Lake Superior Estuary and Coastal Wetland Biotic Inventory Plan

Wisconsin's Natural Heritage Inventory Program
Bureau of Natural Heritage Conservation
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Cover Photos:
Clockwise from upper left: Stockton Island Tombolo by Christina Isenring, Bad River/Kakagon Sloughs by Christina Isenring, Lost Creek State Natural Area by Ryan O'Connor, Little Sand Bay by Christina Isenring.

Table of Contents

List of Figures

List of Tables

Introduction

Purpose and Objectives

The intent of this document is to develop a prioritized inventory plan for collecting new and updated baseline data of Lake Superior estuaries and coastal wetlands with a secondary goal of collecting information that may inform understanding of estuarine characteristics and functions. This inventory plan will outline the biotic inventory needed to assess the biodiversity composition, significance, and threats to estuaries and associated rare species along Wisconsin's Lake Superior shoreline. The intended outcome is that the inventory plan will guide future inventory work of both the Wisconsin Natural Heritage Inventory (NHI) as well as the work of other partner organizations, with efforts focused on the most critical sites, and allow for targeted, systematic monitoring and updates of high-quality natural communities and associated rare species.

Background and Past Efforts

The Wisconsin NHI program is part of the Wisconsin Department of Natural Resources (WDNR) Bureau of Natural Heritage Conservation and is a member of NatureServe, an international network of natural heritage programs representing all 50 states, as well as portions of Canada, Latin America, and the Caribbean. These programs share certain standardized methods for collecting, processing, and managing data for rare species and natural communities.

Natural Heritage programs track certain elements of biological diversity: rare plants, rare animals, high-quality examples of natural communities, and other selected natural features. The Natural Heritage Working List contains the elements tracked in Wisconsin. They include endangered, threatened, and special concern plants and animals, as well as the natural community types recognized by NHI. The Working List is periodically updated to reflect new information about the rarity and distribution of the state's plants, animals, and natural communities. The most recent Working List is available from the Wisconsin DNR website.

Significant work has been conducted on Lake Superior estuaries and coastal wetlands by NHI and partner organizations in the past. Between 1995-1996, the NHI conducted baseline assessments of Lake Superior coastal wetlands in Wisconsin (Epstein 1997, Epstein et al. 1997, Epstein et al. 2002). These surveys covered a wide variety of sites and evaluated the type, size, and condition of natural communities and also targeted rare plants and selected rare animal taxa groups (primarily birds). The ecology and significance of high-quality sites were described in narrative form and published in a printed report (Epstein et al. 2002) and made available on the web as well.

Numerous other partner organizations have also been actively engaged in inventory, monitoring, and research and constitute an important source of information on Lake Superior estuaries and coastal wetlands. A brief description of some of these major efforts and organizations is noted below. This list is not intended to be comprehensive or exhaustive. A more complete list of past and current projects has been compiled through a Lake Superior Estuary Project Directory, and is available online.

U.S. Environmental Protection Agency - Great Lakes coastal wetlands

Between 2002 and 2004, 58 coastal wetlands were sampled around the Great Lakes to evaluate the condition of coastal wetlands along a gradient of eutrophication using a comprehensive suite of data including water quality, hydrology, vegetation structure, sediment type, and fish composition

(Brazner et al. 2007a, 2007b, Morrice et al. 2008, Trebitz et al. 2009, etc.). Wetlands sampled along the Wisconsin Lake Superior shoreline included Allouez Bay, Pokegama Bay, Rask Bay, Amnicon River, Bad River/Kakagon complex, Bark River, Flag River, Lost Creek, and Middle River.

Great Lakes Coastal Wetlands Consortium – Great Lakes Coastal Wetlands Monitoring Plan

In 2008, the Great Lakes Coastal Wetlands Monitoring Plan was completed, culminating nearly seven years of work by the Great Lakes Coastal Wetlands Consortium (GLCWC) to develop a long-term plan to monitor Great Lakes coastal wetlands using a scientifically validated sampling design and suite of indicators and metrics developed by many project partners (Great Lakes Coastal Wetlands Consortium 2008). Partners included scientific and policy experts drawn from key U.S. and Canadian federal, state and provincial agencies, nongovernmental organizations, academia, and members of other interest groups with responsibility for coastal wetlands monitoring. The Monitoring Plan recommends multiple biological protocols and metrics for monitoring the condition of Great Lakes coastal wetlands, including those for plants, invertebrates, fish, amphibians, and birds. In conjunction with the development of the Monitoring Plan and since it has been published, numerous partner organizations contributed to the development of the Plan and have initiated projects to monitor coastal wetland sites (Brazner et al. 2007a, Niemi et al. 2007, Morrice et al. 2008, Niemi et al. 2011, etc.). Institutions involved in these projects include the Natural Resources Research Institute (NRRI) at University of Minnesota-Duluth, University of Wisconsin-Superior, and the U.S. Environmental Protection Agency (EPA).

Lake Superior Research Institute – Coastal Wetland and Stream Monitoring Project

Between 2007 and 2010, the Lake Superior Research Institute (LSRI) at the University of Wisconsin - Superior and the University of Wisconsin Extension (UWEX) program initiated monitoring in eight watersheds in Lake Superior and their coastal wetlands and streams. Watersheds included Allouez Bay, Bark River, Flag River, Little Pokegama River, Lost Creek, Newton Creek, Pokegama Bay, and Sioux River. Pokegama Bay, Little Pokegama River and Allouez Bay are part of the St. Louis River Estuary, which was recently designated as a National Estuarine Research Reserve. Surveys included water quality, vegetation inventory, and aquatic macroinvetebrates as well as land cover analysis in the watershed. Fact sheets were created for the eight sites noted above (Eliot et al. 2008, etc.).

The goal of The Lake Superior Coastal Wetland and Stream Monitoring Project was to utilize GLCWC community indicators and collaborate with professionals and volunteers to assess the condition of Wisconsin Lake Superior coastal wetlands and their watersheds. The ultimate goal of the project is to assess coastal wetland health using widely accepted, standardized indicators in order to help provide resource managers with important information on how to protect, restore, and manage coastal habitats.

Lake Superior National Estuarine Research Reserve

In 2010, the St. Louis River Estuary was designated as a National Estuarine Research Reserve (University of Wisconsin Extension 2010). The St. Louis River was selected from 35 sites (Figure 1) based on criteria established by the National Oceanic and Atmospheric Association (NOAA). Only the second site in the Great Lakes basin in the Reserve system, the designation encompasses 16,967 acres of public land across four non-contiguous blocks. The Reserve includes uplands and submerged lands; riparian and riverine habitat; riverine islands; emergent freshwater marshes, interdunal wetlands and scrub swamp; aspen, dry and hardwood forests; and open sand beach and dunes. The site consists exclusively of public lands and waters owned by Wisconsin Department of Natural Resources, City of Superior, Douglas County and the University of Wisconsin. The recently established Reserve will provide a wide range of estuarine research and public education opportunities.

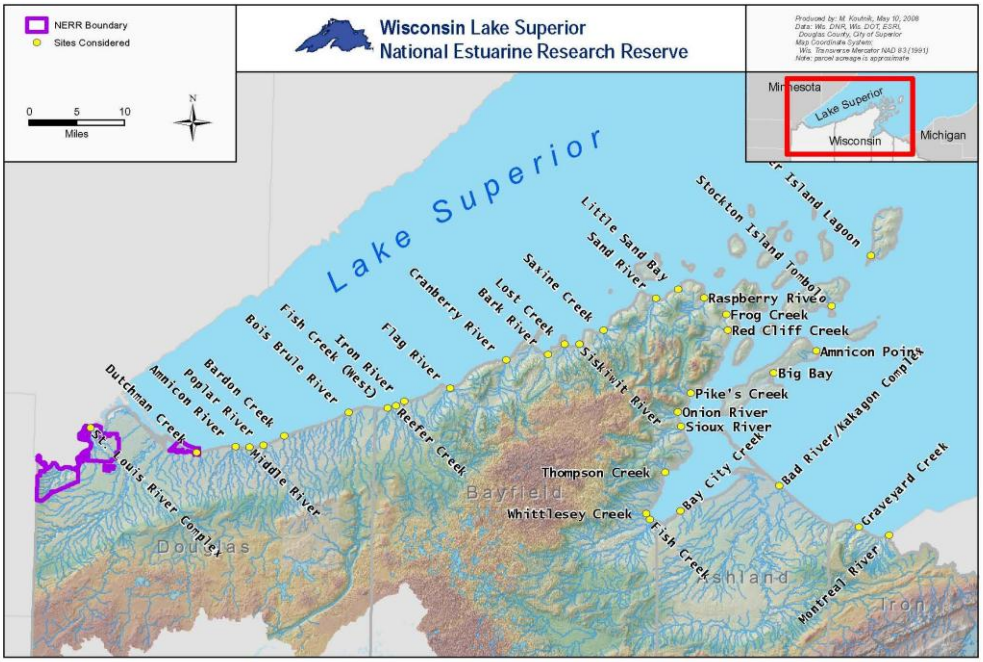

Figure 1. Lake Superior Estuarine Sites considered in NERR Designation Process.

University of Wisconsin-Superior Great Lakes Indicator Consortium: Coastal Monitoring
From 2011 to 2015, a study is being conducted to evaluate wetlands status across the entire Great Lakes basin using indicators developed through the GLCWC (Danz, pers. com.). Surveys are focused on wetland vegetation on all coastal wetlands in Lake Superior and Lake Michigan, including wet meadow, emergent marsh, and submergent marsh community types using quantitative vegetation survey techniques.

Methods: Site Prioritization Criteria

Judziewicz et al. (2001) developed two sets of prioritization criteria to evaluate estuary and coastal wetland sites for future biotic inventory: ecological significance and inventory gaps. We describe these methods in detail below and apply this prioritization framework to the current project in the results section.

Ecological Significance

Criteria for evaluating ecological significance integrate factors such as: unique site attributes; size of site; number and quality of rare animal, plant, and community Element Occurrences (EOs); perceived development and/or use pressure on the site; long term conservation and restoration potential; and connectivity to other sites. Based on current knowledge, each criterion was assigned a numerical score from one to four for each site, with one being the lowest significance and four being the highest significance (for some criteria, such as number of EOs at a site, a score of zero was also possible) (Table 1). For each site, scores in each criterion were added for a total significance score and each site was assigned to a qualitative category of "low", "medium", "high", or "very high" for the site's overall site significance. Detailed descriptions of each criterion are below.

A. **Attributes/qualities unique to Lake Superior estuaries and coastal wetlands**. Sites with the presence of endemic, near-endemic, or regionally rare elements, such as the Stockton Island tombolo, received the highest rankings in this category. "Landscape complexes" such as fen, lagoon, and sand spit systems (Bark River, Long Island/Chequamagon Point, etc.), and large freshwater estuaries (such as portions of the St. Louis River), and coastal embayment systems (such as Big Bay on Madeline Island) were also considered to be highly-rated attributes.

B. **Size.** Size categories were delimited based on powers of ten based on previous analysis (Merryfield 2000). The largest sites received the highest rankings.

C. **Number of Element Occurrences.** An Element Occurrence (EO) is a documented, qualifying observation of a rare species or high-quality natural community (collectively referred to as elements). Sites with the largest numbers of EOs contribute significantly to statewide conservation and biodiversity and received the highest rankings. The number of EOs at each site is taken from the NHI database and is based on current knowledge. Note that, although size of the site and number of EOs may be positively correlated, there are exceptions that make it useful to maintain both size and the number of EOs as separate measures of ecological significance.

D. **Quality of EOs.** This criterion takes into account global and state rarity of species and natural communities as well as the long-term viability (as measured by EO rank) of the EOs that occur at the site. Sites with greater numbers of rarer species received a higher ranking. EO rank is a measure of viability and is assigned to each element occurrence by the NHI Lead Ecologist, Botanist, and Zoologist for natural communities, rare plants, and rare animals respectively, based on three primary factors following standard Natural Heritage methodology: 1) size of the occurrence (population size or area occupied), 2) condition of the occurrence (reproduction, habitat quality, imminent threats, etc.), and 3) landscape context.

E. **Development/use pressure**. This is a measure of the vulnerability of the site to degradation of its ecological quality from either direct threats (e.g. on-site commercial or residential development) or indirect threats (e.g. point or non-point source pollution or sedimentation of a stream). Sites with higher development pressure received a higher ranking, as they are a higher priority for additional surveys to more accurately assess their conservation needs and relative importance to biodiversity.

F. **Long-term conservation/restoration potential**. This is a measure of a site's long-term conservation potential based on current land use, ownership, and landscape context. It also takes into account current site quality, threats and potential for restoration. Sites that are highly urbanized (e.g., Bay City Creek) received the lowest ranking, while sites with excellent site quality and landscape context (e.g., Bad River/Kakagon Sloughs) received the highest ranking.

G. **Landscape Context**. This criteria assesses influence of natural and anthropogenic barriers to biodiversity related to wildlife habitat, plant habitat, and natural shoreline processes. This qualitative measure was evaluated on the degree of connectivity between the site and other high-quality habitat, including other wetlands as well as high-quality upland forest. Sites with the greatest connectivity to other high-quality habitat received the highest ranking.

Table 1. Prioritization Criteria for Site Ecological Significance.

CRITERIA	LOW (1 point)	MEDIUM (2)	HIGH (3)	VERY HIGH (4 points)
Attribute/qualities (unique to Great Lakes Coastal Wetlands)	Small creek with very few wetlands (e.g., Graveyard Creek).	Moderate sized river with few wetlands or common wetland types in moderate condition (e.g. Brule River).	Small but significant landscape complexes (e.g. Lost Creek, Bark Bay).	Endemic species & communities; large landscape complexes (e.g. Stockton Island Tombolo).
Size (including adjacent high-quality uplands)	<100 acres	100-1000 acres	1000-10,000 acres	10,000+ acres
Number of EOs	1-3 EOs	4-6 EOs	7-9 EOs	10+ EOs
Quality of EOs (higher weight given to rarer elements and EOs with higher viability; for an explanation of State ranks and Global ranks see Appendix A)	S4/S5 special concern species present. G5/S3 community EO may be present. High-ranking G5/S3 EOs.	Any G3/S3 species, or B-rank community EOs present.	Any G1G2/S1S2 species, or any state endangered/ threatened species, or A-rank community EOs present.	Great Lakes endemics and communities with high EO rank; AB-rank G1G2/S1S2 species present, or A-rank G1G2/S1S2 community EOs present.
Development/use pressure	Sites with little to no potential for commercial or residential development.	Sites with small potential for commercial or residential development.	Sites with moderate potential for commercial or residential development.	Sites with significant potential for impacts from commercial or residential development.
Long term conservation/ restoration potential	Highly degraded or urbanized sites.	Moderately degraded sites with some restoration potential.	Relatively pristine sites or sites with good restoration potential.	Highly pristine sites or sites with excellent restoration potential.
Landscape Context	Sites effectively isolated by extensive development, agriculture, or intensive forest management.	Sites with moderate connectivity to other high-quality wetlands and/or upland forest.	Sites with considerable connectivity to other high-quality wetlands and/or upland forest.	Sites part of extensive natural shoreline, wetland corridors, and mature forests.

