



Rapid Ecological Assessment for the St. Louis River Planning Group

A Rapid Ecological Assessment Focusing on Rare Plants, Selected Rare Animals, and High-quality Natural Communities

Properties included in this report are:

Douglas County
<ul style="list-style-type: none"> • St. Louis and Red Rivers Streambank Protection Area (including Clough Island) • Pokegama Carnegie Wetlands State Natural Area

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Cover Photos: Top: Submergent and Emergent Marsh at Fond du Lac Islands, by Andy Clark. Middle left: Boreal Forest at Red River Breaks, by Andy Clark. Middle right: Northern Sedge Meadow, Alder Thicket, and Boreal Forest at Pokegama Carnegie Wetlands, by Eric Epstein. Bottom, left to right: Blue-winged Teal, by Jack Bartholmai; Leopard Frog, by WDNR Staff; Wood Thrush, by Steve Maslowski; Yellow lady's-slipper, by Eric Epstein.

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*Available for internal use only; contains detailed information on the location of Endangered, Threatened, and Special Concern Species and is not available for public distribution.

St. Louis River Planning Group At a Glance

Exceptional Characteristics of the Study Area

- **Boreal Forest.** The St. Louis and Red Rivers Streambank Protection Area offers one of the best opportunities for Boreal Forest restoration on state-owned land on the entire Superior Coastal Plain Ecological Landscape, second only to the Brule River State Forest. Remnant Boreal Forest is currently present in several deep ravines and associated slopes in the Red River Breaks unit of the Streambank Protection Area, as well as in small isolated pockets on adjacent uplands. Boreal Forest restoration efforts are also currently underway at Clough Island and Pokegama Carnegie Wetlands SNA.
- **Hydrology, Wetlands, and Water Quality.** The St. Louis River is the largest river to flow into Lake Superior in the United States portion of the watershed, and empties into one of the largest and most diverse freshwater estuaries in the Great Lakes with extensive marshes and other open wetland types. These wetlands serve to slow the release of water during storms (thus minimizing flooding), filter nutrients and pollutants that are carried in runoff, and provide moisture banks during low water periods or droughts.
- **Breeding and Migratory Bird Conservation.** The SLRPG is both an important breeding bird area and a critical migratory bird stopover location. The water bodies, their associated wetlands, and connected forests within the SLRPG support a rich variety of plants, insects, mollusks, crustaceans, fish, and other food sources for birds that breed in or migrate through the Lower St. Louis River. The location of the planning group on the western side of Lake Superior funnels thousands of migrants through this area each spring and fall.

Site Specific Opportunities for Biodiversity Conservation

Four ecologically important sites, or “Primary Sites,” were identified at the St. Louis River Planning Group. “Primary Sites” are typically delineated because they encompass the best examples of 1) rare and representative natural communities, 2) documented occurrences of rare species populations, and/or 3) opportunities for ecological restoration or connections. These sites warrant high protection and/or restoration consideration during the development of the property master plan.

- **Red River Breaks Boreal Forest and Hardwood Swamp.** The site protects a large stand of the extremely rare Boreal Forest along with Hardwood Swamp on poorly drained “flats” of the St. Louis River. Several bird Species of Greatest Conservation Need (SGCN) and rare plants are found at the site.
- **St. Louis River Dry-mesic Forest.** This Primary Site is a peninsula on the south side of the St. Louis River formed by a sandstone and clay ridge. The west side has steep, tall slopes (about 150 feet high) rising abruptly from the river. Northern Dry-mesic Forest is the primary forest type on the peninsula and though small in acreage is embedded within a relatively large block of mature forest in the region.
- **Fond du Lac Marshes.** The Fond du Lac Marshes consist of extensive Emergent and Submergent Marsh protecting water quality and flow, central to maintaining one of the largest freshwater estuaries on the western Great Lakes. These extensive wetlands are important nesting and foraging habitat for migrant and breeding birds, as well as critical spawning habitat for fish, and breeding areas for amphibians.
- **Pokegama Carnegie Wetlands State Natural Area.** This Primary Site features an extensive mosaic of wetland vegetation supporting shrub swamp, sedge meadow, Emergent Marsh, small ponds, and upland islands being restored to Boreal Forest. The area supports a disproportionate number of rare plants along with several birds of conservation concern.

Introduction

Purpose and Objectives

This report is intended to be used as a source of information for developing a new master plan for the St. Louis River Planning Group (SLRPG; Figure 1). The regional ecological context for the SLRPG is provided to assist in developing the Regional and Property Analysis that is part of the master plan. Properties included in this assessment are as follows:

- St. Louis and Red Rivers Streambank Protection Area (including Clough Island)
- Pokegama Carnegie Wetlands State Natural Area (state fee-title land only)

The primary objectives of this project were to collect biological inventory information relevant to the development of a master plan for the SLRPG and to analyze, synthesize and interpret this information for use by the master planning team. This effort focused on assessing areas of documented or potential habitat for rare species and identifying natural community management opportunities.

Survey efforts for the SLRPG were limited to a “rapid ecological assessment” for 1) identifying and evaluating ecologically important areas, 2) documenting rare species occurrences, and 3) documenting occurrences of high quality natural communities. This report can serve as the “Biotic Inventory” document used for master planning although inventory efforts were reduced compared to similar projects conducted on much larger properties such as state forests. There will undoubtedly be gaps in our knowledge of the biota of this property, especially for certain taxa groups; these groups have been identified as representing either opportunities or needs for future work. Inventory data collected through this effort is a starting point for adaptive management of the SLRPG and should be revisited as opportunity allows and updated when new information becomes available.

Overview of Methods

The Wisconsin Natural Heritage Inventory (NHI) program is part of the Wisconsin DNR’s Bureau of Natural Heritage Conservation and a member of 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. NatureServe, an international non-profit organization (see www.NatureServe.org for more information), coordinates the network.

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 NHI Working List (WDNR 2011) 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 NHI 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 (*Wisconsin Natural Heritage Working List*).

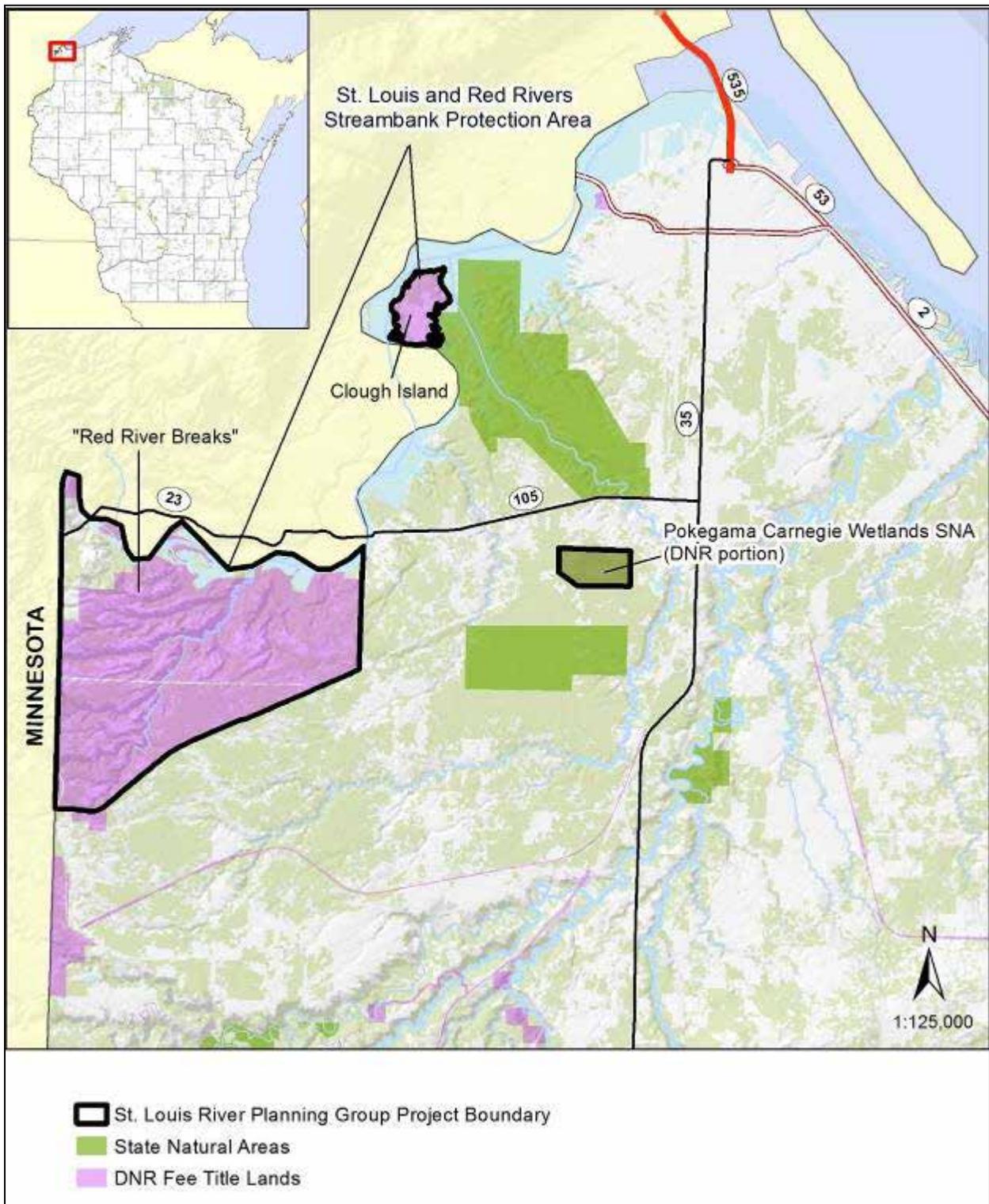


Figure 1. Location of St. Louis River Planning Group properties.

The Wisconsin NHI program uses standard methods for biotic inventory to support master planning (Appendix A). Our general approach involves collecting relevant background information, planning and conducting surveys, compiling and analyzing data, mapping rare species and high quality natural community locations into the NHI database, identifying ecologically important areas, and providing interpretation of the findings through reports and other means.

Existing NHI data are often the starting point for conducting a biotic inventory to support master planning. Prior to this project, NHI data for the SLRPG were limited to: 1) the Statewide Natural Area Inventory, a county-by-county effort conducted by WDNR’s Bureau of Research and Endangered Resources (now Bureau of Natural Heritage Conservation) between 1969 and 1984 that focused on natural communities but include some surveys for rare plants and animals and 2) Biotic Inventory of the St. Louis River Estuary and Associated Lands (Epstein 1997); and 3) taxa-specific surveys.

The most recent taxa-specific field surveys for the study area were conducted during 2013. Surveys focused on documenting high quality natural communities, rare plants, breeding birds (terrestrial, marsh, forest raptors) and migratory birds, aquatic invertebrates, small mammals, and herptiles, with significant contributions by partner organizations, including the Natural Resources Research Institute (NRRI), and contractors from Northland College and Leaning Pine Natives (Table 1). The collective results from all of these surveys were used, along with other information, to identify ecologically important areas (Primary Sites) of the SLRPG.

Table 1. Surveys Conducted on the SLRPG.

Survey Type	Sites	Methods	Organization
Natural Communities	All except Pokegama Carnegie ¹	Meander surveys, plant species lists, GIS boundaries, condition, threats	WDNR
Great Lakes Coastal Wetlands Monitoring	Fond du Lac Islands, Clough Island	GLCWC protocol	NRRI
Rare Plants	All except Pokegama Carnegie ¹	Meander surveys	WDNR
Breeding Birds			
Marsh	Fond du Lac Islands, Clough Island	GLCWC timed point counts with broadcast caller	WDNR, NRRI
Forest Passerines	Clough Island, Red River Breaks	Timed point counts	WDNR
Grassland/Shrubland	Clough Island	Timed area search	WDNR
Small Mammals	Clough Island, Pokegama Carnegie	Transects w/ Sherman Traps	Northland College (contracted by WDNR)
Herptiles	Clough Island, Red River Breaks	Visual encounter surveys	WDNR
Aquatic Invertebrates	Fond du Lac Islands (NRRI), Clough Island (NRRI & WDNR)	GLCWC protocol (NRRI), EPA protocol (WDNR)	NRRI, WDNR

¹Pokegama Carnegie Wetlands SNA has had recent surveys for natural communities and rare plants and was deemed unnecessary to survey for this project.

