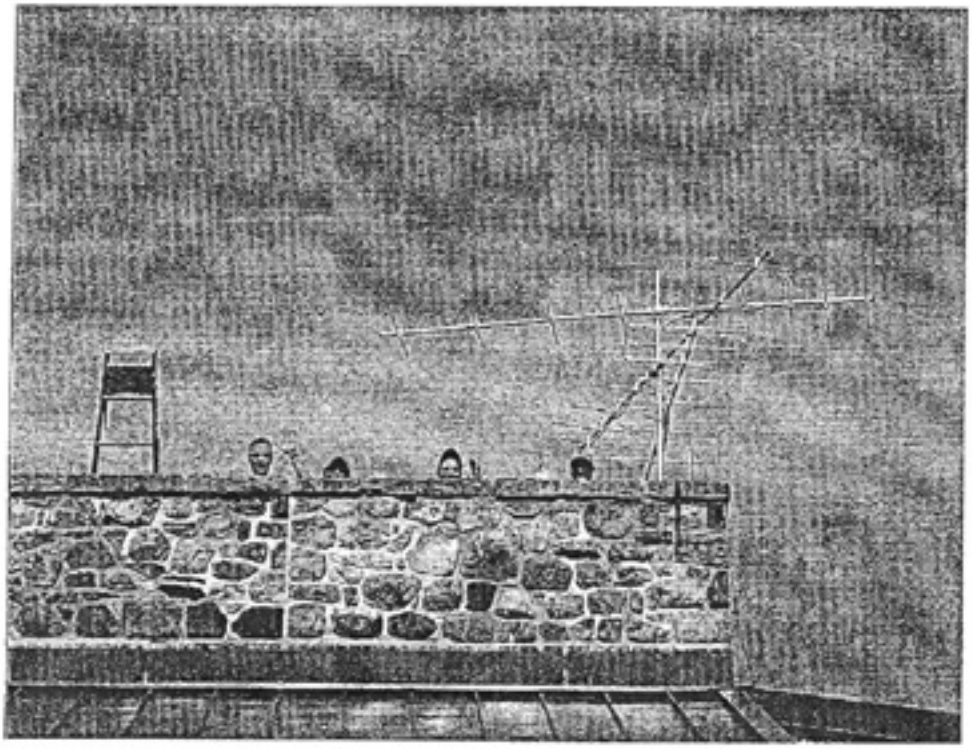
Premises: Map of Premises depicting the location where antenna will be installed. The Premises is located at the Lake Superior National Estuarine Research Reserve at 14 Marina Drive, Superior, Wisconsin 54880. Antennas will be installed on the roof of the Lake Superior Estuarium (N 46.722141, W 92.063084).



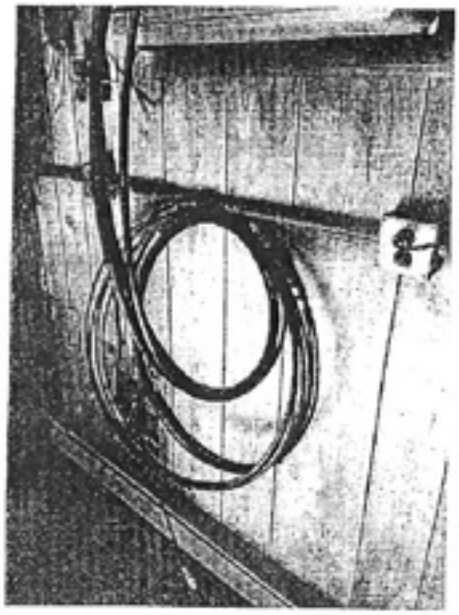
Licensed Site: Antennas will be installed on a single mast in a short tripod on the roof of the Lake Superior National Estuarine Research Reserve building. The antenna receiver will be placed at the base of the Lake Superior Estuarium building. Continuous electrical power will be supplied by the Licensor. Antenna could be placed at the north or south end of the building.