Knowledge Gaps and Inventory Needs

Criteria for evaluating knowledge gaps and information needs was based on both the number and extent of past surveys were considered in concert with the time since the most recent survey, and both vegetative and taxa-specific categories were evaluated (Judziewicz et al. 2001). Past survey and sampling efforts considered included natural communities, wetland flora and fauna, aquatic flora and fauna, and water chemistry. Vegetative surveys were broken into different categories: Natural Heritage community surveys, quantitative vegetation surveys, and rare plant surveys. Animal taxa surveys considered were birds, mammals, turtles, amphibians, wetland Lepidopterans, Odonates (dragonflies and damselflies), other wetland invertebrates, and fishes.

Data on past and current research and inventory projects were obtained through a literature search and from numerous partner organizations through a widely advertised web-based survey. Inventory type, project location, and date(s) were identified for each survey initiative. In addition, where there were large projects spanning many sites, follow-up meetings and interviews were conducted with individuals and organizations, including partners and organizations noted above as well as former NHI Lead Ecologist Eric Epstein to obtain more accurate and complete data. A summary of these data are presented for each site in Appendix B.

Each criteria was assessed on two axes: inventory need and habitat potential. To determine inventory need, each site was assigned on a numerical value of one to four, with one being the lowest need for additional inventory and four being the highest need for additional inventory. For each group, a score of one was assigned when available data indicated surveys had been conducted in the past 1-5 years; a score of two was assigned when surveys had been conducted in the past 6-10 years; a score of three was assigned when surveys had been conducted within the past 11-20 years; and a score of four was assigned when surveys were last conducted 21 or more years ago, or there was no record of surveys having been conducted (Table 2).

Each criteria was also assessed for habitat potential for each inventory or taxa group, with a numerical value assigned from zero to four based on expert opinion, with zero indicating no habitat potential, one indicating minimal habitat potential, two indicating moderate habitat potential, three indicating high habitat potential and/or rare species known from site or in nearby similar habitat, and four being very high habitat potential with numerous rare species known from site and/or the recognized as being important for regular monitoring (Table 2).

The scores for inventory need and habitat potential were multiplied, normalized by dividing the product by four, and summed for all criteria for each site. Thus, each criteria had a maximum possible score of 4 (4 x 4 = 16 / 4 = 4) and minimum possible score of zero (1 x 0 = 0 / 4 = 0). In this way, sites with many criteria or taxa groups with both high inventory needs and high habitat potential received a higher total score than sites with many criteria or taxa groups with low to medium inventory needs and/or low to moderate habitat potential. In addition, the methodology takes into account the lack of suitable habitat for some criteria or taxa groups at some sites (e.g. fishes at a site with little to no suitable surface water) and appropriately returned a score of zero for combined inventory need and habitat potential, as no future inventory is needed for that criteria at that site.

Finally, the normalized inventory need and habitat potential scores for each criterion were summed by site, and each site was assigned to a qualitative category of "low", "medium", "high", or "very high" to describe the site's overall inventory needs. Detailed descriptions of each criterion are below.

A. **Natural Heritage community surveys**. Natural communities are important natural features that serve as a coarse filter or umbrella for many plants and animals. Natural communities are delineated and evaluated by trained NHI ecologists on a variety of factors such as condition, species diversity, impact of invasive species, influence of direct or indirect anthropogenic disturbance, land use history, degree of disruption of ecological processes, size, land use and condition of the larger landscape surrounding the site. Community surveys are of particular interest to the NHI and are conducted using standardized protocols to integrate the above factors in a holistic fashion to evaluate communities for their type, quality and significance on a statewide basis.

B. **Quantitative vegetation surveys**. Quantitative measures of plant structure and composition provide a standardized framework for comparing vegetation within and between sites. Quantitative surveys are of particular use for describing vegetative characteristics to compare sites statistically, and establish correlations, or for monitoring direct (e.g. management) or indirect (e.g. climate change, land use higher in the watershed) anthropogenic impacts.

C. **Rare plant surveys**. Surveys specifically targeting rare plants are necessary because natural community and vegetation surveys may not focus on specialized habitat required by very rare species, or may be conducted outside the best survey time for species with narrow flowering or fruiting windows. In addition, quantitative methods of sampling such as plots and transects have low detection rates for species that are very infrequent in a given site (Elzinga et al. 1998). Finally, the presence, abundance, and condition of rare plant populations is of high interest to NHI as well as other partner organizations.

D. **Bird surveys**. Both breeding and migratory birds are excellent indicators of habitat structure and are important components of biodiversity supported by estuaries and coastal wetlands.

E. Mammal surveys. Small mammals are an important indicator of habitat, as they are responsive to habitat structure, habitat size, and may be highly responsive to climate change (Schloss et al. 2012), particularly in their range. Coastal wetlands and adjacent upland forests are important habitat for several small mammal species including water shrew, woodland jumping mouse, northern flying squirrel, and Franklin's ground squirrel.

F. **Turtle surveys**. Turtles are often indicators of high site quality and an absence of significant threats or anthropogenic impacts.

G. **Amphibian surveys**. Amphibians are important indicators of ecosystem health due to their sensitivity to water quality. The largest group of amphibians found in Lake Superior estuaries and coastal wetlands is frogs, but other groups may be present as well including salamanders.

H. **Lepidopteran surveys**. The unique habitat created by coastal wetlands can support both common and rare lepidopterans (butterflies and moths). This group of invertebrates is split out due to its conservation significance and specific surveys needed to target these taxa at specific times of year.

I. **Odonate surveys**. Coastal wetlands also provide unique habitat for numerous species of dragonflies and damselflies. Similar to lepidopterans, this group of invertebrates is split out due to the conservation significance of some species and the specialized expertise needed to survey for and identify these taxa at specific times of year.

J. **Aquatic fauna and phytoplankton**. Numerous other aquatic invertebrates and phytoplankton occur in estuaries and coastal wetlands, including aquatic insects as well as zooplankton, benthos, and diatoms. Some taxa groups can be excellent indicators of water quality, degree of sediment contamination or other ecological parameters and may be of particular interest to partners.

K. **Fish surveys**. Coastal wetlands and estuaries are important spawning and nursery areas in addition to supporting resident fishes. In addition, some species have been identified as important indicators of water quality (Brazner et al. 2007b).

L. **Water chemistry**. Anthropogenic impacts are often evaluated in terms of nutrient loading, suspended sediments, dissolved oxygen, and other parameters that affect plants and wildlife directly or indirectly. Contaminants may cause a cascade of negative impacts on wetland and aquatic ecosystems. Their identification and remediation can be essential to site restoration. Thus, contaminants may be important sampling targets in some wetlands and estuaries.

Table 2. Prioritization Criteria for Knowledge Gaps and Inventory Needs.

CRITERIA	NONE (0 points)	LOW (1 point)	MEDIUM (2 points)	HIGH (3 points)	VERY HIGH (4 points)
Time since last survey		Surveys conducted within past 1-5 years	Surveys conducted within past 6-10 years	Surveys conducted within past 11-20 years	Surveys last conducted 21 or more years ago, or no record of any surveys
Habitat potential	No potential habitat occurs at site	Minimal habitat potential	Moderate habitat potential	High habitat potential; rare species known from site or nearby	Very high habitat potential; numerous rare species known from site and/or site important for regular monitoring

Results: Site Significance and Inventory Need Evaluation

Sites with the highest significance were generally large, pristine landscape complexes with minimal anthropogenic disturbance that supported numerous rare species and high-quality natural communities (Table 3). Sites with low significance were generally small, isolated from other high-quality habitat, and supported few rare species. While the numerical score of each criteria is presented for each site for transparency, the important result is the categorical ranking of overall ecological significance (very high, high, medium, low), rather that the numerical total score.

Sites with the highest inventory needs were those that had received the least amount of surveys or a long period of time had passed since the last survey and had the highest habitat potential for criteria (Table 4). Again, while the numerical score of each criteria is presented for each site for transparency, the important result is the categorical ranking of overall ecological significance (very high, high, medium, low), rather than the numerical total score.

Table 3. Ecological Site Significance Scoring by Site.

Site	Overall Ecological Significance	Attributes/ Qualities	Size	Number of EOs	Quality of EOs	Development	Restoration Potential	Connectivity	Total Score
Bad River/Kakagon Sloughs Complex	very high	4	4	4	4	2	4	4	26
Stockton Island Tombolo	very high	4	2	4	4	2	4	4	24
St. Louis River (STL)-Allouez Bay & Wisconsin Point	very high	4	2	4	4	3	3	2	22
Long Island-Chequamegon Point	very high	4	2	3	4	1	4	3	21
Bark Bay & River	very high	4	3	3	3	3	3	1	20
Big Bay (Madeline Island)	very high	4	2	3	3	2	4	2	20
Outer Island Lagoon	very high	3	2	3	3	1	4	4	20
STL-Pokegama-Carnegie Wetlands	very high	3	2	3	4	2	3	3	20
STL-St. Louis River Streambank Protection Area	very high	4	2	3	3	1	4	3	20
Big Sand Bay & Sand River	high	3	2	3	3	1	4	3	19
Flag River & Bibon Lake	high	3	2	4	4	3	2	1	19
Raspberry Bay & River	high	4	2	2	4	2	3	2	19
Lost Creek State Natural Area	high	3	2	3	4	2	3	1	18
Sioux River & Bayview Beach	high	2	2	3	4	3	3	1	18
STL-Dwight's Point - Superior Municipal Forest	high	3	2	2	2	3	3	3	18
STL-Kimball's Bay - Superior Municipal Forest	high	3	2	2	2	3	3	3	18
STL-Pokegama Bay - Superior Municipal Forest	high	3	2	2	2	3	3	3	18
STL-Clough Island	medium	3	2	1	2	1	4	3	16
STL-St. Louis River Islands (Fond du Lac)	medium	4	2	1	1	1	4	3	16
STL-Superior Airport-Hill Ave-Superior Triangle	medium	3	1	2	3	4	1	2	16
Bois Brule River	medium	2	1	2	3	2	4	1	15
Fish Creek Slough East (Eileen Twp)	medium	2	3	1	3	3	2	1	15
STL-Oliver Marsh	medium	3	2	1	1	2	3	3	15
Bog Lake & Amnicon Point (Madeline Island)	medium	4	1	0	0	3	3	2	13
Fish Creek West (Orienta Twp)	medium	2	2	2	1	2	3	1	13
Frog Bay	medium	2	1	1	2	2	3	2	13
Little Sand Bay	medium	2	2	1	2	1	3	2	13
STL-Little Pokegama Bay	medium	2	1	1	1	2	3	3	13
Whittlesey Creek	medium	2	1	1	2	3	2	2	13
Saxine Creek	medium	4	1	1	2	1	2	1	12
STL-Lower Nemadji River Marshes	medium	2	2	1	1	1	3	2	12
Thompson Creek	medium	1	1	1	3	4	1	1	12
Dutchman Creek	low	1	1	1	3	2	2	1	11
Middle River	low	1	1	1	3	2	2	1	11
Onion River	low	1	1	1	2	3	2	1	11
Schooner Bay/Red Cliff Bay	low	3	1	0	0	2	3	2	11
Siskiwit Bay & River	low	2	1	1	2	1	2	2	11
Iron River	low	1	1	1	2	2	2	1	10
Pikes Creek Slough	low	1	1	1	3	2	1	1	10
Amnicon River	low	2	1	0	0	3	2	1	9
Bay City Creek	low	1	1	1	3	1	1	1	9
Cranberry River	low	2	1	0	0	3	2	1	9
Graveyard Creek	low	1	1	1	1	2	2	1	9
Bardon Creek	low	1	1	0	0	2	1	1	6
Montreal River	low	1	1	0	0	1	1	1	5
Poplar River	low	1	1	0	0	1	1	1	5
Reefer Creek	low	1	1	0	0	1	1	1	5

Table 4. Inventory Needs and Habitat Potential by Site.