Survey locations were identified or guided by using recent aerial photos, USGS 7.5' topographic maps, various Geographic Information System (GIS) sources, information from past survey efforts, discussions with property managers, and the expertise of several biologists familiar with the properties or with similar habitats in the region. Based on the location and ecological setting of properties within the SLRPG, key inventory considerations included the identification of Boreal Forests, migratory bird stopover sites, high-quality open wetlands, clay-lined springs and seeps, and the location of habitats that had the potential to support rare species. Private lands, including easements, surrounding the SLRPG were not surveyed.

Scientific names for all species mentioned in the text are included in a list on page 46.

Background on Past Efforts

Various large-scale research and planning efforts have identified the SLRPG as being ecologically significant. Sites in the planning group have received numerous designations or have been discussed in other planning efforts. These are presented first in table form (Table 2) and explained in detail below.

Table 2. Existing Conservation Planning Designations for properties in the SLRPG.

Designation/Planning Effort	St. Louis and Red River SPA	Pokegama Carnegie Wetlands SNA
Lake Superior National Estuarine Research Reserve	Part of the NERR	Part of the NERR
Lower St. Louis River Habitat Plan	In project area boundary	In project area boundary
Wisconsin Wildlife Action Plan Conservation Opportunity Area	St. Louis River Estuaries Aquatic COA	Pokegama-Nemadji Wetlands COA
WDNR Legacy Place	St. Louis Estuary and Pokegama Wetlands Legacy Place	St. Louis Estuary and Pokegama Wetlands Legacy Place
The Nature Conservancy Great Lakes Ecoregion Conservation Plan	St. Louis River Estuary	
Wisconsin Wetlands Association Wetland Gem Designation	St. Louis River Estuary Marshes	Pokegama Carnegie Wetlands
Wisconsin DNR Lake Superior Coastal Wetlands Evaluation	Red River Breaks/St. Louis River Marshes Priority Site	Pokegama Carnegie Wetlands Priority Site
Lake Superior Binational Forum (important watersheds)	Red River Watershed	

Lake Superior National Estuarine Research Reserve (NERR)

The Lake Superior NERR is one of 28 areas across the United States designated for long-term research on coastal resources. The Lake Superior NERR is located along a river-to-lake gradient at the confluence

of the St. Louis River and Lake Superior. The Reserve works in partnership to improve the understanding of Lake Superior freshwater estuaries and coastal resources and to address the issues affecting them through an integrated program of research, education, outreach, and stewardship. The Reserve is comprised exclusively of public lands and waters and contains ~16,000 acres of representative terrestrial and aquatic habitats and includes both St. Louis and Red Rivers Streambank Protection Area and Pokegama Carnegie Wetlands SNA.

Lower St. Louis River Habitat Plan

This plan was prepared to facilitate protection of the ecological diversity of the Lower St. Louis River (St. Louis River Citizen Action Committee 2002). The St. Louis and Red Rivers Streambank Protection Area and Pokegama Carnegie Wetlands SNA were included within the Project Area Boundary. The plan was the result of a comprehensive science-based conservation planning process and contains four elements:

1. A detailed and comprehensive synthesis of existing information.
2. An estuary-wide guide for resource management and conservation that would lead to adequate representation, function, and protection of ecological systems in the St. Louis River, so as to sustain biological productivity, native biodiversity, and ecological integrity.
3. A list of conservation and management objectives that reflects a consensus of the Committee.
4. A suite of specific, obtainable, prioritized conservation and management actions that address specific threats.

Wisconsin Wildlife Action Plan: Conservation Opportunity Area

Conservation Opportunity Areas (COA) are places in Wisconsin containing ecological features, natural communities, or Species of Greatest Conservation Need (SGCN) habitat for which Wisconsin has a unique responsibility for protection when viewed from the global, continental, upper Midwest, or state perspective. The Wisconsin Wildlife Action Plan (WAP; WDNR 2006a) identifies two Conservation Opportunity Areas (COA) within which SLRPG sites occur (see Appendix B for a map):

- **Pokegama-Nemadji Wetlands COA**, which includes the St. Louis and Red Rivers Streambank Protection Area and Pokegama Carnegie Wetlands SNA, identified as having Continental Significance for being a Boreal Forest Transition and having extensive related communities, including Boreal Forest, Northern Dry-Mesic Forest, Northern Mesic Forest, and Great Lakes Savanna.
- **St. Louis River Estuaries Aquatic COA**, which includes the Emergent and Submergent Marshes of the St. Louis and Red Rivers Streambank Protection Area, noted as having State Significance for diverse aquatic communities.

Legacy Place

The Land Legacy Report (WDNR 2006b) was designed to identify Wisconsin's most important conservation and recreation needs for the next 50 years. The following site was identified:

- **St. Louis Estuary and Pokegama Wetlands Legacy Place**, which encompasses both the St. Louis and Red Rivers Streambank Protection Area and Pokegama Carnegie Wetlands SNA.

This site is recognized for its wild character, large block of rough, deeply dissected, red clay landscape drained by the Red River, and extensive emergent marshes, open sedge meadows, forested wetlands, and uplands supporting aspen, pine, white spruce, birch, and fir. The area provides habitat for a very large number of diverse plant and animal species.

The Nature Conservancy's Great Lakes Ecoregion Conservation Plan

- **The St. Louis River Estuary** was noted as a priority conservation area in The Nature Conservancy conservation plan for the Great Lakes Ecoregion (The Nature Conservancy 2000).

Wetland Gem Designation

The Wisconsin Wetlands Association has designated high-quality sites as "Wetland Gems". Gems in this planning group include:

- St. Louis River Estuary Marshes, which harbors extensive marshes and other wetland habitats that support many native plants, breeding and migratory birds, and serves as nursery for numerous native fish species (Wisconsin Wetlands Association 2009).
- Pokegama Carnegie Wetlands, which contains the state's most expansive and intact example of red clay flat wetlands, found only in the Superior area in Wisconsin. The site's wetland complex of alder thicket, sedge meadow and marsh on slightly undulating clay soils supports considerable floristic diversity including numerous and sizable populations of rare plants, some of which are only found locally (Wisconsin Wetlands Association 2009).

Wisconsin's Lake Superior Coastal Wetlands Evaluation (Epstein, Judziewicz, and Smith 1997) identified priority wetland sites in Wisconsin's Lake Superior Basin. The primary objectives of the evaluation were to identify important wetland habitats that should be protected and / or restored, identify suitable areas for restoration, and provide a prototype on how to identify areas for protection and restoration. Sites identified include:

- Red River Breaks/St. Louis River Marshes, part of the St. Louis and Red Rivers Streambank Protection Area
- Pokegama Carnegie Wetlands, now a State Natural Area by the same name.

The Lake Superior Binational Program identified the **Red River watershed**, largely located within the St. Louis and Red Rivers Streambank Protection Area, as important to the integrity of the Lake Superior ecosystem for coastal wetlands and contribution to ecosystem integrity (WDNR 2010b)

Special Management Designations

Outstanding/Exceptional Resource Waters

Outstanding and Exceptional Resource Waters (ORW and ERW) are officially designated (Wisconsin Administrative Code NR 102.11) waters that provide outstanding recreational opportunities, support valuable fish and wildlife habitat, have good water quality, are not significantly impacted by human activities, and, thereby recognized as being the highest quality waters in the state. While ORWs typically do not have any point sources discharging pollutants directly to the water, ERWs have existing point sources at the time of designation. One ERW has been designated in the SRLPG:

- **Red River** in St. Louis and Red Rivers Streambank Protection Area is designated an ERW.

Priority Navigable Waterways

Priority Navigable Waterways (PNWs) are a broad category of officially designated lakes and streams that includes ORWs and ERWs as well as Areas of Special Natural Resource Interest (ASNRI) waterways, and waterways that sustain breeding populations of trout, walleye, musky, or sturgeon.

- **St. Louis River** (including the area adjacent to St. Louis and Red Rivers Streambank Protection Area and the area surrounding Clough Island) is designated as a **PNW Musky Area** and **PNW Sturgeon Area**.

Wisconsin's Impaired Waters (303d)

Section 303(d) of the federal Clean Water Act requires states to develop a list of impaired waters ("303(d) list"). The identification and listing of waters as impaired is one step in a continual process of waterbody classification, assessment, and management, the ultimate goal of which is to protect, restore, and maintain the full potential of each waterbody to the maximum extent possible.

- St. Louis River is an Area of Concern (AOC) that is listed for contaminated sediment (DDT and Dieldrin), contaminated fish tissue (mercury and PCBs), and chronic aquatic toxicity (PAHs and unspecified metals). A Total Maximum Daily Load (TMDL) has been developed for mercury.

Forest Certification

Forest Certification is established on all DNR-managed lands, including state parks, wildlife and fishery areas, and natural areas. Certified forests are recognized by the Forest Stewardship Council and the Sustainable Forestry Initiative as being responsibly managed (WDNR 2009). This certification emphasizes the state's commitment to responsibly managing and conserving its lands, supporting economic activities, protecting wildlife habitat, and providing recreational opportunities.

State Natural Areas

State Natural Areas (SNA) are places on the landscape that protect outstanding examples of native natural communities, significant geological formations, and archaeological sites. Designation confers a significant level of land protection through state statutes, administrative rules, and guidelines. Three SNAs occur on the SLRPG:

- **Pokegama Carnegie Wetlands SNA** is a 1,440-acre State Natural Area, of which 311 acres are owned by the Wisconsin DNR and 1,209 acres are owned by Douglas County. Situated on level clay flats between the Pokegama and Little Pokegama Rivers, Pokegama Carnegie Wetlands features an extensive mosaic of wetland vegetation containing many rare plant species.



Aerial view of Pokegama Carnegie Wetlands SNA. Photo by Eric Epstein.

Regional Ecological Context

Text largely reproduced from *Ecological Landscapes of Wisconsin* (WDNR 2014).

Overview of Ecological Landscapes

The WDNR has mapped the state into areas of similar ecological potential and geography called Ecological Landscapes. The Ecological Landscapes are based on aggregations of smaller ecoregional units (Subsections) from a national system of delineated ecoregions known as the National Hierarchical Framework of Ecological Units (NHFEU) (Cleland et al. 1997). These ecoregional classification systems delineate landscapes of similar ecological pattern and potential for use by resource administrators, planners, and managers.

The SLRPG falls completely within the **Superior Coastal Plain Ecological Landscape**. See Figure 2 for the study area in relation to Ecological Landscapes.

The Superior Coastal Plain is Wisconsin's northernmost Ecological Landscape, bordered on the north by southwestern Lake Superior and strongly influencing the local climate, resulting in cooler summers, warmer winters, and greater precipitation compared to more inland locations (WDNR in prep.). The major landform in this Ecological Landscape is a nearly level plain of lacustrine clays that slopes northward toward Lake Superior (WDNR in prep.).

Historically this Ecological Landscape was almost entirely forested with a mixture of white pine (*Pinus strobus*), white spruce (*Picea glauca*), balsam fir (*Abies balsamea*), paper birch (*Betula papyrifera*), balsam poplar (*Populus balsamifera*), trembling aspen (*Populus tremuloides*), and northern white-cedar (*Thuja occidentalis*) (WDNR in prep.). The present coastal plain forest has been fragmented by agricultural use, and today approximately one-third of this landscape is non-forested. Aspen and birch forests occupy about 40% of the total land area, having increased in prominence over the boreal conifers (WDNR in prep.).

Overview of Regional Natural Resources

Opportunities for sustaining natural communities in Ecological Landscapes were developed in 2005 by the Ecosystem Management Planning Team (EMPT, not published until 2007) and later focused on wildlife Species of Greatest Conservation Need and their habitat in the Wisconsin Wildlife Action Plan (WDNR 2006b). The goal of sustaining natural communities is to manage for natural community types that:

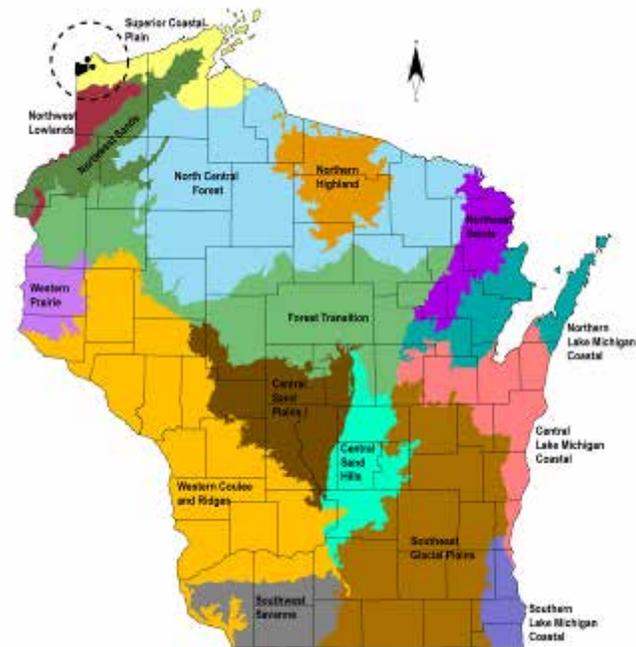


Figure 2. Ecological Landscapes of Wisconsin and the study area.