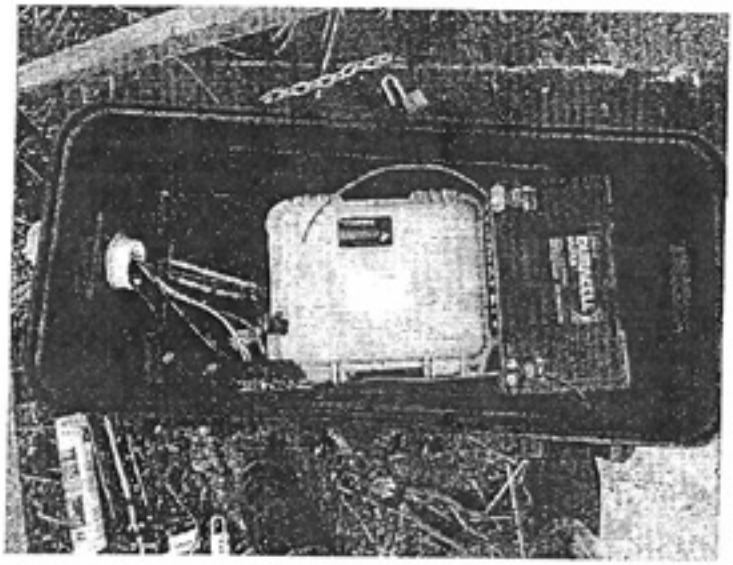
NRRI Equipment: NRRI Equipment consists of a Sensorgnome (radio receiver) in a Rubbermaid ActionPacker or similar, nine-foot Yagi antennas (3 or 4) on a single mast, cables to connect the antennas to the Sensorgnome, and an extension cord to an existing power source.



NRRI Equipment 1: Example antenna installation on rooftop.



NRRI Equipment 2: Example antenna cables.



NRRI Equipment 3: Example ActionPacker with Sensorgnome inside.

Licensor Notice: All notices pursuant to Section 4 of this Agreement shall be sent to Licensor at:

Name: Erika Washburn

Address: 3 Marina Drive, Superior, WI 54880

Email Address: erika.washburn@ces.uwex.edu

Phone Number: (715) 399-4085

NRRI Contact Information:

Alexis Grinde
Research Program Manager
Natural Resources Research Institute
University of Minnesota Duluth
5013 Miller Trunk Highway
Duluth, MN 55811
agrinde@d.umn.edu
218-788-2747

Name of comment submitter	Comment	Response of Reserve staff
Friends of Lake Superior Reserve	Page 18: Regarding the list of BUIs in the AOC – BUI 3 was removed in 2019; BUI 6 was removed in 2020; BUI 8 was removed in 2014.	Correction has been made.
	Page 19: Regarding the use of the word "pristine" – Lake Superior, as well as all of the landscape in and around the reserve has been altered by human activity to a greater or lesser degree. While there are many notable areas of high-quality native plant communities and aquatic ecosystems, none are truly "pristine" and all require a degree of stewardship, restoration, and management action to maintain their ecological function.	Correction was not made because the word pristine was drawn directly from a reference.
	Pages 22-25: Several named areas on this section, including "Douglas County Special Use Area," "Superior Municipal Forest," "Oliver Marsh," and "Nelson Outdoor Laboratory" are not identified on any Plan maps. Since this section appears to be organized by land ownership, it would be useful to have an ownership map here, labeled with the place names used in the Plan, to help orient readers to their locations relative to the Reserve boundary.	This will be corrected in the next version of the management plan, when maps are updated with pending boundary changes.
	Page 30: FOLSR looks forward to ongoing collaboration with the Reserve as we seek to support the mission of the Reserve. We appreciate the past support of the Reserve in helping foster the establishment of FOLSR and the commitment of the Reserve to working closely with us in the future as described in the section "Volunteers – Objective 1."	No correction needed. Comment is appreciated!
	Page 33: Objective 1 Strategies – We appreciate the commitment the Reserve has made to hosting annually the St. Louis River Summit and are pleased to see a continued commitment to this important forum in the Plan. The Summit is the premier regional conference bringing together resource managers, educators, and research scientists focused on the St. Louis River estuary and it has become a crucial and much-appreciated opportunity to foster collaboration. We encourage the Reserve to consider also other collaborative research and management networks as a way of amplifying the	No correction needed. Comment is appreciated.