NAME	Inventory Needs summary	Natural communities	Vegetation	Rare plants	Birds	Mammals	Turtles	Amphibians	Odonates	Wetland Ieps	Aquatic fauna & phytoplankton	Fishes	Water chemistry	Total Score
STL-Red River Breaks	very high	3	3	3	3	4	3	2	2	2	2	2	2	31
STL-St. Louis River Islands - Fond du Lac	very high	3	4	1.5	2.25	2	2	2	2	2	3	3	4	30.75
Bad River / Kakagon Complex	very high	3	2	3	2	4	2	2	3	3	2	2	2	30
Long Island-Chequamegon Point	very high	3	4	4	3	2	2	2	2	3	1	1	1	28
STL-Kimball's Bay	very high	3	3	2.25	1	4	2	1	2	2	2	2	2	26.25
STL-Oliver Marsh	very high	3	4	1.5	3	2	1	2	2	2	1.5	1.5	1.5	25
Outer Island Lagoon	very high	3	2.25	3	3	1	1	2.25	3	3	2	1	0.5	25
Big Sand Bay /Sand River	high	2	1.5	2	0.75	3	1.5	1.5	0.75	2.25	1.5	2.25	2.25	21.25
Raspberry Bay and River	high	3	1	3	0.75	3	2	1	2.25	3	0.75	0.75	0.75	21.25
Frog Bay	high	0.75	0.75	0.75	1	4	2	2	2	2	2	2	2	21.25
STL-Allouez Bay & Wisconsin Point	high	3	1	3	1	4	1.5	0.75	2	2	0.75	1	1	21
Bark River (includes Bark Bay)	high	3	1	3	1	3	1.5	1	1.5	3	0.75	1.5	0.75	21
Schooner Bay/Red Cliff Bay	high	0.5	2	0.5	3	3	1	2	2	2	2	2	1	21
Lost Creek Natural Area	high	3	1	3	0.75	3	1.5	0.75	0.75	3	0.75	1.5	0.75	19.75
STL-Pokegama Bay	high	2.25	0.75	3	0.5	3	2	0.5	4	2	0.5	0.5	0.5	19.5
Stockton Island Tombolo	high	2	1	2	2.25	0.5	1	4	2	0.75	2.25	1	0.5	19.25
Little Sand Bay	high	0.75	2.25	3	2	1.5	2	1	2	2	1	1	0.5	19
Flag River	high	3	0.75	3	0.75	2	1.5	1	0.75	3	0.75	1	1	18.5
Pikes Creek Slough	medium	0.25	2	3	0.5	2	1	1	1	2	1.5	2	1.5	17.75
Bog Lake/Amnicon Point (Madeline Is.)	medium	0.75	0.75	0.75	0.75	2	1	0.75	3	3	2	1	2	17.75
Thompson Creek	medium	0.25	3	0.25	1	1	1	1	1	1	3	1	4	17.5
Bois Brule River	medium	2.25	0.75	1.5	0.5	3	2	0.5	0.5	2	0.5	3	0.75	17.25
Amnicon River Estuary	medium	0.75	1.5	0.5	1.5	3	1.5	1	1	2	1	1.5	1.5	16.75
STL-Dwight's Point	medium	2.25	3	1.5	0.5	1	2	0.5	0.5	2	2	0.5	0.5	16.25
STL-Clough Island	medium	2	0.5	3	0.75	2	1	0.5	2	2	0.5	0.5	0.5	15.25
Siskiwit Bay and River	medium	0.25	2	2.25	1.5	1	1	1	0.25	1	2	2	1	15.25
Big Bay (Madeline Island)	medium	1	1	1	0.75	2	0.5	1	1	1	1.5	2	2	14.75
Whittlesey Creek Mouth	medium	0.25	1	0.25	0.5	1	2	1	2	1	1	3	1.5	14.5
STL-Lower Nemadji River Marshes	medium	2.25	0.75	2.25	0.5	2	1	0.5	1	1	0.5	1.5	1	14.25
Saxine Creek	medium	0.75	0.5	0.5	0.5	3	1	0.25	2	2	0.75	2	1	14.25
Sioux River /Bayview Beach)	medium	2.25	0.75	3	0.75	2	1	0.5	0.5	2	0.5	0.5	0.5	14.25
Poplar River Estuary	medium	0.5	0.5	0.5	1	3	1	2	2	2	0.5	0.5	0.5	14
Fish Creek (East/Eileen Twp)	medium	2.25	0.75	1.5	0.5	2	1.5	0.75	0.5	2	0.5	1	0.75	14
STL-Pokegama-Carnegie Wetlands	low	0.75	0.5	3	0.25	2	2	0.5	2	2	0	0	0	13
Bardon Creek	low	1	1	1	1	2	1	1	1	1	1	1	1	13
Middle River Estuary	low	0.5	1	0.5	0.25	2	1.5	0.5	1	2	1	1	1	12.25
Dutchman Cr/Small Estuaries	low	0.25	1	0.5	1	1	1	1	0.25	1	1	2	2	12
Cranberry River	low	0.25	0.5	0.75	0.5	1	2	0.5	2	2	0.75	1	0.5	11.75
Fish Creek (West/Orienta Twp)	low	0.5	0.5	0.75	0.25	2	2	0.5	1.5	2	0.5	0.5	0.5	11.5
STL-Little Pokegama Bay	low	1.5	0.5	0.75	0.5	1	2	0.5	0.5	2	0.5	1	0.5	11.25
Iron River Mouth	low	0.5	0.5	0.75	0.25	1	1	0.25	2	2	0.5	2	0.5	11.25
STL-Superior Airport-Hill Avenue	low	0.75	2	3	0.75	1	1	1	0.25	1	0	0	0	10.75
Onion River	low	0.5	0.5	0.5	0.5	2	1	0.25	1.5	2	0.25	1.5	0.25	10.75
Montreal River Mouth	low	0	1	0.5	0	1	1	1	1	1	1	1	2	10.5
Graveyard Creek	low	0.25	1	0.25	1	1	1	1	1	1	1	1	1	10.5
Reefer Creek	low	0	1	0	0	1	1	1	1	1	1	1	1	9
Bay City Creek	low	0	0	0	0	0	0	0	1	1	1	1	3	7

Conclusions: Inventory Prioritization

Prioritization of sites for the Biotic Inventory Plan takes into account both site significance and inventory needs. Only sites that received a significance score of medium or higher were considered for comprehensive surveys in the Inventory Plan. It is important to note that sites with low ecological significance may have specific inventory needs that warrant surveys for those specific targets even if they rank low on a comprehensive basis.

Priorities for the Inventory Plan were determined by a combination of the following factors: ecological significance, inventory needs and habitat potential, future survey plans of key partners, and proximity to other priority sites (to maximize travel efficiency). The list of sites for the Inventory Plan is presented in order of possible survey years in Table 5.

Table 5. Prioritized DRAFT Inventory Plan by Site and Possible Inventory Years.

NAME	Significance Summary	Inventory Needs	Possible Inventory Year	Partner Plans for Inventory
STL-Red River River Breaks	very high	very high	2013	2013 (WDNR)
STL-St. Louis River Islands - Fond du Lac	medium	very high	2013	2013 (WDNR)
STL-Oliver Marsh	medium	very high	2013	2013 (WDNR)
STL-Clough Island	medium	medium	2013	2013 (WDNR)
Flag River	high	high	2013	2013 (NRRI)
STL-Pokegama-Carnegie Wetlands	very high	low	2013	2013 (WDNR)
Long Island-Chequamegon Point	very high	very high	2014	2014 (NRRI)
Bark River/Bark Bay	very high	high	2014	2014 (NRRI)
STL-Kimball's Bay	high	very high	2014	2014 (NRRI)
STL-Dwight's Point	high	medium	2014	
STL-Pokegama Bay	high	high	2014	2014 (NRRI)
Outer Island Lagoon	very high	very high	2015	
Stockton Island Tombolo	very high	high	2015	2013 (NRRI)
Bad River/Kakagon Complex	very high	very high	2015	2015 (NRRI)
Big Sand Bay/Sand River	high	high	2015	2015 (NRRI)
STL-Superior Airport-Hill Ave	medium	low	2016	
STL-Little Pokegama Bay	medium	low	2016	
Lost Creek Natural Area	high	high	2016	2014 (NRRI)
Raspberry Bay and River	high	high	2016	
STL-Allouez Bay & Wisconsin Point	very high	high	2017	
Big Bay (Madeline Island)	very high	medium	2017	
STL-Lower Nemadji River Marshes	medium	medium	2017	2014 (NRRI)
Bois Brule River	medium	medium	2017	2014 (NRRI)
Sioux River/Bayview Beach	high	medium	2017	2013 (NRRI)
Little Sand Bay	medium	high	2018	2013 (NRRI)
Frog Bay	medium	high	2018	
Whittlesey Creek Mouth	medium	medium	2018	2014 (NRRI)
Fish Creek Slough (East/Eileen Twp)	medium	medium	2018	
Thompson Creek	medium	medium	2019	
Fish Creek (West/Orienta Twp)	medium	low	2019	
Saxine Creek	medium	medium	2019	
Bog Lake/Amnicon Point (Madeline Is.)	medium	medium	2019	

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Trebitz, A. S., J. C. Brazner, N. P. Danz, M. S. Pearson, G. S. Peterson, D. K. Tanner, D. L. Taylor, C. W. West, and T. P. Hollenhorst. 2009. Geographic, anthropogenic, and habitat influences on Great Lakes coastal wetland fish assemblages. Canadian Journal of Fisheries and Aquatic Sciences 66:1328-1342.

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Appendix A: Wisconsin Natural Heritage Working List Explanation

The Wisconsin Natural Heritage Working List contains species known or suspected to be rare in the state and natural communities native to Wisconsin. It includes species legally designated as "Endangered" or "Threatened" as well as species in the advisory "Special Concern" category. Most of the species and natural communities on the list are actively tracked and we encourage data submissions on these species. This list is meant to be dynamic - it is updated as often as new information regarding the biological status of species becomes available. See the Endangered Resources Program web site for the most recent Natural Heritage Inventory Working List (http://dnr.wi.gov/topic/NHI/WList.html).

Key

Scientific Name: Scientific name used by the Wisconsin Natural Heritage Inventory Program.

Common Name: Standard, contrived, or agreed upon common names.

Global Rank: Global element rank. See the rank definitions below.

State Rank: State element rank. See the rank definitions below.

US Status: Federal protection status in Wisconsin, designated by the Office of Endangered Species, U.S. Fish and Wildlife Service through the U.S. Endangered Species Act. LE = listed endangered; LT = listed threatened; XN = non-essential experimental population(s); LT,PD = listed threatened, proposed for de-listing; C = candidate for future listing.

WI Status: Protection category designated by the Wisconsin DNR. END = endangered; THR = threatened; SC = Special Concern.

WDNR and federal regulations regarding Special Concern species range from full protection to no protection. The current categories and their respective level of protection are SC/P = fully protected; SC/N = no laws regulating use, possession, or harvesting; SC/H = take regulated by establishment of open closed seasons; SC/FL = federally protected as endangered or threatened, but not so designated by WDNR; SC/M = fully protected by federal and state laws under the Migratory Bird Act.

Special Concern species are those species about which some problem of abundance or distribution is suspected but not yet proved. The main purpose of this category is to focus attention on certain species before they become threatened or endangered.

Global & State Element Rank Definitions

Global Element Ranks:

G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.

G2 = Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.

G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single state or physiographic region) or because of other factors making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100.

G4 = Apparently globally secure, though it may be quite rare in parts of its range, especially at the periphery.

G5 = Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.

GH = Of historical occurrence throughout its range, i.e., formerly part of the established biota, with the expectation that it may be rediscovered.

GU = Possibly in peril range-wide, but their status is uncertain. More information is needed.

GX = Believed to be extinct throughout its range (e.g. Passenger pigeon) with virtually no likelihood that it will be rediscovered.

G? = Not ranked.

Species with a questionable taxonomic assignment are given a "Q" after the global rank.

Subspecies and varieties are given subranks composed of the letter "T" plus a number or letter. The definition of the second character of the subrank parallels that of the full global rank. (Examples: a rare subspecies of a rare species is ranked G1T1; a rare subspecies of a common species is ranked G5T1.)

State Element Ranks

S1 = Critically imperiled in Wisconsin because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation from the state.

S2 = Imperiled in Wisconsin because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state.

S3 = Rare or uncommon in Wisconsin (21 to 100 occurrences).

S4 = Apparently secure in Wisconsin, with many occurrences.

S5 = Demonstrably secure in Wisconsin and essentially ineradicable under present conditions.

SA = Accidental (occurring only once or a few times) or casual (occurring more regularly although not every year); a few of these species (typically long-distance migrants such as some

birds and butterflies) may have even bred on one or more of the occasions when they were recorded.

SE = An exotic established in the state; may be native elsewhere in North America.

SH = Of historical occurrence in Wisconsin, perhaps having not been verified in the past 20 years, and suspected to be still extant. Naturally, an element would become SH without such a 20-year delay if the only known occurrence were destroyed or if it had been extensively and unsuccessfully looked for.

SN = Regularly occurring, usually migratory and typically non-breeding species for which no significant or effective habitat conservation measures can be taken in Wisconsin. This category includes migratory birds and bats that pass through twice a year or, may remain in the winter (or, in a few cases, the summer) along with certain lepidoptera which regularly migrate to Wisconsin where they reproduce, but then completely die out every year with no return migration. Species in this category are so widely and unreliably distributed during migration or in winter that no small set of sites could be set aside with the hope of significantly furthering their conservation.

SZ = Not of significant conservation concern in Wisconsin, invariably because there are no definable occurrences in the state, although the taxon is native and appears regularly in the state. An SZ rank will generally be used for long-distance migrants whose occurrence during their migrations are too irregular (in terms of repeated visitation to the same locations), transitory, and dispersed to be reliably identified, mapped, and protected. Typically, the SZ rank applies to a non-breeding population.

SR = Reported from Wisconsin, but without persuasive documentation which would provide a basis for either accepting or rejecting the report. Some of these are very recent discoveries for which the program hasn't yet received first-hand information; others are old, obscure reports that are hard to dismiss because the habitat is now destroyed.

SRF = Reported falsely (in error) from Wisconsin but this error is persisting in the literature.

SU = Possibly in peril in the state, but their status is uncertain. More information is needed.

SX = Apparently extirpated from the state.

State Ranking of Long-Distance Migrant Animals:

Ranking long distance aerial migrant animals presents special problems relating to the fact that their non-breeding status (rank) may be quite different from their breeding status, if any, in Wisconsin. In other words, the conservation needs of these taxa may vary between seasons. In order to present a less ambiguous picture of a migrant's status, it is necessary to specify whether the rank refers to the breeding (B) or non-breeding (N) status of the taxon in question. (e.g. S2B, S5N).

Appendix B: Summary of Previous Inventories by Site

Previous inventory initiatives were summarized on 47 estuarine and coastal wetland sites along Wisconsin's Lake Superior shoreline based on available data. The summary provides details on: 1) inventory targets; 2) survey year(s); and source. The following inventory and sampling targets were identified:

- Natural Heritage community surveys
- Quantitative vegetation surveys
- Rare plants
- Birds
- Small mammals
- Turtles
- Amphibians
- Lepidopterans (butterflies and moths)
- Odonates (dragonflies and damselflies)
- Aquatic fauna and phytoplankton (including aquatic macroinvertebrates as well as zooplankton, benthos, and diatoms)
- Fishes
- Water chemistry

Data sources included publications such as journal articles, books, book chapters, conference proceedings and governmental publications. In addition, information was solicited directly from partners using an online survey of current inventory and research initiatives, summarized in the "Online Directory of Lake Superior Estuary Research Projects" (available at the WDNR website; keyword "Coastal Wetlands"). Finally, data was compiled from WDNR in-house electronic "atlases" for invertebrates, birds, and herptiles and WDNR unpublished inventory data.

This summary is limited in terms of current/ongoing initiatives, as partner response to the online survey was low. Despite extensive efforts, the summary below is incomplete, particularly for some taxa groups. Our intention is that this initial summary of known major inventory efforts might help inform managers, researchers, and future inventories.

Index of Sites:

Site Name	Amnicon River Estuary
Natural Heritage Community surveys	2012 (Staffen/WNHI)
Quantitative Vegetation sampling	2002-2003 (Brady/NRRI); 2002-2004 (Trebitz/EPA)
Rare Plant surveys	2012 (Staffen/WNHI)
Bird surveys	2002-2003 (NRRI)
Small Mammal surveys	
Turtle surveys	2000-2001 (Trebitz et al. 2011)
Amphibian surveys	2002-2003 (NRRI)
Lepidopteran surveys	
Odonate surveys	2003 (DuBois - Invert Atlas)
Aquatic fauna and phytoplankton surveys	macroinverts 1996 (Steffens - Invert Atlas); zoobenthos 2000-2001 (Trebitz et al. 2011); macroinverts 2002-2003 (NRRI)
Native Fish surveys	2000-2001 (Trebitz et al. 2011); 2002-2003 (Brady/NRRI)
Water Chemistry sampling	1998-2000 (Trebitz et al. 2002, 2005); 2000-2001 (Trebitz et al. 2011); contaminants 2002-2003 (NRRI); 2002-2004 (Trebitz/EPA)

PUBLICATIONS:

A.S. Trebitz, J.A. Morrice, and A.M. Cotter. 2002. Relative Role of Lake and Tributary in Hydrology of Lake Superior Coastal Wetlands. Journal of Great Lakes Research 28 (2): 212-227.