- 1) historically occurred in a given landscape and
- 2) have a high potential to maintain their characteristic composition, structure, and ecological function over a long period of time (e.g., 100 years).

This list can help guide land and water management activities so that they are compatible with the local ecology of the Ecological Landscape while maintaining important components of ecological diversity and function. Based on EMPT’s criteria, these are the most appropriate community types that could be considered for management activities within each Ecological Landscape.

There are "major" and "important" management opportunities for 30 natural communities in the **Superior Coastal Plain Ecological Landscape**, 12 of which occur within the SLRPG. For more information, please refer to the Conservation and Management Opportunities section on page 33.

Rare Species of the Superior Coastal Plain Ecological Landscape

Numerous rare species are known from the Superior Coastal Plain Ecological Landscape. “Rare” species include all of those species that appear on the WDNR’s NHI Working List (WDNR 2011) classified as “Endangered,” “Threatened,” or “Special Concern.” Table 3 lists the number of species known to occur in this landscape based on information stored in the NHI database as of 2012.

Table 3. Listing Status for rare species in the Superior Coastal Plain Ecological Landscape as of January 2014. Source is the NHI database. Listing Status is based on the NHI Working List published June 2011.

Listing Status	Taxa					Total Fauna	Total Plants	Total Listed
	Mammals	Birds	Herptiles	Fishes	Invertebrates			
Federally Endangered	1	1	0	0	0	2	0	2
Federally Threatened	0	0	0	0	0	0	1	1
Federal Candidate	0	0	0	0	0	0	0	0
State Endangered	1	5	0	0	0	6	10	16
State Threatened	0	3	2	0	0	5	18	23
State Special Concern	4	16	0	2	22	44	38	82

The Wisconsin Wildlife Action Plan denoted Species of Greatest Conservation Need (SGCN; WDNR 2006a). Species of Greatest Conservation Need are animals that have low and/or declining populations that are in need of conservation action. They include various birds, fish, mammals, reptiles, amphibians, and invertebrates (e.g., dragonflies, butterflies, and freshwater mussels) that are:

- Already listed as threatened or endangered;
- At risk because of threats to their life history needs or their habitats;
- Stable in number in Wisconsin, but declining in adjacent states or nationally.
- Of unknown status in Wisconsin and suspected to be vulnerable.

There are also 43 vertebrate SGCN significantly associated with the **Superior Coastal Plain Ecological Landscape** (see Appendix E). This means that these species are (and/or historically were) significantly associated with this Ecological Landscape, and that restoration of natural communities with which these species are associated would significantly improve their conditions.

Description of the Study Area

Location and Size

The St. Louis River Planning Group is located in Douglas County, and is made up of several properties totaling 7,036 acres. All acreages are based on fee simple ownership from DNR Facilities and Lands GIS records as of November 2013; acreage may not include leases and some permanent water bodies.

Physical Environment

Land Type Associations

This section is reproduced in part from Ecological Landscapes of Wisconsin (WDNR 2014).

Land Type Associations (LTAs) of Wisconsin represent a further definition of the NHFEU (Cleland et al. 1997). The NHFEU is a classification system that divides landscapes into ecologically significant regions at multiple scales. The study area is located entirely with the Douglas Lake-modified Till Plain LTA. (Figure 3).

In general, LTAs nest within Ecological Landscapes, although there is imperfect alignment between the two classification systems. The Douglas Lake-modified Till Plain LTA, sometimes also called the Superior Clay Plain, lies within the Superior Coastal Plain Ecological Landscape. The characteristic landform pattern of the Douglas Lake-modified Till Plain LTA is undulating modified lacustrine moraine with deep v-shaped ravines. Soils are predominantly somewhat poorly drained clay over calcareous clay till or loamy lacustrine.

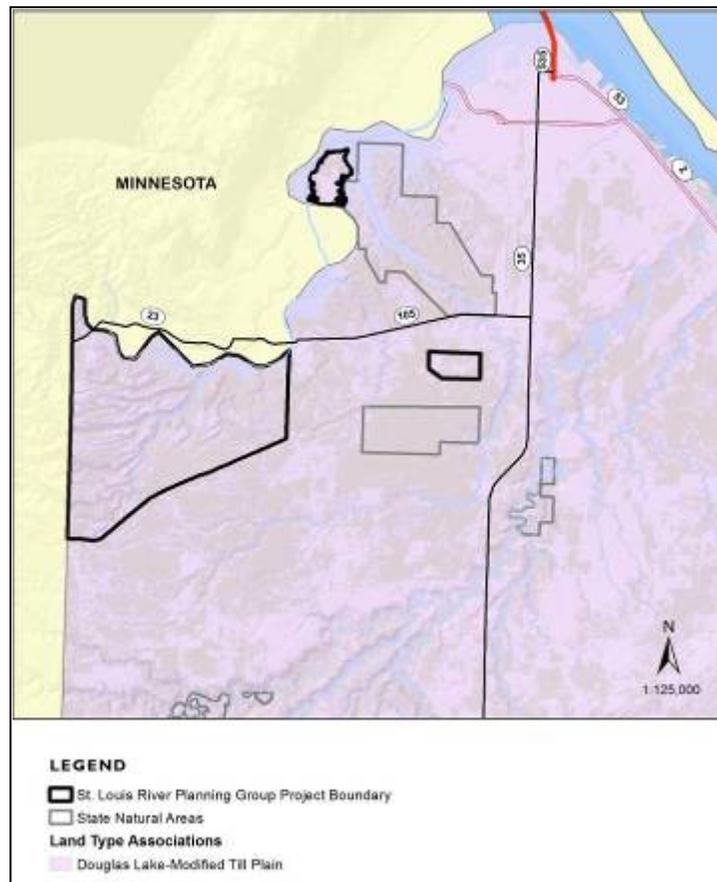


Figure 3. Landtype Associations of the St. Louis River Planning Group.

The red lacustrine clay so characteristic of the study area derives from a complex glacial history of a repeated series of glacial advances, retreats, and glacial lakes. The current landscape resulted from deposition of lacustrine clay in a large glacial lake, reddish in color from ground-up Precambrian sandstone, of which un-eroded outcrops can be seen on the Bayfield Peninsula and Apostle Islands. This clay deposition was followed by a glacial readvance approximately 11,000 – 9,500 years ago, during which ice sheets scraped up the clay and spread it over land in a process sometimes compared with spreading peanut butter on a piece of bread. The ice retreated once again, forming Glacial Lake Duluth, which deposited additional lacustrine sediment over the clayey till. The resulting clay plain has been bisected by the Red River and numerous smaller tributaries, creating numerous deeply incised ravines.

Finally, a process known as differential crustal (isostatic) rebound created the "drowned river mouth" of the St. Louis River estuary and its extensive wetlands. During glaciation, the heavy weight of ice over a mile thick depressed the earth's crust, which rebounded and rose following deglaciation. However, the eastern portion of the Lake Superior basin is rising faster than the western portion (due to later deglaciation and thicker ice deposits), resulting in a tipping of the Lake Superior basin. The differential crustal rebound makes the land area near Superior appear to be sinking by about 27 cm per century (approximately 1 inch per decade) (Bruxer and Southam 2008). Slowly rising water levels also increase sediment accumulation in the already low gradient lower main stem of the St. Louis River (Fitzpatrick et al. 2006).

Soils

This section is reproduced in part from the Ecological Landscapes of Wisconsin (WDNR 2014).

The soils of the SLRPG are strongly associated with the Superior Coastal Plain Ecological Landscape and influenced by topography. Most upland soils of the Superior Coastal Plain are formed in reddish clay or silty clay loam till, and are slightly calcareous. The dominant soil is moderately well drained and clayey, with a clay loam surface, very slow permeability, and very high available water capacity. Soil drainage classes range from well drained to somewhat poorly drained. Surface textures are generally clay to silt loam; permeability ranges from very slow to moderately slow and available water capacity ranges from moderate to very high. Along the higher elevations of the Ecological Landscape some wave-action sand is intermingled with the clayey till. Most lowland soils are poorly drained, and are also formed in reddish calcareous clay to silty clay loam till. The St. Louis River valley and lower part of the Red River consist of moderately well drained to very poorly drained soils formed in sandy to clayey alluvium. Soils in swamps, sloughs, and emergent marshes are very poorly drained non-acid muck or mucky peat.

The fine textures and slow permeability of these soils give them many of the functional characteristics of wetland soils, even when they occur on uplands. Water moves out of them very slowly, and surface ponding from runoff can be common in basins and lower-lying areas. Vegetation communities on these soils typically contain species characteristic of wetlands, including northern white cedar, black ash (*Fraxinus nigra*), and speckled alder (*Alnus incana*). Special management considerations for many of these soils are warranted, as they are seldom completely dry. The Natural Resources Conservation Service gives ratings of "severe" for rutting hazards for many of the red clay soils, and some are rated "poorly suited" for forest harvesting equipment. When these clay soils are rutted or compacted, the effects can be long-lasting. Land managers should utilize guidelines such as those found in the Best Management Practices for Water Quality manual (WDNR 1995), and in the Forest Management Guidelines (WDNR 2003, WDNR 2007), to minimize damage to these soils.

Hydrology

The St. Louis River is the largest stream entering Lake Superior from the United States and also forms one of the largest estuaries in the lake basin. Due to differential crustal rebound, an extensive drowned river mouth has formed in the Lower St. Louis River, and the river has a very low gradient. At the time of Euro-American settlement, the portion of the river near Fond du Lac, MN, was described as being very wide and shallow, with marshes so extensive it was difficult for explorers to follow the main channel St. Louis River Citizen Action Committee 2002). A large hydroelectric dam has been in operation since 1907 just northwest of the study area, although the flow regime of the river is still subject to extreme events such as the June 2012 flood. The Lower St. Louis River is an Area of Concern (AOC) and is listed as an impaired water under Section 303(d) of the federal Clean Water Act.

The Red River is the primary tributary stream within the SLRPG, and most of the watershed lies within the Streambank Protection Area. The Lake Superior Basin Plan (2000) offers the following description of the Red River:

The Red River is an approximately 7.4 mile stream that originates at springs in Jay Cooke State Park in Minnesota, flowing northeasterly in Wisconsin. Red clay soils and steep topography, with sharply rolling hills and some bank slippage and erosion, characterize areas in this watershed. The deeply eroded clay river valley exhibits relief approaching 300 feet in places. Due to common flow extremes, the stream's unstable sand, gravel, and clay bottom is susceptible to disturbance and bottom scouring. Cedar, spruce and upland hardwoods dominate the watershed.

The stream flows into the St. Louis River west of Oliver through a large tract of land previously purchased by WDNR for the purpose of protecting the fishery of the St. Louis River. More than 5,000 acres of the watershed were obtained from a single owner to become part of the St. Louis River Streambank Protection Project. The Lake Superior Binational Program identified this watershed as important to the integrity of the Lake Superior ecosystem for coastal wetlands.

The Red River's attainable use designation and fisheries classification is as a Class I trout stream. Current use designation is listed as a Class III trout stream, showing poor use support. In addition to brook trout (*Salvelinus fontinalis*), other species known to inhabit the river have included northern pike (*Esox Lucius*), rock bass (*Ambloplites rupestris*), white sucker (*Catostomus commersoni*), burbot (*Lota lota*), creek chubs (*Semotilus atromaculatus*) and sculpin. However, baseline fishery surveys performed in 2006 and 2008 (including a survey on unnamed tributary: WBIC-5000984) did not find any trout, further suggesting poor support of the current use designation. Historical surveys indicate brook trout were collected in 1972, but were not in 1964. Although 6.3 miles of the Red River in Wisconsin is listed as an Exceptional Resource Water (ERW), survey work appears to indicate water quality could be potentially declining based on lower coldwater fish IBI scores and habitat ratings. As part of coastal wetlands evaluation, Epstein (1997) found moderate richness of invertebrate taxa present, but noted significant turbidity, iron bacteria, marl, sludge, low flows and bank erosion.