	work of the Reserve and filling important research needs. A good example of this type of collaboration is the Reserve's work with the Natural Resources Research Institute's Avian Ecology Lab to expand the Motus Wildlife Tracking Network with adding a Motus receiver to the Reserve's Headquarters facility. Identifying and engaging in other such regional and national efforts will help the Reserve strengthen its role as a leader and critical collaborator in research and stewardship.	
	Page 40: Education Programs – FOLSR recognizes the value of the priority education programs listed in the Plan. We look forward to partnering with the Reserve on these priorities, particularly in the development and delivery of "formal and nonformal education programs for youth," "community programming, celebrations and events," and at the Lake Superior Estuarium. Assisting with docents, volunteers, and supporting events are areas of potential collaboration we hope to expand on in support of the Reserve.	No correction needed.
	Page 66: FOLSR appreciates our inclusion in the Plan and the effective partnership forged with the Reserve.	No correction needed.
	Page 80: Map 7.1 might be better titled "Map of Reserve public water access points" as it appears to focus on places to launch watercraft. It might also be beneficial for the Reserve to map other public water access sites outside the Reserve boundaries as many boaters may find it more convenient to launch from a site outside the boundary to explore the Reserve. In general, a more comprehensive and complete list of public water access sites and trails throughout the estuary would be good to either include in the text or by referencing other documents such as the St. Louis River Estuary Water Trail map (https://www.stlouisriver.org/national-water-trail-map) or the St. Louis River Estuary Public Access and Cultural Guidebook (https://coast.noaa.gov/data/digitalcoast/pdf/slregb.pdf). Note too that the water trail was recently (October 2020) designated	Link to St. Louis River Estuary National Water Trail map now included in document.
	Page 81: The City of Duluth has formally renamed the Western Waterfront Trail as Waabizheshikana, the "Marten Trail."	Correction made.
	Page 81: A number of important hiking trails are not included in the Plan, including, but not limited to trails on Minnesota and Wisconsin Point, the Superior Municipal Forest, and the recently opened Bear Creek Trail. The Wisconsin Point Trail	Updated Wisconsin Point description to include Bear Creek Trail. Maps will be

	description should be updated to indicate that the Bear Creek Trail (presumably described on page 82 and on page 83) has been completed.	updated in future management plans after the Bear Creek Trail construction has been completed.
	Page 81: Table 7.1 would benefit from section headings to make it clear which geographic component of the Reserve is being addressed.	This will be amended in a future plan.
	Page 88: The Estuarium presents unique facility maintenance challenges relative to other buildings owned by UW-S. We recommend that additional and alternative solutions be explored for facility support, especially during weekends and evenings and when urgent maintenance situations arise at the Estuarium or Confluence Room.	No corrections needed. Revisions to an MOU with UW-Superior have clarified roles related to buildings.
	In addition to the lands identified in the Plan, FOLSR recommends that the following properties should be added to the Reserve: o Rat Island (often unnamed on maps/charts) directly west of Clough Island. o Those parcels owned by the City of Superior and Douglas County west of Moccasin Mike Road and east of the current boundary line through the coastal marshes on the eastern end of Allouez Bay. o Those parcels owned by WDNR and Douglas County comprising the Pokegama-Carnegie wetland State Natural Area. Currently the Reserve boundary does not match WDNR's site map of the State Natural Area (see: https://dnr.wi.gov/topic/lands/naturalareas/documents/topomaps/map516.pdf). The reserve should consider a boundary change to accurately reflect WDNR ownership and the Douglas County owned land and include those parcels in the Reserve boundary.	These additions noted here by FOLSR have been considered in the boundary change planning process. The Rat Island addition will not be pursued at this time due to portions of the island being under management of an agency that is not currently an MOU signatory for the Reserve. The Superior and Douglas County parcels along Allouez Bay were not included in the original Reserve boundaries due to the presence of a historic landfill on the property.