A.S. Trebitz, J.A. Morrice, D.L. Taylor, R.L. Anderson, C.W. West, J.R. Kelly. 2005. Hydromorphic determinants of aquatic habitat variability in Lake Superior coastal wetlands. Wetlands 25 (3): 505-519.

A.S. Trebitz, J.C. Brazner, D.K. Tanner, and R. Meyer. 2011.Interacting watershed size and landcover influences on habitat and biota of Lake Superior coastal wetlands. Aquatic Ecosystem Health & Management 14 (4): 443-455.

PROJECTS FROM ONLINE DIRECTORY:

2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

2002-2004 (Trebitz/EPA) "Great Lakes coastal wetlands"

OTHER SOURCES:

Invert Atlas - Database maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

Site Name	Bad River/Kakagon Sloughs Complex
Natural Heritage Community surveys	Herdendorf et al. 1981; 1995-1996 (Epstein et al. 1997)
Quantitative Vegetation sampling	Herdendorf et al. 1981; 1995-1996 (Epstein et al. 1997); 2002-2003 (NRRI); 2002-2004 (Trebitz/EPA)
Rare Plant surveys	Herdendorf et al. 1981; 1995-1996 (Epstein et al. 1997)
Bird surveys	1996 (Epstein et al. 1997; Elias & Meeker 1999); 2002-2003 (NRRI); Wisconsin Marshbird Surveys (Ryan Brady) 2008-present
Small Mammal surveys	
Turtle surveys	2000-2001 (Trebitz et al. 2011)
Amphibian surveys	2002-2003 (NRRI)
Lepidopteran surveys	1994, 1996 (Doolittle - Invert Atlas)
Odonate surveys	1989 (Smith - Invert Atlas); 1997 (Smith - Invert Atlas)
Aquatic fauna and phytoplankton surveys	macroinverts 1994, 1996 (Doolittle - Invert Atlas); zoobenthos 2000-2001 (Trebitz et al. 2011); macroinverts 2002/2003 (NRRI); diatoms 2002/2003 (NRRI); Coleoptera 2004 (Smith - Invert Atlas)
Native Fish surveys	2000-2001 (Trebitz et al. 2011); 2002-2003 (NRRI); 2002-2004 (Trebitz/EPA)
Water Chemistry sampling	2000-2001 (Trebitz et al. 2011); 2002-2003 (NRRI); 2002-2004 (Trebitz/EPA)

PUBLICATIONS:

J.E. Elias and J.E. Meeker. 1999. Plant communities and birds of six Lake Superior coastal wetlands. The Passenger Pigeon 61 (3): 323-336.

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

C.E. Herdendorf, S.M. Hartley, and M.D. Barnes. 1981. Fish and wildlife resources of the Great Lakes coastal wetlands within the United States. U.S. Fish & Wildlife Service. Washington, D.C.

A.S. Trebitz, J.C. Brazner, D.K. Tanner, and R. Meyer. 2011.Interacting watershed size and landcover influences on habitat and biota of Lake Superior coastal wetlands. Aquatic Ecosystem Health & Management 14 (4): 443-455.

PROJECTS FROM ONLINE DIRECTORY:

2002-2004 (Trebitz/EPA) "Great Lakes coastal wetlands"

2008-2013 (Ryan Brady) "Wisconsin Marshbird Surveys"

OTHER SOURCES:

Invert Atlas - Database maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

Site Name	Bark River (including Bark Bay)
Natural Heritage Community surveys	Herdendorf et al. 1981; 1995-1996 (Epstein et al. 1997)
Quantitative Vegetation sampling	Herdendorf et al. 1981; 1995-1996 (Epstein et al. 1997); 2002-2003 (NRRI); 2002-2004 (Trebitz/EPA); 2008 (O'Halloran/LSRI); 2011 (Eliot/LSRI)
Rare Plant surveys	Herdendorf et al. 1981; 1995-1996 (Epstein et al. 1997)
Bird surveys	1991-2006 (Swengel/SNABBS Atlas); 1996 (Epstein et al. 1997; Elias & Meeker, 1999); 2002-2003 (NRRI); 2012-2013 (Eliot/LSRI)
Small Mammal surveys	
Turtle surveys	2000-2001 (Trebitz et al. 2011)
Amphibian surveys	1984-2008 (WFTS Route 41); 2002-2003 (NRRI); 2012-2013 (Eliot/LSRI)
Lepidopteran surveys	
Odonate surveys	1999 (Chrisinske - Invert Atlas); 2002 (DuBois - Invert Atlas)
Aquatic fauna and phytoplankton surveys	zoobenthos 2000-2001 (Trebitz et al. 2011); macroinverts 2002-2003 (NRRI); macroinverts 2008 (O'Halloran/LSRI); macroinverts 2011-2012 (Eliot/LSRI)
Native Fish surveys	2000-2001 (Trebitz et al. 2011); 2002-2003 (NRRI); 2002-2004 (Trebitz/EPA)
Water Chemistry sampling	1998-2000 (Trebitz et al. 2002, 2005); 2000-2001 (Trebitz et al. 2011); 2002-2004 (Trebitz/EPA); 2008 (O'Halloran/LSRI); 2011-2012 (Eliot/LSRI)

PUBLICATIONS:

J.E. Elias and J.E. Meeker. 1999. Plant communities and birds of six Lake Superior coastal wetlands. The Passenger Pigeon 61 (3): 323-336.

A. Eliot, K. Schmude, P, Hlina and S. O'Halloran. 2009. Sioux River Watershed Project Brief. Lake Superior Coastal Wetland and Stream Monitoring Project. Lake Superior Research Institute. Superior, WI.

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A.S. Trebitz, J.A Morrice, D.L. Taylor, R.L. Anderson, C.W. West, and J.R. Kelly. 2005. Hydromorphic determinants of aquatic habitat variability in Lake Superior coastal wetlands. Wetlands 25 (3): 505-519.

A.S. Trebitz, J.C. Brazner, D.K. Tanner, and R. Meyer. 2011. Interacting watershed size and landcover influences on habitat and biota of Lake Superior coastal wetlands. Aquatic Ecosystem Health & Management 14 (4): 443-455.

PROJECTS FROM ONLINE DIRECTORY:

2011-2013 (Eliot/LSRI) "Implementing WDNR's Lake Superior Nearshore Monitoring Program"

2007-2010 (O'Halloran/LSRI) "Lake Superior Coastal Wetland and Stream Monitoring Project"

2002-2004 (Trebitz/EPA) "Great Lakes coastal wetlands"

OTHER SOURCES:

Invert Atlas - Database maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

SNABBS - State Natural Area Breeding Bird Survey Atlas. Database housed at WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

WFTS - Wisconsin Frog & Toad Survey. Data housed at WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

Site Name	Bay City Creek
Natural Heritage Community surveys	2012 (Staffen/WNHI)
Quantitative Vegetation sampling	
Rare Plant surveys	2012 (Staffen/WNHI)
Bird surveys	2002-2003 (NRRI)
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	2002-2003 (NRRI)
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	
Native Fish surveys	
Water Chemistry sampling	

PROJECTS FROM ONLINE DIRECTORY:
2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

OTHER SOURCES:
NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

Site Name	Big Bay (Madeline Island)
Natural Heritage Community surveys	1972-1983, 1990-1992 (Judziewicz & Koch 1993); 1995-1996 (Epstein et al. 1997); 2007 (Anderson et al. 2008)
Quantitative Vegetation sampling	1972-1983, 1990-1992 (Judziewicz & Koch 1993); 1995-1996 (Epstein et al. 1997)
Rare Plant surveys	1972-1983, 1990-1992 (Judziewicz & Koch 1993); 1995-1996 (Epstein et al. 1997); 2007 (Anderson et al. 2008)
Bird surveys	1993, 1994, 1996 (Shanks & Lexau/SNABBS); 1996 (Epstein et al. 1997); 2005-06 (Anderson et al. 2008); 2012 (Niemi/NRRI)
Small Mammal surveys	
Turtle surveys	2004-2005 (Anderson et al. 2008)
Amphibian surveys	1992-2001 (WFTS Route 23); 2004-2005 (Anderson et al. 2008); 2012 (Niemi/NRRI)
Lepidopteran surveys	2004 (Kirk - Invert Atlas)
Odonate surveys	2004 (DuBois - Invert Atlas); 2010 (Brady - Invert Atlas)
Aquatic fauna and phytoplankton surveys	macroinverts 2004 (Smith - Invert Atlas)
Native Fish surveys	
Water Chemistry sampling	

PUBLICATIONS:

C. Anderson, L. Ayers, T. Bergeson, and B. Smith. 2008. Biodiversity in Selected Natural Communities Related to Global Climate Change - Peatland Complexes. Report to Wisconsin Focus on Energy Environmental Research Program. Wisconsin DNR, Bureau of Endangered Resources, Madison WI.

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI

E.J. Judziewicz and R.G. Koch. 1993. Flora and vegetation of the Apostle Islands National Lakeshore and Madeline Island, Ashland and Bayfield Counties, Wisconsin. The Michigan Botanist 32 (2): 43-189.

PROJECTS FROM ONLINE DIRECTORY:

2012 (Niemi/NRRI) "Great Lakes Restoration Initiative Project: Great Lakes Coastal Monitoring"

OTHER SOURCES:

Invert Atlas - Database maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

SNABBS - State Natural Area Breeding Bird Survey Atlas, WDNR-BER, Madison, WI.

WFTS - Wisconsin Frog & Toad Survey. Data housed at WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

Site Name	Big Sand Bay/Sand River
Natural Heritage Community surveys	1972-1983, 1990-1992 (Judziewicz & Koch, 1993); 1995-1996 (Epstein et al. 1997); 2005 (Anderson et al. 2008)
Quantitative Vegetation sampling	1972-1983, 1990-1992 (Judziewicz & Koch, 1993); 1995-1996 (Epstein et al. 1997)
Rare Plant surveys	1972-1983, 1990-1992 (Judziewicz & Koch, 1993); 1995-1996 (Epstein et al. 1997); 2005 (Anderson et al. 2008)
Bird surveys	2002-2003 (NRRI); 2007 (Anderson et al. 2008)
Small Mammal surveys	
Turtle surveys	1998 (Casper - Herp Atlas); 2000-2001 (Trebitz et al. 2011)
Amphibian surveys	1998 (Casper - Herp Atlas); 2002-2003 (NRRI)
Lepidopteran surveys	2005 (Kirk - Invert Atlas)
Odonate surveys	2004 (DuBois - Invert Atlas); 2010 (Brady - Invert Atlas)
Aquatic fauna and phytoplankton surveys	zoobenthos 2000-2001 (Trebitz et al. 2011); macroinverts 2004 (Schmude - Invert Atlas); macroinverts 2004 (Steffens - Invert Atlas)
Native Fish surveys	2000-2001 (Trebitz et al. 2011)
Water Chemistry sampling	2000-2001 (Trebitz et al. 2011)

PUBLICATIONS:

C. Anderson, L. Ayers, T. Bergeson, and B. Smith. 2008. Biodiversity in Selected Natural Communities Related to Global Climate Change - Peatland Complexes. Report to Wisconsin Focus on Energy Environmental Research Program. Wisconsin DNR, Bureau of Endangered Resources, Madison WI.

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI

E.J. Judziewicz and R.G. Koch. 1993. Flora and vegetation of the Apostle Islands National Lakeshore and Madeline Island, Ashland and Bayfield Counties, Wisconsin. The Michigan Botanist 32 (2): 43-189.

A.S. Trebitz, J.C. Brazner, D.K. Tanner, and R. Meyer. 2011.Interacting watershed size and landcover influences on habitat and biota of Lake Superior coastal wetlands. Aquatic Ecosystem Health & Management 14 (4): 443-455.

OTHER SOURCES:

Herp Atlas - Database that is owned and maintained by Gary Casper.

Invert Atlas - Database owned and maintained by WDNR-BER, Madison, WI.

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

Site Name	Bog Lake and Amnicon Point (Amnicon Bay Bog) - Madeline Island
Natural Heritage Community surveys	1975 (Tans/WDNR, unpub); 1972-1983, 1990-1992 (Judziewicz & Koch 1993); 1996 (Epstein/WNHI, unpub); 2010 (Hoffman/WDNR)
Quantitative Vegetation sampling	1990-1992 (Judziewicz & Koch, 1993); 1996 (Epstein/WNHI, unpub)
Rare Plant surveys	1975 (Tans/WDNR, unpub); 1972-1983, 1990-1992 (Judziewicz & Koch 1993); 1996 (Epstein/WNHI, unpub)
Bird surveys	Thomas tract - 2010 (Hoffman/WDNR, unpub); 2012 (NRRI)
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	1992-2001 (WFTS Route 23); 2012 (NRRI)
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	
Native Fish surveys	
Water Chemistry sampling	

PUBLICATIONS:

E.J. Judziewicz and R.G. Koch. 1993. Flora and vegetation of the Apostle Islands National Lakeshore and Madeline Island, Ashland and Bayfield Counties, Wisconsin. The Michigan Botanist 32 (2): 43-189.

OTHER SOURCES:

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

WDNR, unpub - Unpublished data in files, Bureau of Natural Heritage Conservation, Madison, WI.

WFTS - Wisconsin Frog & Toad Survey. Data housed at WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

Site Name	Bois Brule River
Natural Heritage Community surveys	1995 (Epstein/WNHI, unpub)
Quantitative Vegetation sampling	1995 (Epstein/WNHI, unpub); 2002-2003 (NRRI); 2012-2013 (Eliot/LSRI)
Rare Plant surveys	1995 (Epstein/WNHI, unpub)
Bird surveys	2002-2003 (NRRI); 2012-2013 (Eliot/LSRI)
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	2002-2003 (NRRI); 2012-2013 (Eliot/LSRI)
Lepidopteran surveys	
Odonate surveys	1984 (DuBois - Invert Atlas); 2000-2002, 2004, 2005, 2009 (DuBois - Invert Atlas);
Aquatic fauna and phytoplankton surveys	macroinverts 1996 (Steffens, DuBois, Smith - Invert Atlas); macroinverts 2009 (Schmude - Invert Atlas); macroinverts 2011-2012 (Eliot/LSRI)
Native Fish surveys	1986 (WDNR/Fisheries)
Water Chemistry sampling	1998-2000 (Trebitz et al. 2002, 2005); 2011-2012 (Eliot/LSRI)

PUBLICATIONS:

A.S. Trebitz, J.A. Morrice, and A.M. Cotter. 2002. Relative Role of Lake and Tributary in Hydrology of Lake Superior Coastal Wetlands. Journal of Great Lakes Research 28 (2): 212-227.