Water quality monitoring in 2012 tentatively listed the lower 6 miles of the Red River in Poor or Suspected Poor condition as part of a Clean Water Act section 303(d) assessment (WDNR 2013); however the river was not listed as impaired in the updated draft Impaired Waters list (February 2014). The Red River has been characterized as a Cool (Cold Transition) Headwater, Macroinvertebrate stream.

A small portion of the property, including the southeastern most portion of Red River Breaks and Pokegama Carnegie Wetlands SNA lie with the Pokegama River watershed.

Vegetation

Historical Vegetation

A reconstruction of historical vegetation shows most of the study area was dominated by a unique type of boreal forest dominated by conifers with a hardwood component (Figure 4). Sometimes called the "white forest" due to the combination of white pine, white spruce, paper (white) birch, and northern white-cedar, this extensive forest covered much of the Superior Clay Plain, and was especially characteristic of the Streambank Protection Area. Other trees present included aspen, tamarack (*Larix laricina*), and balsam

fir. Early logging of the forests in the region began in 1860, and, based on the number of local saw mills, reached a peak in the 1890s, and rapidly declined by the 1920s as the cut-over period wound down.

Small open marshy areas were also likely present at Pokegama Carnegie Wetlands SNA where witness tree data indicates tamarack was a predominant species along with white pine and spruce, though data interpretation is limited by the small scale of the property. Witness tree data suggest that tamarack-dominated areas were also present within the watershed divide of the Red River and Little Pokegama River on the southeast portion of the "Red River Breaks" unit of the Streambank Protection Area.

Though the extensive wetland vegetation along the St. Louis River was not recorded in Public Land Surveys, anecdotal historical accounts from early explorers indicate the area contained extensive emergent marshes, floating bogs, and wild rice beds (St. Louis River Citizen Action Committee 2002).

These data are based primarily on notes and maps from the original Public Land Surveys (Finley 1976, Figure 5), which were conducted for the area comprising SLRPG in 1853-1865. It is important to note that Public Land Surveys served to clearly establish a standardized grid for land ownership, not to describe early vegetation and natural communities. This data is most informative by looking for patterns at a landscape scale; property-specific details may or may not be entirely accurate.



Conifer-dominated Boreal Forest, such as this area near the confluence of the Red River and St. Louis River, was formerly much more common on the Superior Clay Plain. Photo by Eric Epstein.

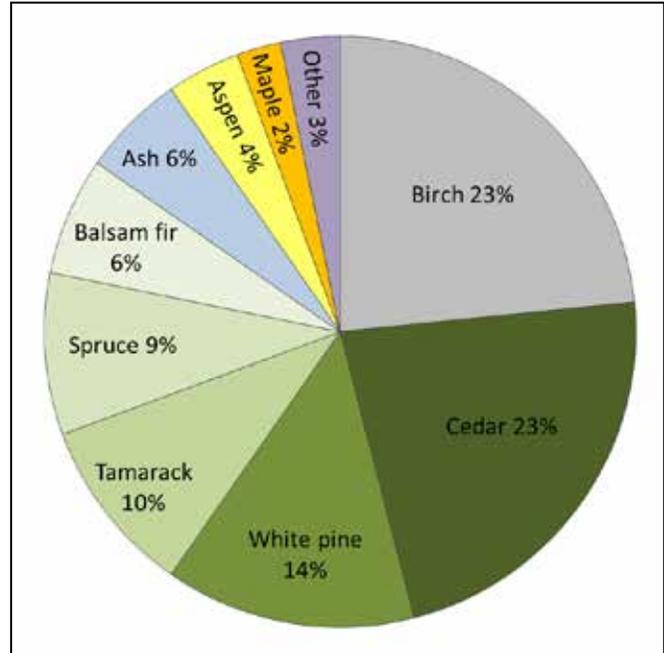


Figure 4. Dominant Trees of the SLRPG circa 1860. Coniferous trees constituted 61% of the witness trees in the forested landscape.

However, there is value in determining the nature of a site's vegetation before European settlement as well as its historical alterations and uses. The purpose of examining historical conditions is to identify ecosystem factors that formerly sustained species and communities that are now altered in number, size, or extent, or which have been changed functionally. Maintaining or restoring some lands to more closely resemble historic systems and including some structural or compositional components of the historic landscape within actively managed lands can help conserve important elements of biological diversity (WDNR In prep. a).

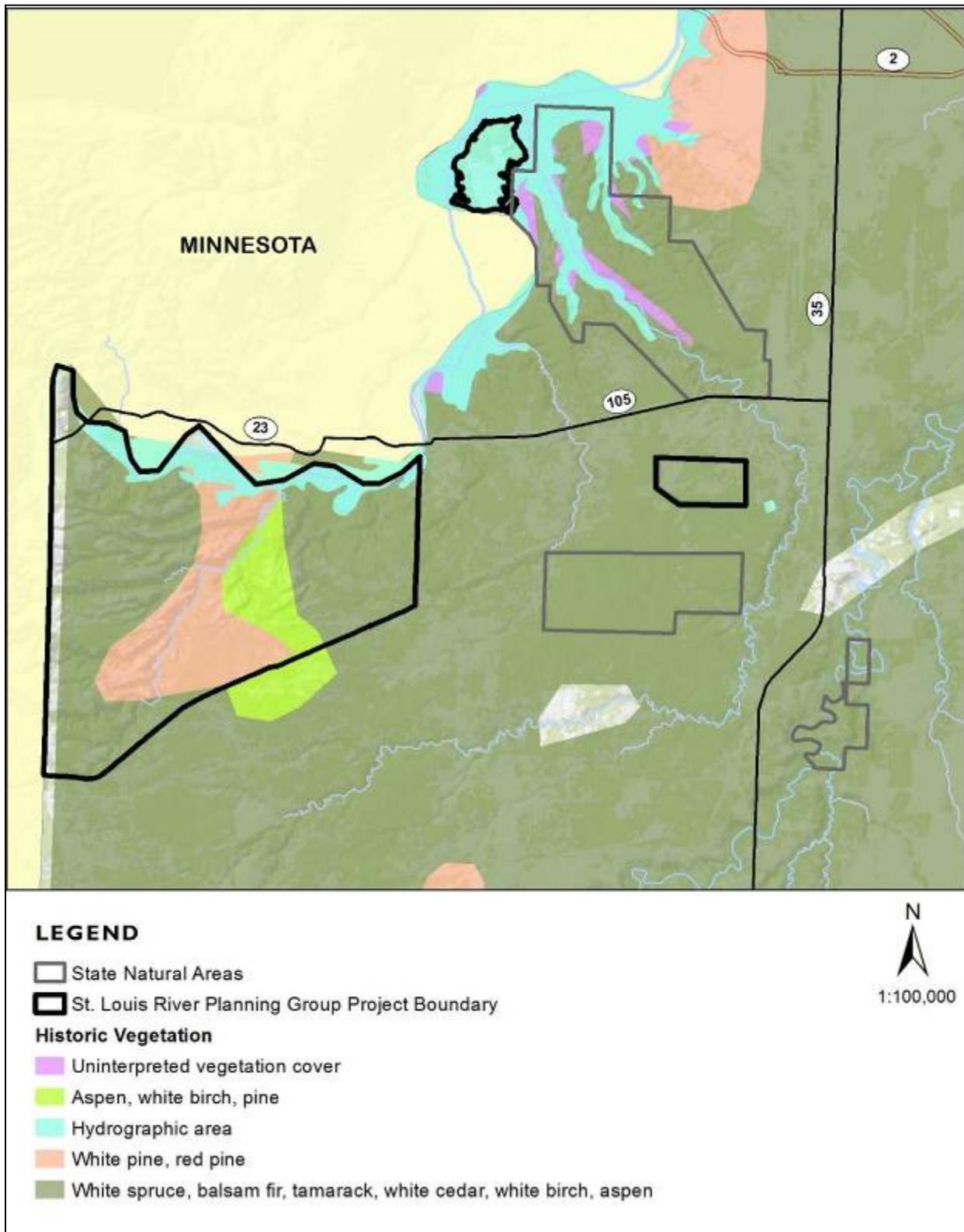


Figure 5. Vegetation of the St. Louis River Planning Group prior to Euro-American settlement (Finley 1976).

Current Vegetation

The SLRPG is largely dominated by early-successional aspen and, to a lesser degree, paper birch (Figures 6 and 7). Coniferous trees including white pine, white spruce, and balsam fir are dominant along narrow, deep ravines, but make up a relatively small portion of the total forested landscape (Figures 6 and 7). Conifers are also a component in the understory of aspen-dominated forests to varying degrees across the landscape. Swamp hardwoods dominate lower-elevation flats, and alder thickets with small openings of sedge meadows are common in high-elevation clay flats with a high water table. Finally, open grass-dominated areas due to past farming attempts are infrequent, but where they do occur, such as on Clough Island, occupy significant acreage. Descriptions of vegetation are presented in more detail by property below.

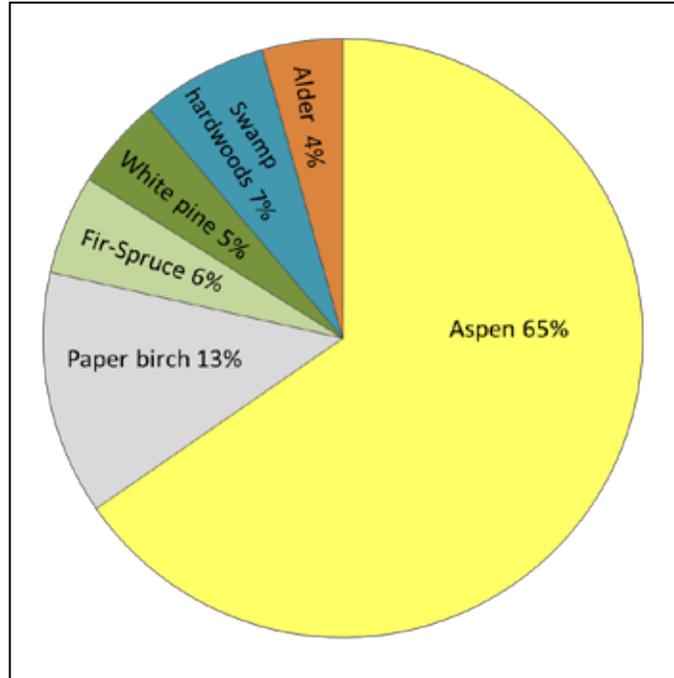


Figure 6. Current Vegetation of the Red River Breaks unit of the SLRPG based on dominant forest type acreage (WisFIRS 2014, Forest Reconnaissance conducted 2007).

Many of the factors that impacted vegetation historically continue to impact the study area today, and include but are not limited to geology, soils, hydrology, and climate. These factors are superseded in many areas, however, by more recent human influences on the land, particularly logging, damming of rivers and streams, and the introduction and spread of non-native invasive species.

St. Louis and Red Rivers Streambank Protection Area

The Streambank Protection Area is here subdivided into three geographical areas for the purposes of describing vegetation:

- a) The main unit of the property commonly called "Red River Breaks", including wetlands in the St. Louis River,
- b) The peninsula in the northwest portion of the property adjacent to the Fond du Lac Dam,
- c) Clough Island, including adjacent wetlands.

Red River Breaks

Level to rolling forested uplands are dominated by trembling aspen with smaller amounts of paper birch and understory of rare to occasional white pine, balsam fir, and white spruce. Approximately 70% of the aspen acreage is estimated to be dominated by trees between 56-60 years old (WisFIRS 2014, based on 2007 Forest Reconnaissance). An additional 20% of the aspen acreage is between 26 and 45 years old. Tall clonal shrubs, primarily beaked hazelnut (*Corylus cornuta*) and occasionally thimbleberry (*Rubus parviflorus*) form dense colonies, while the low shrub bush honeysuckle (*Diervilla lonicera*) is also common. Herbaceous groundcover is dominated by big-leaf aster (*Aster macrophyllus*), wild sarsaparilla (*Aralia nudicaulis*), bracken fern (*Pteridium aquilinum*), and rough-leaved rice-grass (*Oryzopsis asperifolia*) and other species typical of young upland boreal forests. Poorly drained aspen stands have an understory of alder and blue-joint grass (*Calamagrostis canadensis*) and grade into shrub swamps and black ash swamps.