		The Pokegama Carnegie Wetland State Natural Area boundary will be corrected during the boundary update process before 2025. Additions have been made to the plan text on pages 91.
Dr. Peter Nordgren	I have read the LSNERR Five Year Management Plan with interest. The LSNERR staff has done an excellent job of presenting the NERR's accomplishments, current activities, and planned directions to carry out its mission. I would like to suggest an addition on Page 73 of the plan, in the section describing access to the Wisconsin DNR's Red River Breaks and St. Louis River Streambank Protection Area. The property can now also be accessed from a segment of the North Country National Scenic Trail, administered by the National Park Service. The trail crosses the southwest part of the property. This new trail segment was opened in 2019, likely after the draft of the plan was prepared. For reference, see maps at https://northcountrytrail.org/the-trail/explore-the-trail/	Addition of North Country Trail description added on Page 81.
Nelson Thomas, Retired EPA, Barkers Island Marina Board	The plan has a great many fine goals but it not clear how they can be achived. The plan was written by planners not doers. Staff directors are listed page 65. Supporting help should also be included, as well University scientist. It is better to do a few projects and do them well than then opposite. The goals are good but specifics are not provided. The monitoring should be connect to your first goal climate change. There is a well developed Great Lakes data storage system. You need not to develop one. The Great Lakes Observatory and /or EPA could advise you. The plan should include specific results accomplished by you that were part of plan past goals. In the Barkers Island write up page 80 Barkers Island Marina has 400 docks. It also is the largest marina on Lake Superior. It is the major pleasure boat repair facility in the upper great lakes.	Corrections made to include information about Barkers Island Marina on Page 80. Frequent collaborators with the reserve are noted throughout the plan but also very prominently on pages 35, 41, and 50; the graphic on page 65 also includes the reserve advisory board which actively support the Lake Superior NERR (as

		discussed in the reserve's administrative plan beginning on page 55). Many of the listed partners include University scientists. Research and monitoring strategic objective 4 notes that the reserve intends to adapt and expand the system-wide monitoring program to reflect present and potential ecosystem stressors, including storm events, algal blooms, and habitat change, which the plan acknowledges are threats and stressors that are interrelated with climate change on page 18 of the plan. Furthermore, the mission of the research and monitoring program outlined on page 35 notes that the program will focus on identified research and monitoring needs including climate change. More information on how the reserve's research and

		monitoring program addresses climate change can be found on page 36. While the goals outlined in the reserve's strategic plan are visionary, subsequent sections of the plan describe specific strategic objectives and strategies for achieving these goals. For examples, please reference pages 32-54 of the plan.
Paul Piszczek, Wisconsin DNR	This is a very well-written management plan. My compliments to all authors/contributors. Page 22, "Red River Breaks" section: Delete "Red River" from "St. Louis and Red River Streambank Protection Area" (SBPA). The SBPA is officially named "St. Louis River Streambank Protection Area." It is accurately noted on Page 90, but inaccurately referenced as "St. Louis and Red River Streambank Protection Area" on Page 73. The protection area is managed by Wisconsin DNR through DNR's Superior Coastal Plain Regional Master Plan (completed in February 2019). The SBPA component starts on Page 94 of the master plan, available at: https://embed.widencdn.net/pdf/plus/widnr/3rv49zubit/SCP_RegionalMasterPlan.pdf?u=umm5nf&showinbrowser=true Thank you for the opportunity to comment. I have enjoyed working with LS NERR staff.	Corrected to read "St. Louis River Streambank Protection Area" on pages 22 and 73.
Barb Huberty, MPCA	1. There was no information about how the Reserve's work could inform the collaborative planning effort that is currently underway and being led by the South St. Louis County Soil and Water Conservation District (i.e., the St. Louis River's One Watershed One Plan) or whether Reserve staff are/will be participating in that effort.	Reserve staff take note of this suggestion and will consider future participation.