A.S. Trebitz, J.A. Morrice, D.L. Taylor, R.L. Anderson, C.W. West, J.R. Kelly. 2005. Hydromorphic determinants of aquatic habitat variability in Lake Superior coastal wetlands. Wetlands 25 (3): 505-519.

PROJECTS FROM ONLINE DIRECTORY:

2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

2011-2013 (Eliot/LSRI) - "Implementing WDNR's Lake Superior Nearshore Monitoring Program"

OTHER SOURCES:

Invert Atlas - Database maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

WDNR/Fisheries - Wisconsin Dept. of Natural Resources, Bureau of Fisheries Management Biology Database.

WDNR, unpub - Unpublished data in files, Bureau of Natural Heritage Conservation, Madison, WI.

Site Name	Cranberry River
Natural Heritage Community surveys	1995 (Epstein/WNHI, unpub); 2012 (Staffen/WNHI)
Quantitative Vegetation sampling	1995 (Epstein & Judziewicz/WNHI, unpub); 2002-2003 (NRRI); 2011-2012 (Eliot/LSRI)
Rare Plant surveys	1995 (Epstein/WNHI, unpub); 2012 (Staffen/WNHI)
Bird surveys	2002-2003 (NRRI); 2011 (NRRI); 2012-2013 (Eliot/LSRI)
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	2002-2003 (NRRI); 2011 (NRRI); 2012-2013 (Eliot/LSRI)
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	Coleoptera 1993 (Hilsenhoff - Invert Atlas); macroinverts 2002-2003 (NRRI); macroinverts 2011-2012 (Eliot/LSRI)
Native Fish surveys	2002-2003 (NRRI)
Water Chemistry sampling	1998-2000 (Trebitz et al. 2002, 2005); 2011-2012 (Eliot/LSRI)

PUBLICATIONS:

A.S. Trebitz, J.A. Morrice, and A.M. Cotter. 2002. Relative Role of Lake and Tributary in Hydrology of Lake Superior Coastal Wetlands. Journal of Great Lakes Research 28 (2): 212-227.

A.S. Trebitz, J.A. Morrice, D.L. Taylor, R.L. Anderson, C.W. West, J.R. Kelly. 2005. Hydromorphic determinants of aquatic habitat variability in Lake Superior coastal wetlands. Wetlands 25 (3): 505-519.

PROJECTS FROM ONLINE DIRECTORY:

2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

2011-2013 (Eliot/LSRI) "Implementing WDNR's Lake Superior Nearshore Monitoring Program"

OTHER SOURCES:

Invert Atlas - Database maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

WDNR, unpub - Unpublished data in files, Bureau of Natural Heritage Conservation, Madison, WI.

Site Name	Dutchman Creek
Natural Heritage Community surveys	2012 (Staffen/WNHI)
Quantitative Vegetation sampling	
Rare Plant surveys	2012 (Staffen/WNHI)
Bird surveys	
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	
Lepidopteran surveys	
Odonate surveys	2011 (Smith - Invert Atlas)
Aquatic fauna and phytoplankton surveys	
Native Fish surveys	
Water Chemistry sampling	

PROJECTS FROM ONLINE DIRECTORY:
2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

OTHER SOURCES:
Invert Atlas - Database maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

Site Name	Fish Creek (East/Eileen Twp)
Natural Heritage Community surveys	1995-1996 (Epstein et al. 1997)
Quantitative Vegetation sampling	1995-1996 (Epstein et al. 1997); 2002-2003 (NRRI); 2011 (NRRI); 2011-2012 (Eliot/LSRI)
Rare Plant surveys	1995-1996 (Epstein et al. 1997)
Bird surveys	1996 (Epstein et al. 1997; Elias & Meeker 1999); 2002-2003 (NRRI); 2011 (Niemi/NRRI); 2012-2013 (Eliot/LSRI)
Small Mammal surveys	
Turtle surveys	1981 (Pratt/WDNR - Herp Atlas); 2000-2001 (Trebitz et al. 2011)
Amphibian surveys	1981 (Pratt/WDNR - Herp Atlas); 2002-2003 (NRRI); 2011 (Niemi/NRRI); 2012-2013 (Eliot/LSRI)
Lepidopteran surveys	
Odonate surveys	Odonata 1989 (Smith - Invert Atlas); Odonata 2007 (Ross - Invert Atlas)
Aquatic fauna and phytoplankton surveys	macroinverts 1996 (Dovichin - Invert Atlas); zoobenthos 2000-2001 (Trebitz et al. 2011); macroinverts and diatoms 2002-2003 (NRRI); macroinverts 2011 (NRRI); macroinverts 2011-2012 (Eliot/LSRI)
Native Fish surveys	2000-2001 (Trebitz et al. 2011); 2002-2003 (NRRI); 2011 (NRRI)
Water Chemistry sampling	1998-2000 (Trebitz et al. 2002, 2005); 2000-2001 (Trebitz et al. 2011); 2002-2003 (NRRI); 2011 (NRRI); 2011-2012 (Eliot/LSRI)

PUBLICATIONS:

J.E. Elias and J.E. Meeker. 1999. Plant communities and birds of six Lake Superior coastal wetlands. The Passenger Pigeon 61 (3): 323-336.

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

A.S. Trebitz, J.A. Morrice, and A.M. Cotter. 2002. Relative Role of Lake and Tributary in Hydrology of Lake Superior Coastal Wetlands. Journal of Great Lakes Research 28 (2): 212-227.

A.S. Trebitz, J.A. Morrice, D.L. Taylor, R.L. Anderson, C.W. West, J.R. Kelly. 2005. Hydromorphic determinants of aquatic habitat variability in Lake Superior coastal wetlands. Wetlands 25 (3): 505-519.

A.S. Trebitz, J.C. Brazner, D.K. Tanner, and R. Meyer. 2011.Interacting watershed size and landcover influences on habitat and biota of Lake Superior coastal wetlands. Aquatic Ecosystem Health & Management 14 (4): 443-455.

PROJECTS FROM ONLINE DIRECTORY:

2011-2013 (Eliot/LSRI) "Implementing WDNR's Lake Superior Nearshore Monitoring Program"

2011-2012 (Niemi/NRRI) "Great Lakes Restoration Initiative Project: Great Lakes Coastal Monitoring"

OTHER SOURCES:
Herp Atlas - Database owned and maintained by Gary Casper.

Invert Atlas - Database owned and maintained by WDNR-BER, Madison, WI.

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

Site Name	Fish Creek (West/Orienta Twp)
Natural Heritage Community surveys	1995 (Judziewicz/WNHI, unpub)
Quantitative Vegetation sampling	1995 (Judziewicz/WNHI, unpub)
Rare Plant surveys	1995 (Judziewicz/WNHI, unpub)
Bird surveys	
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	
Lepidopteran surveys	
Odonate surveys	1999 (DuBois - Invert Atlas)
Aquatic fauna and phytoplankton surveys	
Native Fish surveys	
Water Chemistry sampling	1998-2000 (Trebitz et al. 2002, 2005)

PUBLICATIONS:

A.S. Trebitz, J.A. Morrice, and A.M. Cotter. 2002. Relative Role of Lake and Tributary in Hydrology of Lake Superior Coastal Wetlands. Journal of Great Lakes Research 28 (2): 212-227.

A.S. Trebitz, J.A. Morrice, D.L. Taylor, R.L. Anderson, C.W. West, J.R. Kelly. 2005. Hydromorphic determinants of aquatic habitat variability in Lake Superior coastal wetlands. Wetlands 25 (3): 505-519.

OTHER SOURCES:

Invert Atlas - Database maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

WDNR, unpub - Unpublished data in files, Bureau of Natural Heritage Conservation, Madison, WI.

Site Name	Flag River (Port Wing/Bibon Lake)
Natural Heritage Community surveys	1995-1996 (Epstein et al. 1997)
Quantitative Vegetation sampling	1995-1996 (Epstein et al. 1997); 2002-2003 (NRRI); 2002-2004 (Trebitz/EPA); 2008 (O'Haolloran/LSRI); 2012 (Eliot/LSRI)
Rare Plant surveys	1995-1996 (Epstein et al. 1997)
Bird surveys	1990-2007 (Scott & Ann Swengel/SNABBS); 1996 (Epstein et al. 1997; Elias & Meeker 1999); 2002-2003 (NRRI); 2012-2013 (Eliot/LSRI)
Small Mammal surveys	
Turtle surveys	2000-2001 (Trebitz et al. 2011)
Amphibian surveys	1984-2008 (WFTS Route 41); 2002-2003 (NRRI); 2012-2013 (Eliot/LSRI)
Lepidopteran surveys	
Odonate surveys	1989 (Smith - Invert Atlas); 1998 (DuBois - Invert Atlas); 2002, 2004, 2006 (DuBois - Invert Atlas); 2007 (Smith - Invert Atlas)
Aquatic fauna and phytoplankton surveys	zoobenthos 2000-2001 (Trebitz et al. 2011); macroinverts and diatoms 2002-2003 (NRRI); macroinverts 2004 (DuBois - Invert Atlas); macroinverts 2008 (O'Halloran/LSRI); 2011-2012 (Eliot/LSRI)
Native Fish surveys	2000-2001 (Trebitz et al. 2011); 2002-2003 (NRRI); 2002-2004 (Trebitz/EPA)
Water Chemistry sampling	1998-2000 (Trebitz et al. 2002, 2005); 2000-2001 (Trebitz et al. 2011); 2002-2003 (NRRI); 2002-2004 (Trebitz/EPA); 2008 (O'Halloran/LSRI); 2011-2012 (Eliot/LSRI)

PUBLICATIONS:

J.E. Elias and J.E. Meeker. 1999. Plant communities and birds of six Lake Superior coastal wetlands. The Passenger Pigeon 61 (3):323–336.

A. Eliot, K. Schmude, P. Hlina and S. O'Halloran. 2009. Flag River Estuary Project Brief. Lake Superior Coastal Wetland and Stream Monitoring Project. Lake Superior Research Institute. Superior, WI.

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

A.S. Trebitz, J.C. Brazner, D.K. Tanner, and R. Meyer. 2011.Interacting watershed size and landcover influences on habitat and biota of Lake Superior coastal wetlands. Aquatic Ecosystem Health & Management 14 (4): 443-455.

A.S. Trebitz, J.A. Morrice, and A.M. Cotter. 2002. Relative Role of Lake and Tributary in Hydrology of Lake Superior Coastal Wetlands. Journal of Great Lakes Research 28 (2): 212-227.

A.S. Trebitz, J.A. Morrice, D.L. Taylor, R.L. Anderson, C.W. West, J.R. Kelly. 2005. Hydromorphic determinants of aquatic habitat variability in Lake Superior coastal wetlands. Wetlands 25 (3): 505-519.

PROJECTS FROM ONLINE DIRECTORY:
2007-2010 (O'Halloran/LSRI) "Lake Superior Coastal Wetland and Stream Monitoring Project"

2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

2002-2004 (Trebitz/EPA) Great Lakes coastal wetlands"
2011-2013 (Eliot/LSRI) "Implementing WDNR's Lake Superior Nearshore Monitoring Program"

OTHER SOURCES:
Invert Atlas - Database maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

SNABBS - State Natural Area Breeding Bird Survey Atlas, WDNR-BER, Madison, WI.

Site Name	Frog Bay
Natural Heritage Community surveys	1995-1996 (Epstein et al. 1997); 2012 (Staffen/WNHI)
Quantitative Vegetation sampling	2011 (Danz/UW-Superior)
Rare Plant surveys	2012 (Staffen/WNHI)
Bird surveys	
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	
Native Fish surveys	
Water Chemistry sampling	

PUBLICATIONS:

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI

PROJECTS FROM ONLINE DIRECTORY:

2011 (Danz/UW-Superior) "Great Lakes Indicator Consortium: Coastal Monitoring"

2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

Site Name	Graveyard Creek
Natural Heritage Community surveys	aquatic macrophytes 2012 (Staffen/WNHI)
Quantitative Vegetation sampling	
Rare Plant surveys	aquatic macrophytes 2012 (Staffen/WNHI)
Bird surveys	
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	
Native Fish surveys	
Water Chemistry sampling	

PROJECTS FROM ONLINE DIRECTORY:
2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

Site Name	Iron River Mouth
Natural Heritage Community surveys	2012 (Staffen/WNHI)
Quantitative Vegetation sampling	aquatic macrophytes 1995 (Judziewicz/WNHI, unpub); 2011-2012 (Eliot/LSRI)
Rare Plant surveys	2012 (Staffen/WNHI)
Bird surveys	2012-2013 (Eliot/LSRI)
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	1984-2008 (WFTS Route 41); 2012-2013 (Eliot/LSRI)
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	macroinverts 2011-2012 (Eliot/LSRI)
Native Fish surveys	1986 (WDNR/Fisheries)
Water Chemistry sampling	1998-2000 (Trebitz et al. 2002, 2005); 2011-2012 (Eliot/LSRI)

PUBLICATIONS:

A.S. Trebitz, J.A. Morrice, and A.M. Cotter. 2002. Relative Role of Lake and Tributary in Hydrology of Lake Superior Coastal Wetlands. Journal of Great Lakes Research 28 (2): 212-227.

A.S. Trebitz, J.A. Morrice, D.L. Taylor, R.L. Anderson, C.W. West, J.R. Kelly. 2005. Hydromorphic determinants of aquatic habitat variability in Lake Superior coastal wetlands. Wetlands 25 (3): 505-519.

PROJECTS FROM ONLINE DIRECTORY:

2011-2013 (Eliot/LSRI) "Implementing WDNR's Lake Superior Nearshore Monitoring Program"

2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

OTHER SOURCES:

WDNR, unpub - Unpublished data in files, Bureau of Natural Heritage Conservation, Madison, WI.