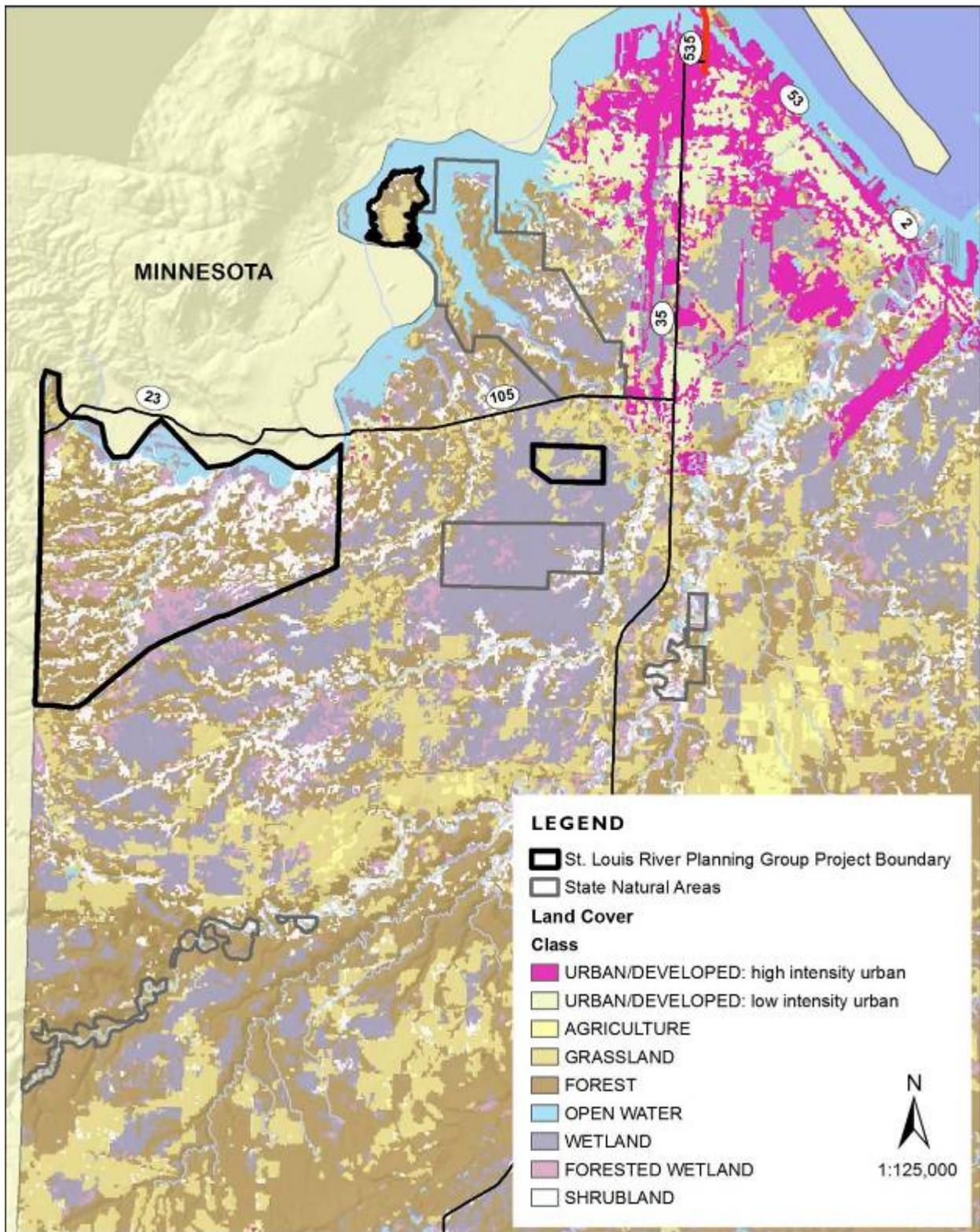


Figure 7. Landcover for St. Louis River Planning Group from the Wisconsin DNR Wisland GIS coverage (WDNR 1993).

Boreal Forest

Deep, steep-sided conifer-dominated ravines are the most significant feature of the uplands and are dominated by large white pine [15-24 inches or more in diameter at breast height (dbh, measured 4.5 feet above the ground)] along with white spruce, and rarely, northern white-cedar. These ravines contain remnant Boreal Forest, and support shrubs and groundcover plants such as beaked hazelnut, thimbleberry, blue-bead-lily (*Clintonia borealis*), bunchberry (*Cornus canadensis*), big-leaf aster, starflower (*Trientalis borealis*), rose twisted-stalk (*Streptopus roseus*) and drooping woodland sedge (*Carex arctata*), which are characteristic of Boreal Forest (Curtis 1959).

Ravines can be more than 150 feet deep and usually contain intermittent to permanent streams with a narrow alluvial terrace dominated by black ash, trembling aspen, balsam poplar, and northern white-cedar. Groundcover plants here include ostrich fern (*Matteuccia struthiopteris*), wild ginger (*Asarum canadense*), tall meadow-rue (*Thalictrum dasycarpum*), and common horsetail (*Equisetum arvense*). Several rare plants were previously known from ravine bottoms, though none were relocated in 2013. It is possible they may have been overlooked during surveys, washed away in floods, or buried in tons of sediment from upstream landslides during the June 2012 500-year flood (Kotz et al. 2014).

Alder Thickets and Shrub-carr

The southeast portion of the Red River Breaks unit is located on a watershed divide between the Red River and Little Pokegama River and is dominated by Alder Thicket with abundant speckled alder as well as various willow species (*Salix discolor* and *S. petiolaris*). Within scattered openings, blue-joint grass is common along with lake sedge (*Carex lacustris*), marsh marigold (*Caltha palustris*), and the unusual hybrid sweet-colts-foot (*Petasites x vitifolius*). This area is also important habitat for several rare plants associated with the Superior Clay Plain.

Hardwood Swamp

Near the mouth of the Red River and an associated unnamed stream to the east, Hardwood Swamp dominates, characterized by black ash, balsam poplar, and occasional trembling aspen and basswood (*Tilia americana*). High-bush cranberry (*Viburnum trilobum*) and nannyberry (*V. lentago*) are present in the shrub layer and groundcover is characterized by blue-joint grass, ostrich fern, common horsetail, and dwarf red raspberry (*Rubus pubescens*). Several orchids also occur here, including large yellow lady's-slipper (*Cypripedium parviflorum* var. *pubescens*).

Emergent and Submergent Marsh

Finally, within the St. Louis River lie several highly significant stands of Emergent Marsh. Often, these occur in embayments within horseshoe- or crab-claw-shaped islands, protected from the current by an upstream natural levee and open on the downstream end. The shape of the islands may be due in part to a phenomenon of lakes and their freshwater estuaries known as a seiche, in which strong winds and high and low pressure weather systems interact to push lake water upstream into the river (Schooler, pers. communication). Natural levees and other higher ground consist of lowland shrubs and scattered trees. The marshes themselves are characterized by heterogeneous zones of vegetation based on water depth; the proportions of various species in each zone and location of zones vary from year to year based on changing water levels and stream channel dynamics. Dominant and characteristic emergent species include cat-tail (*Typha angustifolia*, *T. latifolia*), soft-stem bulrush (*Schoenoplectus tabernaemontani*), common bur-reed (*Sparganium eurycarpum*), and arrow-head (*Sagittaria latifolia*, *S. rigida*). The floating-leaved aquatics bullhead pond-lily (*Nuphar variegata*) and white water-lily (*Nymphaea odorata*) are also present in open-water areas along with submergent aquatics, including several species of pondweed (*Potamogeton richardsonii*, *P. natans*, *P. spirillus*), water-celery (*Vallisneria canadensis*), and common waterweed (*Elodea canadensis*). Small areas of Shrub-carr and Northern Sedge Meadow also occur in slightly higher elevation areas where marshes meet the mainland or levees on the islands. Wild

rice (*Zizania palustris*) was present in 2013, though in lower abundance compared to 1997 surveys (WDNR, unpublished data). However, due to extreme year to year variation in this species, no conclusions can be drawn other than the need for regular monitoring of wild rice and its ecological requirements (water depth, sedimentation, water chemistry, etc.).

Fond du Lac Dam Peninsula

In the extreme northwest portion of the Streambank Protection is a peninsula with a sandstone bedrock core that lies immediately east of the Fond du Lac Dam, built in 1907. The peninsula rises steeply from the river on the west side to tall slopes (about 150 feet high) partially forested with white pine, red pine (*Pinus resinosa*), northern white-cedar, white spruce, and paper birch with bare, eroded areas and exposed clay and sandstone. The groundlayer is sparsely vegetated. The narrow ridge top and eastern slopes are primarily forested with red oak (*Quercus rubra*), white and red pine, white spruce, and paper birch, with small areas of sugar maple (*Acer saccharum*). Alluvial deposits on the east side support a forest dominated by green ash (*Fraxinus pensylvanica*) and balsam poplar with black ash and white spruce. The northern end of the peninsula shoreline is rocky with areas of exposed sandstone present, including in an old quarry.

Northern Dry-mesic Forest

Northern Dry-mesic Forest is the primary forest type on the peninsula with lesser areas of Floodplain Forest and Boreal Forest (on steep slopes) also present. The Northern Dry-mesic Forest canopy is dominated by white spruce, red and white pine and red oak with northern white-cedar, white birch, green and black ash, balsam poplar, and sugar maple as canopy associates. The shrub layer includes speckled alder, dogwood species (*Cornus alternifolia*, *C. canadensis*), beaked hazelnut, black currant (*Ribes americanum*), thimbleberry, and red raspberry (*Rubus idaeus*). The ground layer is dominated by false melic grass (*Schizachne purpurascens*), ostrich fern, sensitive fern (*Onoclea sensibilis*), wood anemone (*Anemone quinquefolia*), Canada mayflower (*Maianthemum canadense*), and starflower.

Clough Island

Though a gem in the St. Louis River estuary from a landscape conservation perspective, Clough Island is highly disturbed from an ecological perspective, reflecting its past human landuse history. Purchased by Robert B. Whiteside in 1904, the island was first logged, and then used as a resort and farm, as well as to breed and graze race horses until the 1950s. A second cutting of timber is estimated to have occurred during this timeframe as well. The island remained in the Whiteside family until the early 2000s when it was sold to a development company who proposed building a resort, high-end condominiums, and a golf course, accessed by ferry and tram service from the mainland. In 2010, the island was purchased by The Nature Conservancy and transferred to the Wisconsin DNR in 2011, at which point it became part of the St. Louis and Red Rivers Streambank Protection Area.

Clay Cliffs and Sedge Meadows

Clay cliffs surround much of the island and rise 20-30 feet to a broad, level red clay plain. The southern half of the island interior is an open landscape of approximately 100 acres of wet grasslands, sedge meadows, and shrublands that has generally recovered well from past farming and grazing. Blue-joint grass is common along with Kentucky bluegrass (*Poa pratensis*), timothy (*Phleum pratense*) and marsh bluegrass (*Poa palustris*), while wetter areas contain tall manna grass (*Glyceria grandis*) and sedges (*Carex bebbii*, *C. stipata*, and *C. retrorsa*). Open areas are interspersed with thickets of speckled alder, trembling aspen clones, and significant amounts of hawthorn (*Crataegus* sp.) and wild plum (*Prunus americana*).

Aspen and Boreal Forest and Forested Seep

The northern portion of the island is generally forested with aspen mixed with conifers giving way to a narrow band of emergent marsh on the northern shore. The northern and northwestern portion of the island harbors a 15-acre moderate-quality Boreal Forest with balsam fir, white spruce, red maple, mountain ash, & paper birch & a moderate-diversity ground layer. A Forested Seep originates in the northwestern portion of the island. Dominated by black ash & a diverse ground layer of ferns, sedges & forbs, the seep feeds a small stream flowing north through a large ravine, into a sedge meadow and into the St. Louis River. Most of the remainder of the forest is lower in quality, likely due to past land use, and is dominated by trembling aspen and paper birch,

The understory contains locally dense infestations of invasive shrubs including honeysuckle (*Lonicera* spp.) and common buckthorn (*Rhamnus cathartica*). Beaked hazelnut is also common, along with scattered thimbleberry. The groundlayer is variable in quality but contains species typical of young Boreal Forest including big-leaf aster, wild sarsaparilla, and Arctic sweet-colts-foot (*Petasites frigidus*).