	2. At several locations throughout this document, "estuaries" is used in the plural form rather than estuary, giving the impression that we have more than one estuary here.	The plural refers to Lake Superior estuaries.
	3. On page 1, reference is made to a tiered scope. Seeing this depicted visually would be helpful to get a better sense of the priority areas, geographically.	This will be considered in a future plan.
	4. On page 12, under Social Attributes, there is a reference to 3.5M visitors per year to the Twin Ports. Visit Duluth cites numbers that are much higher (& that refer specifically to Duluth): "6.7 million tourist visitors per year accounting for over $950 million in economic impact."	Correction made on page 12.
	On page 18, under the Industrial history and the St. Louis River AOC: o The SLRAOC was designated in 1987, not 1989.	Correction made on page 18.
	On page 18: In the second paragraph of that section, rather than saying we will be "removing sediment", please change that to "remediating sediment"; only in very limited situations is sediment actually being removed; other techniques like capping and adding amendments are used more commonly to reduce environmental and human health risks from contaminated sediments. Similarly, rather than saying "protecting islands and shoreline", please say "restoring habitat", which is a much more comprehensive term. There is only one island that is included as a management action and shorelines are only one of many restoration components.	Corrections made on page 18.
	On page 18: o Under the Threats and Stressors section, please note that …six "BUIs remain as stressors in the ecosystem." In the list of BUIs, please replace the term delisting with removal (we remove BUIs and delist the AOC). If you wish, you could add parenthetical statements that BUI 2 is planned for removal in 2021, that BUI 3 was removed in 2019, BUI 6 was removed in 2020, and BUI was removed in 2014.	Corrections made on page 18.
	On page 18 o In the paragraph following the BUI list, you infer that all water, etc. that enters the estuary ultimately reaches Lake Superior. I'm not sure that is correct; I think the estuary is a sink for some constituents, such that only some of the constituents reach the Lake. Later in that same paragraph, you mention	Correction made regarding stormwater on page 18.

	treated wastewater and stormwater. Stormwater is not centrally treated.	
	On page 19, fish consumption advisories are in effect for both mercury and PCBs.	Correction made on page 19.
	On page 19, in the Boundary Description section, I'd recommend that where Map 2.1 is referenced in the text, you add a statement that enlarged versions of Maps 2.1-2.9 are contained in Appendix A.	Correction made on page 19.
	On page 19, in the last bullet, I don't believe the Fond du Lac Band is considered part of our federal government; it might be better to use a comma instead of a slash mark in that series of partners.	Correction made on page 19.
	On pages 22 – 24, mention is made of levees and their importance to marsh habitat, but there was no mention of the fact that those wetland-protective levees are being lost due to factors related to higher water levels.	Future plans may include more information about fluctuating water levels, but robust information related to changes in the natural levees as a result of recent high-water levels is not currently available via the Reserve or our partners. Sentinel Site monitoring data collected by the Reserve does demonstrate changes of the levee plant communities as a result of fluctuating water levels. The Sentinel Site is described on page 37.

	On pages 20-21, in maps 2.4, 2.5, 2.6, and 2.7, I would have found it helpful to have seen the symbols for core and buffer areas overlain on top of the aerial photograph so I could reference each figure while reading the narrative text.	This suggestion will be considered as part of map updates in a future plan when maps are updated with pending boundary changes and the Reserve has enhanced mapping support.
	On page 24, under the Wisconsin Point description, mention could be given to two completed AOC projects: the Wisconsin Point Dunes and the Piping Plover habitat restoration projects. Also, it is a former, inactive Coast Guard station, correct?	Additions made on page 24.
	On page 25, Map 2.10, note that the Reserve properties are in yellow.	Correction made on page 25.
	On page 34, the 2nd bullet under strategies, replace the word "delisting" with removal.	Correction made on page 34.
	On page 35, in order to think about who might be missing, it would be helpful if the list of the organizations were categorized by local, state, federal and tribal organizations and then listed alphabetically within each group. The Landmark Conservancy should be listed as the Wisconsin Landmark Conservancy. EPA-MED is now EPA-GLTED. Add the City of Duluth? Duluth Seaway Port Authority? HTAC? Others?	We will consider this revision in a future plan, as frequent research partners change over time.
	On page 36, under Restoration research, you reference the 2017 AOC RAP, this should be updated either to the 2020 version, which should be posted by the end of December. Also, are you working with EPA-GLTED folks on their Remediation, Restoration, and Revitalization Effectiveness efforts for which some of the SLRAOC's project sites are being included in their evaluation?	Correction made to 2020 AOC RAP. The REserve has been working closely with the GLTED R to R to R process related to the Barkers Island/Pickle Pond project, which is near our offices.