WDNR/Fisheries - Wisconsin Dept. of Natural Resources, Bureau of Fisheries Management Biology Database

WFTS - Wisconsin Frog & Toad Survey. Data housed at WDNR, Bureau of Natural Heritage Conservation, Madison, WI

Site Name	Little Sand Bay
Natural Heritage Community surveys	1972-1983, 1990-1992 (Judziewicz & Koch 1993); 1995 (Judziewicz & Epstein/WNHI, unpub); 2012 (Staffen/WNHI)
Quantitative Vegetation sampling	1990-1992 (Judziewicz & Koch, 1993); 1995 (Judziewicz & Epstein/WNHI, unpub)
Rare Plant surveys	1972-1983, 1990-1992 (Judziewicz & Koch 1993); 1995 (Judziewicz & Epstein/WNHI, unpub); 2012 (Staffen/WNHI)
Bird surveys	
Small Mammal surveys	2003 (Smith and Maragi 2004)
Turtle surveys	
Amphibian surveys	1991-1997, 2004-2005 (WFTS Route 44); 2002-2003 (NRRI)
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	1986 phytoplankton, zooplankton, macroinverts, and benthos (NPS/Kraft et al. 2007)
Native Fish surveys	2002-2003 (NRRI)
Water Chemistry sampling	1986-1987 (Kraft et al. 2007); 2007-2013 (Elias/NPS)

PUBLICATIONS:

E.J. Judziewicz and R.G. Koch. 1993. Flora and vegetation of the Apostle Islands National Lakeshore and Madeline Island, Ashland and Bayfield Counties, Wisconsin. The Michigan Botanist 32 (2): 43-189.

G.J. Kraft, C.Mechenich, D.J. Mechenich, and S.W. Szczytko. 2007. Assessment of coastal water resources and watershed conditions at Apostle Islands National Lakeshore (Wisconsin). Report to National Park Service, Fort Collins, CO.

G. Smith and F. Maragi. 2004. Small mammal inventory of the Apostle Islands National Lakeshore. Northland College. Ashland WI.

PROJECTS FROM ONLINE DIRECTORY:

2007-2013 (Elias/NPS) - "National Park Service - Great Lakes Inventory & Monitoring Network"

2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

OTHER SOURCES:

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

WDNR, unpub - Unpublished data in files, Bureau of Natural Heritage Conservation, Madison, WI.

WFTS - Wisconsin Frog & Toad Survey. Data housed at WDNR, Bureau of Natural Heritage Conservation, Madison, WI

Site Name	Long Island-Chequamegon Point
Natural Heritage Community surveys	1995-1996 (Epstein et al. 1997)
Quantitative Vegetation sampling	1995-1996 (Epstein et al. 1997)
Rare Plant surveys	1995-1996 (Epstein et al. 1997)
Bird surveys	
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	
Native Fish surveys	
Water Chemistry sampling	

PUBLICATIONS:

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

Site Name	Lost Creek Natural Area
Natural Heritage Community surveys	1995-1996 (Epstein et al. 1997)
Quantitative Vegetation sampling	2002-2003 (NRRI); 2002-2004 (Trebitz/EPA); 2008 (O'Halloran/LSRI), 2012 (Eliot/LSRI)
Rare Plant surveys	1995-1996 (Epstein et al. 1997)
Bird surveys	1994-2005 (Swengel/SNABBS); 1996 (Epstein et al. 1997; Elias & Meeker 1999); 2002-2003 (NRRI); 2012-2013 (Eliot/LSRI); 2008-present (Brady/WDNR)
Small Mammal surveys	
Turtle surveys	2000-2001 (Trebitz et al. 2011)
Amphibian surveys	2002-2003 (NRRI); amphibians 2012-2013 (Eliot/LSRI)
Lepidopteran surveys	
Odonate surveys	1998 (Hudson - Invert Atlas); 2002, 2004 (DuBois - Invert Atlas); 2006 (Hanson - Invert Atlas); 2010 (Brady - Invert Atlas)
Aquatic fauna and phytoplankton surveys	zoobenthos 2000-2001 (Trebitz et al. 2011); macroinverts & diatoms 2002-2003 (NRRI); macroinverts 2007-2008 (O'Halloran/LSRI); macroinverts 2011-2012 (Eliot/LSRI)
Native Fish surveys	2000-2001 (Trebitz et al. 2011); 2002-2003 (NRRI); 2002-2004 (Trebitz/EPA)
Water Chemistry sampling	1998-2000 (Trebitz et al. 2002, 2005); 2000-2001 (Trebitz et al. 2011); 2002-2003 (NRRI); 2002-2004 (Trebitz/EPA); 2007-2008 (O'Halloran/LSRI); 2011-2012 (Eliot/LSRI)

PUBLICATIONS:

J.E. Elias and J.E. Meeker. 1999. Plant communities and birds of six Lake Superior coastal wetlands. The Passenger Pigeon 61 (3): 323-336.

A. Eliot, K. Schmude, and S. O'Halloran. 2008. Lost Creek Watershed Project Brief. Lake Superior Coastal Wetland and Stream Monitoring Project. Lake Superior Research Institute. Superior, WI.

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

A.S. Trebitz, J.A. Morrice, and A.M. Cotter. 2002. Relative Role of Lake and Tributary in Hydrology of Lake Superior Coastal Wetlands. Journal of Great Lakes Research 28 (2): 212-227.

A.S. Trebitz, J.A. Morrice, D.L. Taylor, R.L. Anderson, C.W. West, J.R. Kelly. 2005. Hydromorphic determinants of aquatic habitat variability in Lake Superior coastal wetlands. Wetlands 25 (3): 505-519.

A.S. Trebitz, J.C. Brazner, D.K. Tanner, and R. Meyer. 2011.Interacting watershed size and landcover influences on habitat and biota of Lake Superior coastal wetlands. Aquatic Ecosystem Health & Management 14 (4): 443-455.

PROJECTS FROM ONLINE DIRECTORY:

2008-present (Ryan Brady) "Wisconsin Marshbird Surveys"

2011-2013 (Eliot/LSRI) "Implementing WDNR's Lake Superior Nearshore Monitoring Program"

2007-2010 (O'Halloran/LSRI) "Lake Superior Coastal Wetland and Stream Monitoring Project"

2002-2004 (Trebitz/EPA) "Great Lakes coastal wetlands"

OTHER SOURCES:
Invert Atlas - Database owned and maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

SNABBS - State Natural Area Breeding Bird Survey Atlas. Database housed at WDNR, Bureau of Natural Heritage Conservation, Madison, WI

Site Name	Middle River Estuary
Natural Heritage Community surveys	2012 (Staffen/WNHI)
Quantitative Vegetation sampling	aquatic macrophytes - 1995 (Judziewicz/WNHI, unpub); 2002-2003 (NRRI); 2002-2004 (Trebitz/EPA)
Rare Plant surveys	aquatic macrophytes - 1995 (Judziewicz/WNHI); 2012 (Staffen/WNHI)
Bird surveys	2002-2003 (NRRI); 2012 (Niemi/NRRI)
Small Mammal surveys	
Turtle surveys	2000-2001 (Trebitz et al. 2011)
Amphibian surveys	2002-2003 (NRRI); 2012 (Niemi/NRRI)
Lepidopteran surveys	
Odonate surveys	Odonata 2002 (DuBois - Invert Atlas)
Aquatic fauna and phytoplankton surveys	zoobenthos 2000-2001 (Trebitz et al. 2011); macroinverts 2002-2003 (NRRI)
Native Fish surveys	2000-2001 (Trebitz et al. 2011); 2002-2003 (NRRI); 2002-2004 (Trebitz/EPA)
Water Chemistry sampling	1998-2000 (Trebitz et al. 2002, 2005); 2000-2001 (Trebitz et al. 2011); 2002-2004 (Trebitz/EPA)

PUBLICATIONS:

A.S. Trebitz, J.A. Morrice, and A.M. Cotter. 2002. Relative Role of Lake and Tributary in Hydrology of Lake Superior Coastal Wetlands. Journal of Great Lakes Research 28 (2): 212-227.

A.S. Trebitz, J.A. Morrice, D.L. Taylor, R.L. Anderson, C.W. West, J.R. Kelly. 2005. Hydromorphic determinants of aquatic habitat variability in Lake Superior coastal wetlands. Wetlands 25 (3): 505-519.

A.S. Trebitz, J.C. Brazner, D.K. Tanner, and R. Meyer. 2011. Interacting watershed size and landcover influences on habitat and biota of Lake Superior coastal wetlands. Aquatic Ecosystem Health & Management 14 (4): 443-455.

PROJECTS FROM ONLINE DIRECTORY:

2011-2012 (Niemi/NRRI) "Great Lakes Restoration Initiative Project: Great Lakes Coastal Monitoring"

2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

2002-2004 (Trebitz/EPA) "Great Lakes coastal wetlands"

OTHER SOURCES:

Invert Atlas - Database owned and maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

WDNR, unpub - Unpublished data in files, Bureau of Natural Heritage Conservation, Madison, WI.

Site Name	Montreal River Mouth
Natural Heritage Community surveys	2012 (Staffen/WNHI)
Quantitative Vegetation sampling	
Rare Plant surveys	2012 (Staffen/WNHI)
Bird surveys	
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	
Native Fish surveys	
Water Chemistry sampling	

PROJECTS FROM ONLINE DIRECTORY:
2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

Site Name	Onion River
Natural Heritage Community surveys	2012 (Staffen/WNHI)
Quantitative Vegetation sampling	2002-2003 (NRRI); 2011-2013 (Eliot/LSRI)
Rare Plant surveys	2012 (Staffen/WNHI)
Bird surveys	2002-2003 (NRRI); 2011 (NRRI); 2011-2013 (Eliot/LSRI)
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	2002-2003 (NRRI); 2011 (NRRI); 2011-2013 (Eliot/LSRI)
Lepidopteran surveys	
Odonate surveys	Odonata 1998 (DuBois - Invert Atlas)
Aquatic fauna and phytoplankton surveys	macroinverts 2002-2003 (NRRI); macroinverts 2011-2013 (Eliot/LSRI)
Native Fish surveys	2002-2003 (NRRI)
Water Chemistry sampling	2011-2013 (Eliot/LSRI)

PROJECTS FROM ONLINE DIRECTORY:
2011-2013 (Eliot/LSRI) "Implementing WDNR's Lake Superior Nearshore Monitoring Program"

2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

OTHER SOURCES:
Invert Atlas - Database owned and maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

Site Name	Outer Island Lagoon
Natural Heritage Community surveys	1972-1983, 1990-1992 (Judziewicz & Koch 1993); 1995-1996 (Epstein et al. 1997)
Quantitative Vegetation sampling	1990-1992 (Judziewicz & Koch 1993); 1995-1996 (Epstein et al. 1997)
Rare Plant surveys	1972-1983, 1990-1992 (Judziewicz & Koch 1993); 1995-1996 (Epstein et al. 1997)
Bird surveys	
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	1998 (Casper - Herp Atlas)
Lepidopteran surveys	
Odonate surveys	1990 (Smith - Invert Atlas)
Aquatic fauna and phytoplankton surveys	
Native Fish surveys	
Water Chemistry sampling	2007-present (Elias/NPS)

PUBLICATIONS:

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

E.J. Judziewicz and R.G. Koch. 1993. Flora and vegetation of the Apostle Islands National Lakeshore and Madeline Island, Ashland and Bayfield Counties, Wisconsin. The Michigan Botanist 32 (2): 43-189.

PROJECTS FROM ONLINE DIRECTORY:

2007-present (Elias/NPS) "National Park Service - Great Lakes Inventory & Monitoring Network"

OTHER SOURCES:

Herp Atlas - WDNR-BER purchased 1996 version of this database that is owned and maintained by Gary Casper.

Invert Atlas - Database owned and maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

Site Name	Pikes Creek Slough
Natural Heritage Community surveys	2012 (Staffen/WNHI)
Quantitative Vegetation sampling	
Rare Plant surveys	2012 (Staffen/WNHI)
Bird surveys	2002-2003 (NRRI)
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	2002-2003 (NRRI)
Lepidopteran surveys	
Odonate surveys	1988 (Smith - Invert Atlas)
Aquatic fauna and phytoplankton surveys	macroinverts 1996 (Dovichin - Invert Atlas)
Native Fish surveys	
Water Chemistry sampling	1998-2000 (Trebitz et al. 2002, 2005)

PUBLICATIONS:

A.S. Trebitz, J.A. Morrice, and A.M. Cotter. 2002. Relative Role of Lake and Tributary in Hydrology of Lake Superior Coastal Wetlands. Journal of Great Lakes Research 28 (2): 212-227.

A.S. Trebitz, J.A. Morrice, D.L. Taylor, R.L. Anderson, C.W. West, and J.R. Kelly. 2005. Hydromorphic determinants of aquatic habitat variability in Lake Superior coastal wetlands. Wetlands 25 (3): 505-519.

PROJECTS FROM ONLINE DIRECTORY:

2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

OTHER SOURCES:

Invert Atlas - Database owned and maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

Site Name	Poplar River Estuary
Natural Heritage Community surveys	2012 (Staffen/WNHI)
Quantitative Vegetation sampling	aquatic macrophytes - 1995 (Judziewicz/WNHI, unpub); 2011 (Danz)
Rare Plant surveys	aquatic macrophytes - 1995 (Judziewicz/WNHI); 2012 (Staffen/WNHI)
Bird surveys	
Small Mammal surveys	
Turtle surveys	2000-2001 (Trebitz et al. 2011)
Amphibian surveys	
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	zoobenthos 2000-2001 (Trebitz et al. 2011); macroinverts 2011 (NRRI)
Native Fish surveys	2000-2001 (Trebitz et al. 2011); 2011 (NRRI)
Water Chemistry sampling	1998-2000 (Trebitz et al. 2002, 2005); 2000-2001 (Trebitz et al. 2011); 2011 (NRRI)

PUBLICATIONS:

A.S. Trebitz, J.A. Morrice, and A.M. Cotter. 2002. Relative Role of Lake and Tributary in Hydrology of Lake Superior Coastal Wetlands. Journal of Great Lakes Research 28 (2): 212-227.

A.S. Trebitz, J.A. Morrice, D.L. Taylor, R.L. Anderson, C.W. West, and J.R. Kelly. 2005. Hydromorphic determinants of aquatic habitat variability in Lake Superior coastal wetlands. Wetlands 25 (3): 505-519.

A.S. Trebitz, J.C. Brazner, D.K. Tanner, and R. Meyer. 2011. Interacting watershed size and landcover influences on habitat and biota of Lake Superior coastal wetlands. Aquatic Ecosystem Health & Management 14 (4): 443-455.

PROJECTS FROM ONLINE DIRECTORY:

2011 (Danz) "Great Lakes Indicator Consortium: Coastal Monitoring"

2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

OTHER SOURCES:

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

WDNR, unpub - Unpublished data in files, Bureau of Natural Heritage Conservation, Madison, WI.