Emergent and Submergent Marsh

Wetlands surround Clough Island, particularly on the north, east, and southwest shores. These have received significant study from partner organizations (principally the Natural Resources Research Institute, University of Minnesota-Duluth), which sampled three wetland sites using Great Coastal Wetlands Consortium monitoring protocols (Great Lakes Coastal Wetlands Consortium 2008). In addition, the Wisconsin DNR sampled deeper water marsh habitat for aquatic macrophytes. Wetland types include Northern Sedge Meadow, Floating-leaved Marsh, and Submergent Marsh. Dominant species of sedge meadow included lake sedge, sensitive fern, river bulrush (*Bolboschoenus fluviatilis*), sweet gale (*Myrica gale*), broad-leaved arrowhead (*Sagittaria latifolia*), common spike-rush (*Eleocharis palustris*) and common bladderwort (*Utricularia vulgaris*). Species common in Floating-leaved Marsh and Submergent Marsh included white water-lily, coon tail (*Ceratophyllum demersum*), spiral pondweed (*Potamogeton spirillus*), flat-stem pondweed (*P. zosteriformis*), and floating bur-reed (*Sparganium fluctuans*). Purple loosestrife (*Lythrum salicaria*) and invasive cat-tails (*Typha X glaucophylla* and *T. angustifolia*) were also present at all sample locations, though neither reached high levels of percent cover at the three sample locations: purple loosestrife ranged from 4-11 percent cover; cat-tail (both non-native species combined for this analysis) ranged from 3 – 8 percent cover.

Pokegama Carnegie Wetlands SNA

Situated on level clay flats between the Pokegama and Little Pokegama Rivers, Pokegama Carnegie Wetlands features an extensive mosaic of wetland vegetation containing many rare plant species. A tall complex of shrub wetlands composed of speckled alder and willows has the greatest coverage with small patches of open sedge meadow dominated by coarse-leaved sedges and blue-joint grass also present. Widely scattered small pools support a variety of emergent and submergent aquatic plant species. Small "islands" of trees dot the wetland with tamarack, white pine, white spruce, red pine, trembling aspen, and balsam poplar. Of special significance are the numerous populations of rare plants occurring within the wetlands. In 2010, a Boreal Forest restoration project was initiated here, which involved the clearing of alder and willow and planting dozens of narrow bands of conifers oriented perpendicular to the predominant direction of water flow across the site.



Aerial view of Boreal Forest restoration at Pokegama Carnegie Wetlands SNA. Photo is oriented approximately north-south. Photo by Ryan P. O'Connor.

Rare Species and High-Quality Natural Communities of Superior Township

Rare species and high-quality natural communities have been documented in Superior Township, including the St. Louis River Planning Group (SLRPG) (Table 4). See Appendix C for rare species occurrences by property and Appendix D for summary descriptions of the species. Bird occurrences refer only to breeding activity.

Table 4. Documented rare species and high-quality natural communities of Superior Township

For an explanation of state and global ranks, as well as state status, see Appendix F. State status, tracking status, and ranks are based on the working list published June 1, 2011. Species with a “W” in the “Tracked by NHI” column are on the Watch List (see Appendix F) and are not mapped in the NHI database. Various sources were used to determine the Watch List species and SGCN present and this may not be a complete list.

Common Name	Scientific Name	Last Observation Date	State Rank	Global Rank	State Status	SGCN	Tracked by NHI
Amphibians							
Northern Leopard Frog	<i>Lithobates pipiens</i>	2013	S4?	G5	SC/H	N	W
Birds							
American Bittern	<i>Botaurus lentiginosus</i>	2013	S3B	G4	SC/M	Y	Y
American Woodcock	<i>Scolopax minor</i>	1996	S3S4B	G5	SC/M	Y	W
Bald Eagle	<i>Haliaeetus leucocephalus</i>	2013	S4B,S4N	G5	SC/P	Y	Y
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	2013	S3S4B	G5	SC/M	Y	W
Blue-winged Teal	<i>Anas discors</i>	2013	S3S4B	G5	SC/M	Y	W
Canada Warbler	<i>Wilsonia canadensis</i>	2013	S3S4B	G5	SC/M	Y	W
Cape May Warbler	<i>Dendroica tigrina</i>	1994	S3B	G5	SC/M	N	W
Connecticut Warbler	<i>Oporornis agilis</i>	1981	S2S3B	G4	SC/M	Y	Y
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	2013	S3S4B	G4	SC/M	Y	W
Least Bittern	<i>Ixobrychus exilis</i>	2013	S2S3B	G5	SC/M	N	Y
Least Flycatcher	<i>Empidonax minimus</i>	2013	S4B	G5	SC/M	Y	W
Le Conte's Sparrow	<i>Ammodramus leconteii</i>	2014	S2S3B	G4	SC/M	Y	Y
Merlin	<i>Falco columbarius</i>	2013	S3B,S2N	G5	SC/M	N	W
Northern Harrier	<i>Circus cyaneus</i>	2013	S3B,S2N	G5	SC/M	Y	W
Upland Sandpiper	<i>Bartramia longicauda</i>	2000	S2B	G5	SC/M	Y	Y
Veery	<i>Catharus fuscescens</i>	2013	S3S4B	G5	SC/M	Y	W
Western Meadowlark	<i>Sturnella neglecta</i>	1996	S2B	G5	SC/M	Y	Y
Wood Thrush	<i>Hylocichla mustelina</i>	2013	S4B	G5	SC/M	Y	W
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	2013	S3S4B	G5	SC/M	Y	W
Fishes							
American Eel	<i>Anguilla rostrata</i>	1993	S2	G4	SC/N	Y	Y
Lake Sturgeon	<i>Acipenser fulvescens</i>	No Date	S3	G3G4	SC/H	Y	Y

Mayflies							
A Flat-headed Mayfly	<i>Maccaffertium pulchellum</i>	2009	S2S4	G5	SC/N		Y
A Small Square-gilled Mayfly	<i>Sparbarus maculatus</i>	2009	S2S3	G5	SC/N		Y
Reptiles							
Wood Turtle	<i>Glyptemys insculpta</i>	2013	S2	G4	THR	Y	Y
Mussel							
Eastern Elliptio	<i>Elliptio complanata</i>	2009	S2S3	G5	SC/P	N	Y
Plant							
Arrow-leaved Sweet-coltsfoot	<i>Petasites sagittatus</i>	1996	S3	G5	THR		Y
Fairy Slipper	<i>Calypso bulbosa</i>	1897	S2	G5	THR		Y
Floating Marsh-marigold	<i>Caltha natans</i>	2008	S1	G5	END		Y
Large-leaved Avens	<i>Geum macrophyllum</i> var. <i>macrophyllum</i>	2008	S1	G5T5	SC		Y
Mamillate Spike-rush	<i>Eleocharis mamillata</i>	1995	S1	G4?	SC		Y
Marsh Grass-of-Parnassus	<i>Parnassia palustris</i>	1995	S1S2	G5	THR		Y
Marsh Horsetail	<i>Equisetum palustre</i>	1996	S2	G5	SC		Y
Northern Bur-reed	<i>Sparganium glomeratum</i>	2013	S2	G4?	THR		Y
Northern Yellow Lady's-slipper	<i>Cypripedium parviflorum</i> var. <i>makasin</i>	2013	S4	G5T4T5	SC		W
Northwestern Sticky Aster	<i>Aster modestus</i>	2008	S1	G5	SC		Y
Seaside Crowfoot	<i>Ranunculus cymbalaria</i>	1996	S2	G5	THR		Y
Showy Lady's-slipper	<i>Cypripedium reginae</i>	1996	S4	G4	SC		W
Slender Spike-rush	<i>Eleocharis nitida</i>	2008	S2	G4	END		Y
Slim-stem Small Reed Grass	<i>Calamagrostis stricta</i>	1995	S3	G5	SC		Y
Small Yellow Water Crowfoot	<i>Ranunculus gmelinii</i>	1996	S2	G5	END		Y
Tea-leaved Willow	<i>Salix planifolia</i>	2013	S2	G5	THR		Y
Torrey's Bulrush	<i>Scirpus torreyi</i>	2013	S2	G5?	SC		Y
Vasey's Rush	<i>Juncus vaseyi</i>	2008	S3	G5?	SC		Y
Natural Community							
Boreal Forest		2013	S2	G3?	NA		Y
Emergent Marsh		2013	S4	G4	NA		Y
Ephemeral Pond		2013	SU	GNRQ	NA		Y
Forested Seep		2013	S2	GNR	NA		Y
Floodplain Forest		1994	S3	G3?	NA		Y
Northern Sedge Meadow		1996	S3	G4	NA		Y

Management Considerations and Opportunities for Biodiversity Conservation

Hydrology and Water Quality

The St. Louis and Red Rivers Streambank Protection Area was established for the express purpose of protecting the St. Louis and Red Rivers and their tributaries from siltation and sedimentation. Although erosion of clay soils and exposed clay seepage areas are a natural phenomenon in the SLRPG landscape, erosion and sedimentation have been greatly exacerbated by human impacts. Clearing of forest land during the late 1800s and early 1900s drastically altered the streams, rivers, and associated fish and wildlife habitat of the Superior Clay Plain. The loss of mature forest cover resulted in increased seasonal run-off volumes, increased peak discharges, and increased soil moisture levels. The excess volume and velocity of water exacerbated erosion of fragile clay soils, causing slumping of clay banks and steep slopes. The resulting sediment buried gravel beds used for fish spawning and filled deep pools critical for sheltering fish and other aquatic organisms. More recently, use of recreational vehicles such as ATVs and UTVs have caused localized but significant problems with soil compaction and erosion, particularly near stream crossings, which are numerous on the landscape.

With the natural reforestation of much of the SLRPG, the health of streams has improved since the early 1900s. However, slumping and siltation remain a primary management concern. Analysis of the nearby Nemadji River estimated that more than 131,100 tons of sediment are deposited into Superior-Duluth Harbor annually (equivalent to about 17 dump truck loads per day); over 90% of this sediment originates from erosion of valley walls and bank slumping (NRCS 1988). The Nemadji River watershed (433 mi²) is approximately 30 times larger than the Red River (approximately 14 mi²), however the two watersheds share a similar geology and bank slumping is a significant threat to water quality on the Red River as well (Kotz et al. 2014).

The percentage of open land in a given watershed has a significant impact on stream peak flows and erosion, with open land defined as non-forested uplands as well as forests dominated by tree less than 16 years old (Verry et al. 1983). While changes in vegetation cover do not directly affect the peak flow of large floods from extreme rain events, they do affect smaller peak flows (Jereczek et al. 2011). It is during this time that the majority of sediment moving and stream shaping work occurs. These bank full flows shape the channel, build the floodplain, and determine the stream cross sectional area, which influences hydrologic response of the stream during larger flood events. Spring snowmelt is the primary event during which these bank-full flows occur. Snowmelt is more rapid and more synchronized in watersheds with more open land, producing higher bank-full flows (Jereczek et al. 2011). In watersheds with more mature forest, and in particular, more coniferous forest, snowmelt is asynchronous due in part to shading effect of evergreen trees, and peak flows are up to three times lower (Verry et al. 1983). Thus, maintaining a high percentage of mature forest and increasing the percentage of conifer cover in watersheds of the SLRPG would be highly beneficial to water quality through reduced non-storm peak flows. These strategies and rationale are outlined in more detail in a Wisconsin DNR initiative to "Slow the Flow" of snowmelt and runoff throughout the Superior Coastal Plain Ecological Landscape on the Wisconsin Lake Superior south shore (Jereczek et al. 2011).

Major rainstorms are also thought to be a driver of slope failure and slumping in the Red River watershed. The June 2012 "500-year flood" caused nearly twice as many landslide events as the previous 61 years combined, with nearly 1,000 mapped slope failures depositing as much as 16 feet (5 meters) of sediment in the river valleys (Kotz et al. 2014).

Other plans also highlight water quality issues and offer additional recommendations. The Lower St. Louis River Habitat Plan (2010) noted that the Streambank Protection Area is in need of a management plan that specifically addresses 1) restoration of mature conifer and hardwood forest to control erosion of red clay sediment, and 2) protection of water quality through control of off-highway vehicles (OHVs) and restoration of stream crossings that have been degraded by uncontrolled use of recreational vehicles. In addition, the St. Louis and Lower Nemadji River Water Quality Management Plan (WDNR 2010b) recommended a 303(d) assessment and monitoring of the Red River and several tributaries to determine current status of stream/watershed condition and to confirm brook trout presence/absence.