	On Page 37, under the Needs and opportunities section, you say: "Several opportunities revolve around the St. Louis River's designation as an AOC and the ongoing delisting process." If this is still the case, can you be more specific about the role the Reserve is playing? If not, I'd suggest deleting that sentence.	Clarification made on page 37.
	On page 38, first paragraph, is there value in mentioning the pursuit of Science Collaborative funding to support building the long-term monitoring network?	Comment is noted. No corrections made. The Reserve will continue to pursue funding related to long-term collaborative monitoring in the Estuary, through the NERRS Science Collaborative or other opportunities that arise.
	On p. 38, under the Education section, (and in later sections of the Plan, notably page 40) I was pleased to see several references that would support creating a citizen science network for the Reserve. Such a program would be a great way to support the Reserve's mission and meld its focus areas of Research & Monitoring, Education, and Coastal Training, while extending Reserve capacity and creating citizen ownership in the Reserve and protection of the SLRE resources. The development of a Stewardship Program and funding a Stewardship Coordinator (mentioned in the prior section) could also increase research capacity supported by citizen science efforts.	Comment is noted. No corrections made.
	On page 44, under Community Education Recommendations, the 3rd bullet references using trails to improve information access. Is their value in noting the recent designation of the SLRE National Water Trail?	Information regarding the St. Louis River National Water Trail was added on Page 80.
	On pages 44, 49 & 50, tours are mentioned, but none refer specifically to tours on Reserve properties; is that an option that is being considered?	Tours within the Reserve boundaries are regularly led by education staff, but tours are not exclusively

		within the boundaries. No corrections made.
	On page 45, I suggest modifying the first bullet under Interpretive Center Recommendations to read: "… from historic times, through the AOC delisting process, and beyond to address emerging issues." The AOC is not addressing modern day issues and the LSNERR is.	The AOC delisting process itself is referred to as contemporary. No changes made.
	On page 45, under Capacity and opportunities (and also on p. 66), there is discussion about the need for volunteers to supplement staff capacity, potentially being managed by FOLSR in a volunteer coordination role. I wonder about the ability of a volunteer organization being adequately equipped to fully manage a volunteer program and whether a Volunteer Coordinator should instead be considered as a Reserve staff need (or integrating those duties into the Stewardship Coordinator position). Regardless of who manages a volunteer program, I think there is a need to develop a concrete list of volunteer opportunities (beyond staffing the Estuarium) so people know how and when to engage their talents. With so many education and science-based careers in the Twin Ports area, I suspect there are a lot of working and retired professionals that can be tapped to help meet the Reserve's unique research, education, and training needs.	The suggestions noted here will be considered in the process of establishing volunteer opportunities and shared with FOLSR.
	On pages 48-51, there are several places describing CTP program efforts that "will be completed" in 2019. These should be updated to reflect the outcome of those efforts.	Since the management plan was completed and submitted in 2019, revisions will appear in the next version of the plan.
	On page 62, please delete the word "enhance" from the reference to MPCA's mission (it was removed in a recent mission revision).	Correction made on page 62.
	On page 62, under the Future RAB members and new partners section, the EPA-GLTED name should be updated.	Correction made on page 62.

	On page 66, it would be good to share the FOLSR's membership level as an expression of their capacity to undertake the tasks described in the first paragraph. You reference an in-progress FOLSR tactical operational plan for 2019. Was this completed? Is it a multi-year plan or is it updated annually?	Addition made to page 66: Further information about FOLSR can be found on their website at www.folsr.org
	On page 68, in the list of Research and Monitoring target audiences, should tribal agencies be added?	Correction made on page 68.
	On page 71, there is a sentence: "Some sediment-derived contaminants also appear to be carried by the water column to Lake Superior, the most pristine Great Lake." I'm not aware of AOC work that documents this statement and you did not include a footnote identifying the source of this conclusion. If there is evidence for that statement, can you please footnote it? Otherwise, I'd recommend deleting it.	Sentence removed from page 71.
	On page 72, I'd recommend deleting the sentence beginning "The AOC delisting roadmap developed in 2013…" and replacing it with this: "The 2020 St. Louis River AOC Remedial Action Plan anticipates delisting the AOC sometime after 2025." Later in that same paragraph, delete 2016 and replace it with 2020.	Corrections made on page 72.
	On page 76, in the Allouez Bay bullet, Revise it to say that the Piping Plover habitat restoration project was completed in 2020 as an SLRAOC management action.	Correction made on page 76.
	On page 81, under the Hiking section, the name of the Western Waterfront Trail has been changed to Waabizheshikana: The Marten Trail.	Correction made on page 81
	On page 89, is it worth mentioning in the photo's caption that Spirit Island is owned by the Fond du Lac Band?	Comment is noted. No corrections made, as photo shows more land areas than Spirit Island.
	On page 92, I believe the proposed Talus Island Paddle Center is no longer being pursued by the City. If that is the case, you might want to delete that phrase.	Correction made on page 92.