Site Name	Raspberry Bay and River
Natural Heritage Community surveys	Herdendorf et al. 1981; 1995-1996 (Epstein et al. 1997)
Quantitative Vegetation sampling	2011 (Danz); 2012 (Eliot/LSRI)
Rare Plant surveys	Herdendorf et al. 1981; 1995-1996 (Epstein et al. 1997)
Bird surveys	2002-2003 (NRRI); 2011 (NRRI); 2012-2013 (Eliot/LSRI)
Small Mammal surveys	
Turtle surveys	2000-2001 (Trebitz et al. 2011);
Amphibian surveys	2002-2003 (NRRI); 2011 (NRRI); amphibians 2012-2013 (Eliot/LSRI)
Lepidopteran surveys	
Odonate surveys	Odonata 2001 (DuBois - Invert Atlas)
Aquatic fauna and phytoplankton surveys	macroinverts 1996 (Steffens - Invert Atlas); zoobenthos 2000-2001 (Trebitz et al. 2011); macroinverts 2011 (NRRI); macroinverts 2012 (Eliot/LSRI)
Native Fish surveys	2000-2001 (Trebitz et al. 2011); 2011 (NRRI)
Water Chemistry sampling	2000-2001 (Trebitz et al. 2011); 2011 (NRRI); 2012 (Eliot/LSRI)

PUBLICATIONS:

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

C.E. Herdendorf, S.M. Hartley, and M.D. Barnes. 1981. Fish and wildlife resources of the Great Lakes coastal wetlands within the United States. U.S. Fish & Wildlife Service. Washington, D.C.

A.S. Trebitz, J.C. Brazner, D.K. Tanner, and R. Meyer. 2011 .Interacting watershed size and landcover influences on habitat and biota of Lake Superior coastal wetlands. Aquatic Ecosystem Health & Management 14 (4): 443-455.

A.S. Trebitz, J.A. Morrice, and A.M. Cotter. 2002. Relative Role of Lake and Tributary in Hydrology of Lake Superior Coastal Wetlands. Journal of Great Lakes Research 28 (2): 212-227.

A.S. Trebitz, J.A. Morrice, D.L. Taylor, R.L. Anderson, C.W. West, J.R. Kelly. 2005. Hydromorphic determinants of aquatic habitat variability in Lake Superior coastal wetlands. Wetlands 25 (3): 505-519.

PROJECTS FROM ONLINE DIRECTORY:

2011 (Danz) "Great Lakes Indicator Consortium: Coastal Monitoring"

2011-2013 (Eliot/LSRI) "Implementing WDNR's Lake Superior Nearshore Monitoring Program"

OTHER SOURCES:

Invert Atlas - Database owned and maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

Site Name	Reefer Creek
Natural Heritage Community surveys	2012 (Staffen/WNHI)
Quantitative Vegetation sampling	
Rare Plant surveys	2012 (Staffen/WNHI)
Bird surveys	
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	
Native Fish surveys	
Water Chemistry sampling	

PROJECTS FROM ONLINE DIRECTORY:
2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

Site Name	Saxine Creek & Mawikwe Bay
Natural Heritage Community surveys	2012 (Staffen/WNHI)
Quantitative Vegetation sampling	2011-2012 (Eliot/LSRI)
Rare Plant surveys	2012 (Staffen/WNHI)
Bird surveys	2012-2013 (Eliot/LSRI)
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	1991-1997, 2004-2005 (WFTS Route 44); 2012-2013 (Eliot/LSRI)
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	macroinverts 1996 (Steffens - Invert Atlas); macroinverts 2003 (SWIMS - Invert Atlas); macroinverts 2011-2012 (Eliot/LSRI)
Native Fish surveys	
Water Chemistry sampling	2011-2012 (Eliot/LSRI)

PROJECTS FROM ONLINE DIRECTORY:
2011-2013 (Eliot/LSRI) "Implementing WDNR's Lake Superior Nearshore Monitoring Program"

2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

OTHER SOURCES:
WFTS - Wisconsin Frog & Toad Survey. Data housed at WDNR, Bureau of Natural Heritage Conservation, Madison, WI

Invert Atlas - Database owned and maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

Site Name	Schooner Bay/Red Cliff Bay
Natural Heritage Community surveys	2012 (Staffen/WNHI)
Quantitative Vegetation sampling	
Rare Plant surveys	2012 (Staffen/WNHI)
Bird surveys	
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	
Native Fish surveys	
Water Chemistry sampling	Contaminants 2002-2003 (NRRI)

PROJECTS FROM ONLINE DIRECTORY:
2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

OTHER SOURCES:
NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

WDNR, unpub - Unpublished data in files, Bureau of Natural Heritage Conservation, Madison, WI.

Site Name	Sioux River Wetland Estuary (and Bayview Beach)
Natural Heritage Community surveys	1995-1996 (Epstein et al. 1997)
Quantitative Vegetation sampling	1995-1996 (Epstein et al. 1997); 2002-2003 (NRRI); 2008 (O'Halloran/LSRI); 2011 (Danz/LSRI)
Rare Plant surveys	1995-1996 (Epstein et al. 1997)
Bird surveys	1996 (Epstein et al. 1997); 2002-2003 (NRRI); 2011 (NRRI); 2012-2013 (Eliot/LSRI)
Small Mammal surveys	
Turtle surveys	2000-2001 (Trebitz et al. 2011)
Amphibian surveys	2002-2003 (NRRI); 2011 (NRRI); 2012-2013 (Eliot/LSRI)
Lepidopteran surveys	
Odonate surveys	1998, 2004 (DuBois - Invert Atlas); 2011 (Brady - Invert Atlas)
Aquatic fauna and phytoplankton surveys	macroinverts 1996 (Schmude - Invert Atlas); zoobenthos 2000-2001 (Trebitz et al. 2011); macroinverts 2002-2003 (NRRI); macroinverts 2007-2008 (O'Halloran/LSRI); macroinverts 2011-2012 (Eliot/LSRI); macroinverts 2011 (NRRI)
Native Fish surveys	2000-2001 (Trebitz et al. 2011); 2002-2003 (NRRI); 2011 (NRRI)
Water Chemistry sampling	1998-2000 (Trebitz et al. 2002, 2005); 2000-2001 (Trebitz et al. 2011); 2007-2008 (O'Halloran/LSRI); 2011-2012 (Eliot/LSRI); 2011 (NRRI)

PUBLICATIONS:

A. Eliot, K. Schmude, and S. O'Halloran. 2008. Sioux River Watershed Project Brief. Lake Superior Coastal Wetland and Stream Monitoring Project. Lake Superior Research Institute. Superior, WI.

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

A.S. Trebitz, J.C. Brazner, D.K. Tanner, and R. Meyer. 2011. Interacting watershed size and landcover influences on habitat and biota of Lake Superior coastal wetlands. Aquatic Ecosystem Health & Management 14 (4): 443-455.

A.S. Trebitz, J.A. Morrice, and A.M. Cotter. 2002. Relative Role of Lake and Tributary in Hydrology of Lake Superior Coastal Wetlands. Journal of Great Lakes Research 28 (2): 212-227.

A.S. Trebitz, J.A. Morrice, D.L. Taylor, R.L. Anderson, C.W. West, J.R. Kelly. 2005. Hydromorphic determinants of aquatic habitat variability in Lake Superior coastal wetlands. Wetlands 25 (3): 505-519.

PROJECTS FROM ONLINE DIRECTORY:

2011 (Danz/UW-Superior) "Great Lakes Indicator Consortium: Coastal Monitoring"

2011-2013 (Eliot/LSRI) "Implementing WDNR's Lake Superior Nearshore Monitoring Program"

2007-2010 (O'Halloran/LSRI) "Lake Superior Coastal Wetland and Stream Monitoring Project"

OTHER SOURCES:

Invert Atlas - Database owned and maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

Site Name	Siskiwit Bay and River
Natural Heritage Community surveys	Herdendorf et al. 1981; 2012 (Staffen/WNHI)
Quantitative Vegetation sampling	Herdendorf et al. 1981
Rare Plant surveys	Herdendorf et al. 1981; 2012 (Staffen/WNHI)
Bird surveys	1996 (Epstein et al. 1997)
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	
Lepidopteran surveys	
Odonate surveys	2007 (Smith - Invert Atlas)
Aquatic fauna and phytoplankton surveys	
Native Fish surveys	
Water Chemistry sampling	

PUBLICATIONS:

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

C.E. Herdendorf, S.M. Hartley, and M.D. Barnes. 1981. Fish and wildlife resources of the Great Lakes coastal wetlands within the United States. U.S. Fish & Wildlife Service. Washington, D.C.

PROJECTS FROM ONLINE DIRECTORY:

2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

OTHER SOURCES:

Invert Atlas - Database owned and maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

Site Name	St. Louis River- Allouez Bay & Wisconsin Point
Natural Heritage Community surveys	1995-1996 (Epstein et al. 1997); wetlands 2002-2006 (Johnson/City of Superior)
Quantitative Vegetation sampling	2002-2003 (NRRI); 2002-2004 (Trebitz/EPA); 2008-2009 (O'Halloran/LSRI); dune plants 2010 (Danz/UW-Superior); 2011 (NRRI); 2011-2012 (Eliot/LSRI)
Rare Plant surveys	1995-1996 (Epstein et al. 1997); dune plants 2010 (Danz/UW-Superior)
Bird surveys	1996 (Epstein et al. 1997; Elias & Meeker 1999); 2002-2003 (NRRI); 2011 (Niemi/NRRI); 2012-2013 (Eliot/LSRI)
Small Mammal surveys	
Turtle surveys	2000-2001 (Trebitz et al. 2011)
Amphibian surveys	2002-2003 (NRRI); 2011 (Niemi/NRRI); 2012-2013 (Eliot/LSRI)
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	zoobenthos 2000-2001 (Trebitz et al. 2011); macroinverts & diatoms 2002-2003 (NRRI); macroinverts 2007-2009 (O'Halloran/LSRI); 2011 (NRRI); 2011-2012 (Eliot/LSRI)
Native Fish surveys	2000-2001 (Trebitz et al. 2011); 2002-2003 (NRRI); 2002-2004 (Trebitz/EPA)
Water Chemistry sampling	2000-2001 (Trebitz et al. 2011); 2002-2003 (NRRI); 2002-2004 (Trebitz/EPA); 2007-2009 (O'Halloran/LSRI); 2011-2012 (Eliot/LSRI)

PUBLICATIONS:

J.E. Elias and J.E. Meeker. 1999. Plant communities and birds of six Lake Superior coastal wetlands. The Passenger Pigeon 61 (3): 323-336

A. Eliot, K. Schmude, and S. O'Halloran. 2008. Allouez Bay Watershed Project Brief. Lake Superior Coastal Wetland and Stream Monitoring Project. Lake Superior Research Institute. Superior, WI.

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

R.G. Koch. 1980. Wisconsin Point: A review of the fauna and flora with management suggestions. University of Wisconsin-Superior. Superior, WI.

R.G. Koch. 1981. Vegetation and floristics of Allouez Bay, Superior, Wisconsin. University of Wisconsin-Superior. Superior, WI.

A.S. Trebitz., J.C. Brazner, D.K. Tanner, and R. Meyer. 2011. Interacting watershed size and landcover influences on habitat and biota of Lake Superior coastal wetlands. Aquatic Ecosystem Health & Management 14:443–455.

PROJECTS FROM ONLINE DIRECTORY:

2011-2013 (Eliot/LSRI) "Implementing WDNR's Lake Superior Nearshore Monitoring Program"

2002-2006 (Johnson/City of Superior) "City of Superior Special Area Management Plan"

2011-2012 (Niemi/NRRI) "Great Lakes Restoration Initiative Project: Great Lakes Coastal Monitoring"

2007-2010 (O'Halloran/LSRI) "Lake Superior Coastal Wetland and Stream Monitoring Project"

2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

2002-2004 (Trebitz/EPA) "Great Lakes coastal wetlands"

OTHER SOURCES:
NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

Site Name	St. Louis River- Clough Island
Natural Heritage Community surveys	2013 (WNHI)
Quantitative Vegetation sampling	2012 (NRRI); 2103 (NRRI)
Rare Plant surveys	2013 (WDNR)
Bird surveys	2012 (NRRI); marsh birds, forest interior birds, & grassland birds 2013 (NRRI & WNHI)
Small Mammal surveys	2013 (WNHI)
Turtle surveys	2000-2001 (Trebitz et al. 2011); 2013 (WDNR)
Amphibian surveys	2012 (NRRI); 2013 (WDNR)
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	zoobenthos 2000-2001 (Trebitz et al. 2011); macroinverts 2012 (NRRI)
Native Fish surveys	2000-2001 (Trebitz et al. 2011); 2012 (NRRI)
Water Chemistry sampling	2000-2001 (Trebitz et al. 2011); 2012 (NRRI)

PUBLICATIONS:

A.S. Trebitz, J.C. Brazner, D.K. Tanner, and R. Meyer. 2011. Interacting watershed size and landcover influences on habitat and biota of Lake Superior coastal wetlands. Aquatic Ecosystem Health & Management 14:443–455.

OTHER SOURCES:

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

WNHI – Data from Biotic Inventory surveys, Wisconsin Natural Heritage Inventory, Wisconsin Department of Natural Resources.