Efforts to improve water quality will benefit significantly from a watershed perspective. In particular, opportunities for joint projects exist for watershed-scale management between Red River Breaks and the adjacent Minnesota DNR properties Fond Du Lac State Forest and Jay Cooke State Park. When combined, these properties cover approximately 80 % of the Red River watershed, a proportion of public land unrivaled for a tributary of its size to the St. Louis River.

Boreal Forest

The St. Louis and Red Rivers Streambank Protection Area offers one of the best opportunities for Boreal Forest restoration on state-owned land on the entire Superior Coastal Plain Ecological Landscape, second only to the Brule River State Forest. Historically, Boreal Forest was the predominant forest type on the SLRPG. Currently, documented high-quality Boreal Forest on the Superior Coastal Plain occupies approximately 5,000 acres (WDNR, unpublished data), compared to nearly 600,000 acres circa 1850 (Finley 1976), a loss of over 99%. With over 5,000 acres of uplands, restoration of Boreal Forest on the entire Streambank Protection Area would double the amount of high-quality Boreal Forest on the Superior Coastal Plain Ecological Landscape. In addition, the area is almost entirely roadless, contributing to the unfragmented nature of the forested landscape.

Remnant Boreal Forest is currently present in several deep ravines and associated slopes in the Red River Breaks unit of the Streambank Projection Area, as well as in small isolated pockets on adjacent uplands. Both forest composition and structure are diverse in these areas with trees present including white pine, white spruce, white cedar, balsam fir, paper birch, and trembling aspen (as a minor component). Large individuals of white pine (up to 24 inches or more in diameter) are present. With their mature canopy and high proportion of conifers, these forests help slow the flow of runoff.

Though many areas surrounding ravines are dominated by trembling aspen at the Red River Breaks unit, there are opportunities to expand Boreal Forest here. Allowing the conifer component to increase over time would be beneficial to both water quality and to wildlife that prefer boreal forests with a coniferous component (Table 5). Challenges to restoration include a lack of existing conifer regeneration and herbivory from deer. In addition, some areas currently have a high water table, which may be a function of the near complete removal of trees during logging and subsequent slash fires. Already shallow due to poor drainage in clay soils, the sudden reduction of trees would have reduced evapotranspiration, allowing water to rise to the point that trees now have difficulty establishing (Epstein, pers. communication). Ancient white pine stumps in alder and blue-joint grass meadows bear mute witness to this phenomenon.

Table 5. Species of Greatest Conservation Need Strongly Associated with Boreal Forest

<u>Mammals</u>	<u>Birds</u>
American Marten	Canada Warbler
Northern Flying Squirrel	Veery
Water Shrew	Black-backed Warbler
Eastern Red Bat	Boreal Chickadee
Hoary Bat	Least Flycatcher
Silver-haired Bat	Northern Goshawk
Woodland Jumping Mouse	Olive-sided Flycatcher
	Spruce Grouse

A unique opportunity exists to restore Boreal Forest at Clough Island. Due to its past landuse history, ecological restoration is warranted, including but not limited to invasive species control and tree planting, both of which have already begun. Due to its relative accessibility and inclusion within the Lake Superior NERR, an opportunity to partner with researchers and managers also exists. Numerous research ideas have already been generated related to Boreal Forest restoration, water quality remediation, and other topics (S. Schooler, pers. communication).

Just as water quality remediation is enhanced when addressed at the watershed level, applying a landscape perspective to Boreal Forest restoration is similarly beneficial. For example, restoration, management and research conducted at Clough Island and the Red River Breaks unit could complement work in the Superior Municipal Forest, which includes Dwight's Point State Natural Area. Similarly, Jay Cooke State Park and portions of the Fond du Lac State Forest, directly adjacent to Red River Breaks in Minnesota, offer opportunities for wider collaboration. Coordinated management with common goals for this area could result in a 15,000 acre block of near-contiguous Boreal Forest, yielding commensurately higher conservation outcomes.

Finally, any restoration should take into account the potential for altered future environmental conditions, including but not limited to climate change as well as invasions of non-native species and forest pests (e.g., common buckthorn, emerald ash borer, mountain pine beetle, etc.). Reforestation efforts should favor trees native to the Superior Coastal Plain Ecological Landscape that are expected to be well suited to anticipated future conditions. Recent research suggests that a warmer climate could be unfavorable to species such as trembling aspen, balsam poplar, paper birch, white spruce, and red pine, while other species such as white pine and red maple may fare better (Janowiak et al. 2014). Local landscape factors such as north-facing slopes and close proximity to Lake Superior could also mediate climate change impacts, and the SLRPG and other areas along the Lake Superior coastline likely offer the best place to preserve Boreal Forest in Wisconsin from a landscape perspective.

Wetlands of the SLRPG

The St. Louis River is the largest river to flow into Lake Superior from the United States portion of the Lake Superior watershed and empties into one of the largest and most diverse freshwater estuaries in the Great Lakes, with extensive marshes and other open wetland types. Great Lakes wetland ecosystems are unique from a global perspective, and the St. Louis River wetlands are the largest such complex on the Lake Superior shore, representing a significant source of productivity for the entire Lake Superior ecosystem (St. Louis River Citizen Action Committee 2002). Wetlands are especially found in the upper portions of the estuary, upstream to the Fond du Lac dam. Along this reach of the river, the shoreline on the Wisconsin side has remained largely undeveloped, undisturbed, and roadless, including the Red River Breaks unit of the SLRPG. Wetlands, and especially riverine marshes, play a significant role in protecting water quality in the estuary downstream and provide habitat for a number of rare species.

In Wisconsin, more than 50% of our pre-settlement wetland acreage has been lost (WDNR 2001). Wetland loss for the St. Louis River estuary mirrors these declines as filling of wetlands and open water for river-side development has caused a loss of about 3,000 acres, while another 4,000 acres have been dredged or deepened for navigation, a loss of around 60% of the approximately 12,000 acres of original wetlands in the estuary (St. Louis and Nemadji River Watershed Plan 2010 & St. Louis River Citizen Action Committee 2002). These declines are attributed to numerous factors, but habitat loss via destruction, fragmentation and alteration are the most serious culprits (WDNR 2001).

Riparian wetlands are relatively common throughout the lower St. Louis River. They serve to slow the release of water during storms (thus minimizing flooding), filter nutrients and pollutants that are carried in runoff, and provide moisture banks during low water periods or droughts. Proper management of remaining wetlands is also important for the conservation of animals that inhabit them, marsh birds, reptiles and amphibians, fishes, and aquatic insects, as well as natural corridors for their migration. A functional analysis of wetlands in the St. Louis River estuary is currently being conducted by the Lake Superior NERR and when complete, should aid conservation, management, and restoration (S. Schooler, pers. communication).

Open and brushy wetlands comprise approximately 11% of the total land cover of the SLRPG. Natural community types represented here include Northern Sedge Meadow, Shrub-carr, Emergent Marsh, and Alder Thicket (Table 6). Although shrub wetlands are the dominant wetland type, especially at Pokegama – Carnegie Wetlands, the wetland landscape actually comprises a mosaic of intertwined habitat where Emergent Marsh and sedge meadow intergrade with shrubby wetlands due to variations in topography, hydrology, soil type, and disturbance history. Emergent and submergent marsh is extensive on the “Fond du Lac Islands” within the St. Louis River adjacent to the Red River Breaks unit. Run-off from croplands, residential areas, and eroding streambanks has a negative impact on wetlands. Non-native invasives, especially reed canary grass (*Phalaris arundinacea*), can also dominate and eventually supplant native wetland plants.

Table 6. Wetlands of the St. Louis River Planning Group

Property Name	Remnant Wetlands				Wet Meadow (former cropland)	Approximate Total Wetland Area (Acres)
	Emergent/Submergent Marsh	Shrub-carr	Northern Sedge Meadow	Alder Thicket		
Clough Island	48 [^]	17 [^]	3 [^]		x	68
Pokegama Carnegie Wetlands			33*	139*		172
Fond du Lac Islands	200*					200
Red River Breaks	60*	x		274#		334

[^]Acreage based on Wisconsin Wetlands Inventory data. *Acreage based on NHI inventory data. #Acreage based on WISFIRS. X = present but acreage not calculated.

Historically, wild rice was an important feature of SLRPG wetlands, especially in Emergent Marsh along the St. Louis River, where early explorers noted it as a dominant species. NHI surveys in 1995 documented significant stands of wild rice near the Fond du Lac Islands, however, surveys in 2013 showed markedly less. Whether this is part of a long-term trend or simply a function of natural interannual variation is unknown. A wild rice restoration feasibility study is currently underway for the St. Louis River Estuary and may shed light on site-specific opportunities (Minnesota DNR, in prep.).

Birds and Wetlands. The numbers and species of birds utilizing a given marsh in a given year can vary greatly. Dramatic changes in vegetation can occur in the normal hydrological cycle of a marsh (Hoffman 1990). Water depth is an important predictor of wetland habitat use by marsh birds because it directly influences accessibility of foraging habitats for a variety of species in ways that are associated with morphology (Velasquez 1992, Elphick and Oring 1998, Colwell and Taft 2000, Isola et al. 2000). Water fluctuations strongly impact energy expenditure and foraging ability by inhibiting movement through dense vegetation and potentially reducing invertebrate food availability. It also can impact breeding ecology by flooding nests or increasing risk of predation due to forcing marsh birds to walk on top of dense vegetation (Ogden 1991, Gawlik 2002, Connor and Gabor 2006). Cyclical flooding events associated with large river systems are recognized as one of the most important sources of ecosystem disturbance, and floodplains of major rivers are among the most disturbance-prone of all ecosystems (Santisteban et al. 2011). Many of the marsh-dependent organisms endemic to the lower reaches of large rivers may be adapted to this historical disturbance regime (Santisteban et al. 2011).

Despite high water conditions in 2013, surveyors detected a moderately diverse assemblage of breeding birds, including some that are rare. Typical marsh birds observed included Sora, Virginia Rail, Marsh Wren, Sedge Wren, and Swamp Sparrow. Of particular interest was the observation of two rare marsh birds: least and American bittern. Breeding observations of least bittern are previously unknown in the St. Louis River estuary, while American bittern was not observed breeding in the area during 1999 surveys. Bird surveys at Clough Island found an excellent population of LeConte's Sparrow, a species of Special Concern, in the shrubby meadow.

Herptiles and Wetlands. Amphibians are important indicators of wetland health and environmental conditions, as their permeable skin makes them especially vulnerable to pollutants. They can make up a large portion of the vertebrate biomass in some ecosystems, and are important both as consumers of insects and other invertebrates and as prey in aquatic and terrestrial food webs (Burton and Likens 1975, Petraska and Murray 2001). Many amphibian species around the world are experiencing population declines (Alford and Richards 1999, Houlahan et al. 2000, Kiesecker et al. 2001). The properties making up the SLRPG protect sizable wetland acreage associated with the Lower St. Louis River and its tributaries. These wetlands provide breeding, foraging, and overwintering habitat for numerous amphibians. Visual encounter and calling surveys in spring and summer 2013 within the planning group found records of uncommon or declining amphibians including the Special Concern northern leopard frog (*Lithobates pipiens*), the SGCN boreal chorus frog (*Pseudacris maculate*), along with eastern gray treefrog (*Hyla versicolor*), spring peeper (*Pseudacris crucifer*), and wood frog (*Lithobates sylvatica*). The SLRPG has good potential to support mink and pickerel frogs (*Lithobates septentrionalis* and *L. palustris*), both Special Concern species, though none were detected during surveys.

Rare Plants and Wetlands. There are 18 rare plant species found on the SLRPG, including three endangered, six threatened, and nine special concern species (Table 3), and all found in either open or forested wetlands. In particular, significant examples of Northern Sedge Meadow, Emergent Marsh and Alder Thicket in and around the SLRPG provide important habitat for this unique group of the Wisconsin flora. The combination of lake-influenced climate and lacustrine clay soils allows boreal species such as floating marsh-marigold (*Caltha natans*), mamillate spike-rush (*Eleocharis mamillata*), northern bur-reed

(*Sparganium glomeratum*), northwestern sticky aster (*Aster modestus*) and slender spike-rush (*Eleocharis nitida*) to extend south into the northwest corner of the state. Other rare plants, which are found occasionally further south or east in Wisconsin, reach their highest level of importance here in the Superior area, making this region a hot spot for rare plants in the state.