	Something to keep in mind when the Reserve begins preparing their next five-year plan: the AOC Program will be coming to an end within that timeframe. That may warrant significant revisions to the Plan in order to transition emphasis away from the AOC focus on legacy issues and toward programs that WI and MN are implementing under the federal Clean Water Act.	Comment is noted. Thank you!

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office for Coastal Management
Silver Spring Metro Center, Building 4
1305 East-West Highway
Silver Spring, Maryland 20910

November 23, 2020

Kathleen Angel
Federal Consistency and Coastal Hazards Coordinator
Wisconsin Coastal Management Program
Wisconsin Department of Administration
101 E Wilson Street, 9th floor
P.O. Box 8944
Madison, WI 53708-8944

Re: Coastal Zone Management Act Negative Determination
Lake Superior National Estuarine Research Reserve 2020 – 2025 Management Plan

Dear Ms. Angel:

Pursuant to section 307(c)(1) of the Coastal Zone Management Act (CZMA), 16 U.S.C. § 1456(c)(1), and 15 C.F.R. § 930.35, NOAA's Office for Coastal Management, Stewardship Division, is submitting this negative determination for the federal approval of proposed revisions to the management plan for the Lake Superior National Estuarine Research Reserve, attached. We have determined that the approval of revisions to the plan will have no effects to the coastal uses or resources of Wisconsin.

The CZMA requires that federal actions affecting coastal uses or resources of the coastal zone of a state be consistent to the maximum extent practicable with the enforceable policies of state coastal management programs. When a federal agency determines that an activity of the agency has no coastal effects, the CZMA requirements do not apply except in those circumstances specified at 15 CFR 930.35 where a negative determination must be submitted to the state for review. The Federal Consistency regulations at 15 CFR § 930.35(a)(2) specify that a negative determination must be submitted for activities that are the same or similar to those for which effects were previously found and a consistency determination submitted to the state. In this instance, it has been determined that although a finding of coastal effects was made and a consistency determination submitted for previous management plans, the approval of the revised Lake Superior NERR Management Plan would have no coastal effects as there are no substantive changes between the actions and priorities included in this plan and the previous management plan.

Pursuant to 15 C.F.R. § 930.35, the Wisconsin Coastal Management Program has 60 days from the receipt of this negative determination to concur with or object to the finding of no coastal effects, with an option to extend the review an additional 15 days pursuant to 15 C.F.R. § 930.41 (b) with notice to this Office. NOAA will presume State concurrence if a decision by the state is not received by the 60th day from receipt of this determination (or 75 days if the review period is extended by the state).

Please send the State's response to:

Elizabeth Mountz
Program Specialist
National Oceanic and Atmospheric Administration
NOS, Office for Coastal Management

Please let me know if you have any questions or concerns. I can be reached at (301) 728-2712 or at Elizabeth.Mountz@noaa.gov

Sincerely,

Elizabeth Mountz
Stewardship Operations Manager
National Estuarine Research Reserve System

Attachment

Cc: Deanna Erickson, Acting Manager, Lake Superior National Estuarine Research Reserve

LakeSuperiorReserve.org

The Lake Superior National Estuarine Research Reserve is part of the National Estuarine Research Reserve System, established by Section 315 of the Coastal Zone Management Act, as amended. Additional information about the system can be obtained from the Estuarine Reserves Division, Office for Coastal Management, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, 1305 East West Highway - N/ORM5, Silver Spring, MD 20910. An EEO/AA employer, University of Wisconsin–Madison Division of Extension provides equal opportunities in employment and programming, including Title VI, Title IX, the Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act requirements.