Site Name	St. Louis River- Dwight's Point
Natural Heritage Community surveys	1995-1996 (Epstein et al. 1997)
Quantitative Vegetation sampling	
Rare Plant surveys	1995-1996 (Epstein et al. 1997)
Bird surveys	1996 (Epstein et al. 1997); 2012 (NRRI)
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	2012 (NRRI)
Lepidopteran surveys	
Odonate surveys	2007 (Pratt - Invert Atlas)
Aquatic fauna and phytoplankton surveys	
Native Fish surveys	
Water Chemistry sampling	

PUBLICATIONS:

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory Program, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

OTHER SOURCES:

Invert Atlas - Database maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

Site Name	St. Louis River- Kimball's Bay
Natural Heritage Community surveys	1995-1996 (Epstein et al. 1997); wetlands 2002-2006 (Johnson/City of Superior)
Quantitative Vegetation sampling	2002-2003 (NRRI)
Rare Plant surveys	1995-1996 (Epstein et al. 1997)
Bird surveys	1996 (Epstein et al. 1997); 2002-2003 (NRRI)
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	2002-2003 (NRRI)
Lepidopteran surveys	
Odonate surveys	2002-2006 (DuBois - Invert Atlas)
Aquatic fauna and phytoplankton surveys	
Native Fish surveys	
Water Chemistry sampling	

PUBLICATIONS:

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory Program, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

PROJECTS FROM ONLINE DIRECTORY:

2002-2006 (Johnson/City of Superior) "City of Superior Special Area Management Plan"

OTHER SOURCES:

Invert Atlas - Database maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

Site Name	St. Louis River- Little Pokegama Bay
Natural Heritage Community surveys	1995-1996 (Epstein et al. 1997); wetlands 2002-2006 (Johnson/City of Superior)
Quantitative Vegetation sampling	2002-2003 (NRRI); 2009 (O'Halloran/LSRI); 2012 (Eliot/LSRI)
Rare Plant surveys	1995-1996 (Epstein et al. 1997)
Bird surveys	1996 (Epstein et al. 1997); 2002-2003 (NRRI); 2012-2013 (Eliot/LSRI)
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	2002-2003 (NRRI); 2012-2013 (Eliot/LSRI)
Lepidopteran surveys	
Odonate surveys	2009 (Schmude - Invert Atlas)
Aquatic fauna and phytoplankton surveys	macroinverts 2002-2003 (NRRI); macroinverts 2009 (O'Halloran/LSRI); macroinverts 2011-2012 (Eliot/LSRI)
Native Fish surveys	2002-2003 (NRRI)
Water Chemistry sampling	2009 (O'Halloran/LSRI), 2011-2012 (Eliot/LSRI)

PUBLICATIONS:

A. Eliot, K. Schmude, P. Hlina, and S. O'Halloran. 2010. Little Pokegama River Watershed Project Brief. Lake Superior Coastal Wetland and Stream Monitoring Project. Lake Superior Research Institute. Superior, Wisconsin.

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory Program, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

PROJECTS FROM ONLINE DIRECTORY:

2011-2013 (Eliot/LSRI) "Implementing WDNR's Lake Superior Nearshore Monitoring Program"

2002-2006 (Johnson/City of Superior) "City of Superior Special Area Management Plan"

2007-2010 (O'Halloran/LSRI) "Lake Superior Coastal Wetland and Stream Monitoring Project"

OTHER SOURCES:

Invert Atlas - Database maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

Site Name	St. Louis River- Lower Nemadji River Marshes
Natural Heritage Community surveys	1995-1996 (Epstein et al. 1997); wetlands 2002-2006 (Johnson/City of Superior)
Quantitative Vegetation sampling	2002-2003 (NRRI); 2011-2012 (Eliot/LSRI)
Rare Plant surveys	1995-1996 (Epstein et al. 1997)
Bird surveys	1996 (Epstein et al. 1997); 2002-2003 (NRRI); 2012-2013 (Eliot/LSRI)
Small Mammal surveys	
Turtle surveys	2000-2001 (Trebitz et al. 2011)
Amphibian surveys	2002-2003 (NRRI); 2012-2013 (Eliot/LSRI)
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	zoobenthos 2000-2001 (Trebitz et al. 2011); macroinverts 2011-2012 (Eliot/LSRI)
Native Fish surveys	2000-2001 (Trebitz et al. 2011)
Water Chemistry sampling	2000-2001 (Trebitz et al. 2011); 2011-2012 (Eliot/LSRI)

PUBLICATIONS:

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory Program, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

A.S. Trebitz, J.C. Brazner, D.K. Tanner, and R. Meyer. 2011. Interacting watershed size and landcover influences on habitat and biota of Lake Superior coastal wetlands. Aquatic Ecosystem Health & Management 14:443–455.

PROJECTS FROM ONLINE DIRECTORY:

2011-2013 (Eliot/LSRI) "Implementing WDNR's Lake Superior Nearshore Monitoring Program"

2002-2006 (Johnson/City of Superior) "City of Superior Special Area Management Plan"

OTHER SOURCES:

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

Site Name	St. Louis River- Oliver Marsh
Natural Heritage Community surveys	1995-1996 (Epstein et al. 1997); 2013 (WNHI)
Quantitative Vegetation sampling	
Rare Plant surveys	1995-1996 (Epstein et al. 1997)
Bird surveys	1996 (Epstein et al. 1997)
Small Mammal surveys	
Turtle surveys	2000-2001 (Trebitz et al. 2011)
Amphibian surveys	
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	zoobenthos 2000-2001 (Trebitz et al. 2011)
Native Fish surveys	2000-2001 (Trebitz et al. 2011)
Water Chemistry sampling	2000-2001 (Trebitz et al. 2011)

PUBLICATIONS:

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory Program, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

A.S. Trebitz, J.C. Brazner, D.K. Tanner, and R. Meyer. 2011. Interacting watershed size and landcover influences on habitat and biota of Lake Superior coastal wetlands. Aquatic Ecosystem Health & Management 14:443–455.

OTHER SOURCES:

WNHI – Data from Biotic Inventory surveys, Wisconsin Natural Heritage Inventory, Wisconsin Department of Natural Resources.

Site Name	St. Louis River- Pokegama Bay
Natural Heritage Community surveys	1995-1996 (Epstein et al. 1997); wetlands 2002-2006 (Johnson/City of Superior)
Quantitative Vegetation sampling	2002-2003 (NRRI); 2002-2004 (Trebitz/EPA); 2009 (O'Halloran/LSRI); 2011 (NRRI); 2012 (Eliot/LSRI)
Rare Plant surveys	1995-1996 (Epstein et al. 1997)
Bird surveys	1996 (Epstein et al. 1997); 2002-2003 (NRRI); 2011 (NRRI); 2012-2013 (Eliot/LSRI)
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	2002-2003 (NRRI); 2011 (NRRI); 2012-2013 (Eliot/LSRI)
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	macroinverts & diatoms 2002-2003 (NRRI); macroinverts 2009 (O'Halloran/LSRI); macroinverts 2011 (NRRI); macroinverts 2011-2012 (Eliot/LSRI)
Native Fish surveys	2002-2003 (NRRI) 2002-2004 (Trebitz/EPA); 2011 (NRRI)
Water Chemistry sampling	2002-2004 (Trebitz/EPA); 2009 (O'Halloran/LSRI); 2011 (NRRI); 2011-2012 (Eliot/LSRI)

PUBLICATIONS:

A. Eliot, K. Schmude, P. Hlina, and S. O'Halloran. 2010. Pokegama River Watershed Project Brief. Lake Superior Coastal Wetland and Stream Monitoring Project. Lake Superior Research Institute. Superior, WI.

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory Program, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

PROJECTS FROM ONLINE DIRECTORY:

2011-2013 (Eliot/LSRI) "Implementing WDNR's Lake Superior Nearshore Monitoring Program"

2002-2006 (Johnson/City of Superior) "City of Superior Special Area Management Plan"

2007-2010 (O'Halloran/LSRI) "Lake Superior Coastal Wetland and Stream Monitoring Project"

2002-2004 (Trebitz/EPA) "Great Lakes coastal wetlands"

OTHER SOURCES:

NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.

Site Name	St. Louis River- Pokegama-Carnegie Wetlands
Natural Heritage Community surveys	1995-1996 (Epstein et al. 1997); wetlands 2002-2006 (Johnson/City of Superior)
Quantitative Vegetation sampling	
Rare Plant surveys	1995-1996 (Epstein et al. 1997)
Bird surveys	1996 (Epstein et al. 1997)
Small Mammal surveys	2013 (WNHI)
Turtle surveys	
Amphibian surveys	
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	
Native Fish surveys	
Water Chemistry sampling	

PUBLICATIONS:

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory Program, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

PROJECTS FROM ONLINE DIRECTORY:

2002-2006 (Johnson/City of Superior) "City of Superior Special Area Management Plan"

OTHER SOURCES:

WNHI – Data from Biotic Inventory surveys, Wisconsin Natural Heritage Inventory, Wisconsin Department of Natural Resources.

Site Name	St. Louis River- Red River Breaks (St. Louis River Streambank Protection Area)
Natural Heritage Community surveys	1995-1996 (Epstein et al. 1997); 2013 (WNHI)
Quantitative Vegetation sampling	
Rare Plant surveys	1995-1996 (Epstein et al. 1997); 2013 (WNHI)
Bird surveys	1996 (Epstein et al. 1997); marsh birds, forest interior birds 2013 (WNHI)
Small Mammal surveys	2013 (WNHI)
Turtle surveys	2013 (WNHI)
Amphibian surveys	2013 (WNHI)
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	
Native Fish surveys	
Water Chemistry sampling	

PUBLICATIONS:

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory Program, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

OTHER SOURCES:

WNHI – Data from Biotic Inventory surveys, Wisconsin Natural Heritage Inventory, Wisconsin Department of Natural Resources.

Site Name	St. Louis River- St. Louis River Islands (near Fond du Lac, MN)
Natural Heritage Community surveys	1995-1996 (Epstein et al. 1997), 2013 (WNHI)
Quantitative Vegetation sampling	
Rare Plant surveys	1995-1996 (Epstein et al. 1997)
Bird surveys	1996 (Epstein et al. 1997); marsh birds 2013 (WNHI)
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	
Native Fish surveys	
Water Chemistry sampling	

PUBLICATIONS:

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory Program, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

OTHER SOURCES:

WNHI – Data from Biotic Inventory surveys, Wisconsin Natural Heritage Inventory, Wisconsin Department of Natural Resources.

Site Name	St. Louis River- Superior Airport-Hill Avenue-South Superior Triangle
Natural Heritage Community surveys	1995-1996 (Epstein et al. 1997); wetlands 2002-2006 (Johnson/City of Superior)
Quantitative Vegetation sampling	
Rare Plant surveys	1995-1996 (Epstein et al. 1997)
Bird surveys	1996 (Epstein et al. 1997)
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	
Native Fish surveys	
Water Chemistry sampling	

PUBLICATIONS:

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory Program, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

PROJECTS FROM ONLINE DIRECTORY:

2002-2006 (Johnson/City of Superior) "City of Superior Special Area Management Plan"

Site Name	Stockton Island Tombolo
Natural Heritage Community surveys	1972-1983, 1990-1992 (Judziewicz & Koch, 1993 unpub); Herdendorf et al. 1981; 1995-1996 (Epstein et al. 1997); 2006 (Anderson et al. 2008)
Quantitative Vegetation sampling	1990-1992 (Judziewicz & Koch, 1993); Herdendorf et al. 1981; 1995-1996 (Epstein et al. 1997); wetlands 2011 (Elias/NPS)
Rare Plant surveys	1972-1983, 1990-1992 (Judziewicz & Koch, 1993 unpub); Herdendorf et al. 1981; 1995-1996 (Epstein et al. 1997); 2006 (Anderson et al. 2008)
Bird surveys	1994 (Epstein/WNHI, unpub); impacts of toxic exposure 2010-2011 (Custer/USGS)
Small Mammal surveys	2003 (Smith and Maragi 2004)
Turtle surveys	
Amphibian surveys	1976 (MPM - Herp Atlas); 1974, 1980 (summarized in Kraft et al. 2007)
Lepidopteran surveys	2005 (Kirk - Invert Atlas)
Odonate surveys	1990 (Smith - Invert Atlas); 2004 (DuBois - Invert Atlas)
Aquatic fauna and phytoplankton surveys	1986 littoral benthos, 1986-1987 benthic macroinvertebrates, <1997 zooplankton & benthos (summarized in Kraft et al. 2007)
Native Fish surveys	
Water Chemistry sampling	1980s, <1997 (summarized in Kraft et al. 2007); 2011 (Elias/NPS)

PUBLICATIONS:

C. Anderson, L. Ayers, T. Bergeson, and B. Smith. 2008. Biodiversity in Selected Natural Communities Related to Global Climate Change - Peatland Complexes. Report to Wisconsin Focus on Energy Environmental Research Program. Wisconsin DNR, Bureau of Endangered Resources, Madison WI.

E.J. Epstein, E.J. Judziewicz, and W.A. Smith. 1997. Wisconsin's Lake Superior coastal wetlands evaluation - including other selected natural features of the Lake Superior Basin. Wisconsin's Natural Heritage Inventory, Bureau of Endangered Resources, Department of Natural Resources. Madison, WI.

C.E. Herdendorf, S.M. Hartley, and M.D. Barnes. 1981. Fish and wildlife resources of the Great Lakes coastal wetlands within the United States. U.S. Fish & Wildlife Service. Washington, D.C.

E.J. Judziewicz and R.G. Koch. 1993. Flora and vegetation of the Apostle Islands National Lakeshore and Madeline Island, Ashland and Bayfield Counties, Wisconsin. The Michigan Botanist 32 (2): 43-189 .

G.J. Kraft, C.Mechenich, D.J. Mechenich, and S.W. Szczytko. 2007. Assessment of coastal water resources and watershed conditions at Apostle Islands National Lakeshore (Wisconsin). Report to National Park Service, Fort Collins, CO.

G. Smith and F. Maragi. 2004. Small mammal inventory of the Apostle Islands National Lakeshore. Northland College. Ashland WI.

PROJECTS FROM ONLINE DIRECTORY:

2010-2011 (Custer/USGS) "Birds as Indicators of Contaminant Exposure in the Great Lakes"

2011 (Elias/NPS) "EPA nationwide wetland assessment"

2007-present (Elias/NPS) "water quality monitoring of inland lakes and lagoons"

OTHER SOURCES:

WDNR, unpub - Unpublished data in files, Bureau of Natural Heritage Conservation, Madison, WI.

Herp Atlas - Database that is owned and maintained by Gary Casper.

Invert Atlas - Database maintained by WDNR, Bureau of Natural Heritage Conservation, Madison, WI.

Site Name	Thompson Creek
Natural Heritage Community surveys	2012 (Staffen/WNHI)
Quantitative Vegetation sampling	
Rare Plant surveys	2012 (Staffen/WNHI)
Bird surveys	
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	
Native Fish surveys	
Water Chemistry sampling	

PROJECTS FROM ONLINE DIRECTORY:
2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

Site Name	Whittlesey Creek Mouth
Natural Heritage Community surveys	2012 (Staffen/WNHI)
Quantitative Vegetation sampling	
Rare Plant surveys	2012 (Staffen/WNHI)
Bird surveys	2002-2003 (NRRI)
Small Mammal surveys	
Turtle surveys	
Amphibian surveys	2002-2003 (NRRI)
Lepidopteran surveys	
Odonate surveys	
Aquatic fauna and phytoplankton surveys	diatoms 2002-2003 (NRRI);
Native Fish surveys	
Water Chemistry sampling	2002-2003 (NRRI); contaminants 2002-2003 (NRRI)

PROJECTS FROM ONLINE DIRECTORY:
2012 (Staffen/WNHI) - "Lake Superior Estuaries Natural Community Surveys"

OTHER SOURCES:
NRRI - Data from Great Lakes Coastal Wetlands Monitoring project, Natural Resources Research Institute, University of Minnesota-Duluth.