Migratory Bird Conservation

The Lower St. Louis River and its associated upland forests and wetlands are home to a diverse array of native bird species. Over 230 species have been documented in the Lower St. Louis River at various times of the year (WDNR 2010b). This area is both an important breeding area and a critical migratory stopover location. The water bodies, their associated wetlands, and connected forests within the SLRPG support a rich variety of plants, insects, mollusks, crustaceans, fish, and other food sources for birds that breed or migrate through the Lower St. Louis River.

The location of the planning group on the western side of Lake Superior funnels thousands of migrants through this area each spring and fall (Figure 8). Many migrants avoid flying over large bodies of water, therefore, in the spring, birds migrating north from across the central United States encounter the south shore of Lake Superior and travel westward until they reach the Lower St. Louis River where they can resume their northward journey. The same holds true in the fall, as birds migrating south are effectively channeled along the north shore of Lake Superior and then along the western edge through the Lower St. Louis River to the Mississippi



Migratory bird stopover habitat in the form of island embayments, wetlands, open water, and upland forest. Photo by Eric J. Epstein.

Flyway. Locations all along the shores of Lake Superior become important concentration areas for migrants. The Wisconsin Stopover Initiative identified sites through modeling efforts and workshops, and found the St. Louis River Estuary to support estimates of >10,000 migrants of waterfowl, waterbirds, landbirds, and raptors during both spring and fall and shorebirds in the fall only (Grveles and Matteson 2008). The diversity of habitat types, food resources, and geographical location make the Lower St. Louis River an ideal location for conservation of migratory birds.

Important habitat components for staging and refueling of migratory birds exist on the SLRPG and include large blocks of forests providing cover and shelter from predators, an abundance of water and wetlands where aquatic insects are emerging serving as an important food source, and the presence of expansive wetlands with native fruit-producing shrubs. The productivity of the wetlands forms the basis of the food supply. Many waterfowl species feed on tubers, seeds, and other plant parts, while other birds feed on fish or invertebrates that rely on wetland productivity and open waterways. The Lower St. Louis River is especially important during the spring migration because it is often the only place with open water early in the season.



Figure 8. Bird migration route around the western portion of Lake Superior through the planning group. Many birds avoid flying over large bodies of water. As birds fly north or south, they hit the shore of Lake Superior and then fly west until they can safely get around the lake, effectively funneling large numbers of birds through the study area outlined above.

Threats to Migratory Bird Stopover Sites and migratory birds include habitat destruction and alteration (Duncan et al. 2002). Habitat alteration includes the simplification of forest structure or the alteration of forest composition, including invasive species that may change the kinds, quantity, and quality of food resources (Duncan et al. 2002). Important considerations for conserving migratory birds within the SLRPG would include:

1. diversifying the forests that are present in the planning group,
2. keeping these forests connected to wetlands,
3. control of invasive species in forests and wetlands,
4. maintaining natural hydrology of the watershed,
5. protecting water quality to promote insect life and plant diversity.

Wildlife Action Plan Implementation and the SLRPG

Conservation Opportunity Areas

Conservation Opportunity Areas (COAs) are places in Wisconsin that contain ecological features, natural communities, or SGCN habitat for which Wisconsin has a unique responsibility for protection when viewed from the global, continental, upper Midwest, or state perspective. Several SLRPG properties fall within COAs (see also the map in Appendix B):

- **St. Louis and Red Rivers Streambank Protection Area** (including Clough Island) lies within or adjacent to St. Louis River Estuary COA, which holds statewide significance because of its exceptional opportunities to protect or restore many high-quality wetland habitats and coolwater streams.
- **St. Louis and Red Rivers Streambank Protection Area and Pokegama – Carnegie Wetlands SNA** occurs within the Pokegama – Nemadji Wetlands COA, which harbors Boreal Forest of continental significance.

The Wisconsin Wildlife Action Plan identifies Ecological Priorities in each Ecological Landscape. Ecological priorities are the natural communities in each Ecological Landscape that are most important to the SGCN. Appendix E highlights the Ecological Priorities for vertebrate SGCN at SLRPG properties. Note that these Ecological Priorities include all of the natural communities and associated SGCN that are determined to provide the best opportunities for management at the SLRPG properties from an ecological/biodiversity perspective.

Priority Conservation Actions

The Wildlife Action Plan also describes Priority Conservation Actions that make effective use of limited resources and address multiple species with each action. Implementing these actions and avoiding activities that may preclude successful implementation of these actions in the future would greatly benefit the SGCN at SLRPG. Priority Conservation Actions identified in the Wisconsin Wildlife Action Plan (WDNR 2006a) for the **Superior Coastal Plain** Ecological Landscape that apply to SLRPG include:

- Protect and restore harbor and river mouth shoreline and wetland habitats.
- Improve regulations and education to prevent the introduction of additional exotic species and slow the spread of existing aquatic invasive species.
- Increase representation of near shore boreal forest by encouraging retention of white spruce, white pine, white cedar, and balsam fir, especially in older age classes, by adaptive management and selective planting.
- Manage forested wetlands and fens as part of a vegetation mosaic that includes other open wetland communities, shrub swamp, and swamp conifer forest.

Opportunities for Natural Community Conservation

The Wisconsin Wildlife Action Plan (WAP) (WDNR 2006a) identifies 30 natural communities for which there are “Major” or “Important” opportunities for protection, restoration, or management in the **Superior Coastal Plain Ecological Landscape**. Of these, 12 are present at the SLRPG (Table 7).

Table 7. Major and Important Natural Community Management Opportunities in the Superior Coastal Plain Ecological Landscape that occur in the SLRPG (WDNR 2006a).

<u>Major Opportunity</u>	<u>Important Opportunity</u>
Boreal Forest	Alder Thicket
Coolwater Streams	Clay Seepage Bluff
Emergent Marsh	Floodplain Forest
Submergent Marsh	Northern Dry-mesic Forest
	Northern Hardwood Swamp
	Northern Sedge Meadow
	Shrub Carr
	Warmwater Rivers

Wisconsin’s Statewide Forest Strategy and the SLRPG

Wisconsin’s Statewide Forest Assessment (WDNR 2010a) was based on Wisconsin’s Forest Sustainability Framework (Wisconsin Council on Forestry 2008) and was designed to assess the current state of Wisconsin’s public and private forests and analyze the sustainability of our forested ecosystems. Wisconsin’s Statewide Forest Strategy (WDNR 2010b) contains a collection of strategies and actions designed to address the management and landscape priorities identified in the Statewide Forest Assessment. The strategies are broad guides intended to focus the actions of the forestry community. These documents include topics related to biological diversity in Wisconsin’s forests, and provide information useful for department master planning and management activities. Several Statewide Forest Strategies are particularly pertinent to the SLRPG planning efforts in regard to opportunities to maintain or enhance biological diversity (Table 8, WDNR 2010b).

Table 8. Selection of Wisconsin Statewide Forest Strategies Relevant to the SLRPG.

Strategy Number	Strategy
11	Encourage the management of under-represented forest communities.
13	Increase forest structure and diversity.
14	Encourage the use of disturbance mechanisms to maintain diverse forest communities.
15	Maintain appropriate forest types for the ecological landscape while protecting forest health and function.
19	Adapt forest management practices to sustainably manage forests with locally high deer populations.
22	Strive to prevent infestations of invasive species before they arrive.
23	Work to detect new (invasive species) infestations early and respond rapidly to minimize impacts to forests.
24	Control and manage existing (invasive species) infestations.
25	Rehabilitate, restore, or adapt native forest habitats and ecosystems.

Non-Native Invasive Species

Non-native invasive species thrive in newly disturbed areas, but also may invade and compromise high-quality natural areas. They establish quickly, tolerate a wide range of conditions, are easily dispersed, and are relatively free of the diseases, predators, and competitors that kept their populations in check in their native range. Non-native invasive plants can out-compete and even kill native plants by monopolizing light, water, and nutrients, and by altering soil chemistry and mycorrhizal relationships. In situations where non-native invasive plants become dominant, they may even alter ecological processes by limiting use of prescribed fire, by modifying hydrology, and by limiting tree regeneration and ultimately impacting forest composition (WDNR In prep. b). In addition to the threats to native communities and native species diversity, non-native invasive species negatively impact forestry (by reducing tree regeneration, growth and longevity), recreation, agriculture, and human health (by causing skin rashes and increasing incidence of tick-borne diseases). For example, in bottomland forests, dense patches of reed canary grass can prevent regeneration of trees and a minor infestation can become dense if the canopy is opened beyond 80% cover (WDNR In prep. b). Non-native invasive plants and animals can also have negative impacts on fish and wildlife species by long-term displacement of native food sources (e.g., for white-tailed deer [*Odocoileus virginianus*] and turkey [*Meleagris gallopavo*]; Gorchov and Trisel 2003), diminishing habitat for ground-nesting birds (e.g., ovenbirds [*Seiurus aurocapillus*] and woodcock [*Scolopax minor*]; Miller and Jordan 2011, Loss et al. 2012) and altering aquatic macroinvertebrate communities in streams, thereby impacting fish that feed on them (McNeish et al. 2012).

The usage of the SLRPG for recreation has contributed to the introduction and spread of non-native invasive species throughout the properties. Parking areas, trails, and other high-use areas are typical entry points for non-native invasive species that are introduced by visitors' footwear, clothing, vehicle tires, boats, and recreational equipment. Once established, these invasives may continue to spread along natural corridors (e.g., waterways) and along human-made corridors (e.g., trails and roads). They even have the potential to invade remote natural areas via vectors such as wind, water, and wildlife. Non-native invasive species may also be spread inadvertently through management activities such as timber operations and roadside mowing. All management activities should follow the Best Management Practices developed by the Wisconsin Council on Forestry ([Invasive Species Best Management Practices](#)).

Non-native invasive species distribution, spread, and impact will likely be exacerbated by climate change. Projected changes such as longer growing seasons and less harsh winters provide conditions favorable to many southern species either not currently found on the SLRPG or found in low abundance. Extreme weather events such as large floods can facilitate the spread of aquatic invasive species into new, previously unoccupied habitats, while extensive mudslides expose bare mineral soil colonized by both native ruderal species and non-native pioneering invasives. In addition, invasive plants, non-native earthworms, and over abundant deer interact to create conditions more favorable to non-native invasive species and less favorable for native species (Wiegmann 2006).

Non-native invasive species that are widespread at SLRPG and pose the greatest immediate threat to native species diversity, rare species habitats, or high-quality natural communities are listed in Table 9. See Table 10 for invasive species that are currently not known at SLRPG, but could appear there.

When resources for complete control of widespread invasives are lacking, containment (i.e., limiting further spread) should be considered as an alternative action. Prevention of spread is the most cost-effective means of dealing with invasive species. Roads, trails, access points for fishing, and other high-use areas are typical entry points for invasive species that are introduced by visitors' footwear, clothing,

vehicle tires, boats, and recreational equipment. Once established, these invasives may continue to spread along natural corridors (e.g., streams) and along recreational corridors (e.g. hunting/fishing walking trails). Invasive species may also be spread inadvertently through management activities such as timber operations (especially trenching for planting pine seedlings), roadside mowing, and right-of-way maintenance. Early detection and rapid control of new and/or small infestations should be considered for higher prioritization in any invasive species management strategy (Boos et al. 2010).

Table 9. Non-native invasive species currently known at St. Louis River Planning Group.

Chapter NR 40 classification codes in superscript: P = Prohibited, R = Restricted, PR = Proposed Restricted, NR = Non-Restricted

Common Name	Latin Name	Upland Habitats		Wetland Habitats		Aquatic	Comments
		Open	Wooded	Open	Wooded		
Plants							
Amur maple ^{PR}	<i>Acer ginnala</i>	x					Uncommon at Clough Island – one large tree.
bird's-foot trefoil	<i>Lotus corniculatus</i>	x					Present at Pokegama Carnegie.
Canada thistle ^R	<i>Cirsium arvense</i>	x		x			Uncommon at Clough I. Present at Pokegama Carnegie.
common buckthorn ^R	<i>Rhamnus cathartica</i>		x		x		Abundant throughout forested areas of Clough I.; moderate on small island to SE. Present at Red River Breaks.
common forget-me-not	<i>Myosotis scorpioides</i>			x	x	x	Present at Red River Breaks.
curly-leaf pondweed ^R	<i>Potamogeton crispus</i>					x	Present in St. Louis River.
devil's-paintbrush	<i>Hieracium aurantiacum</i>	x		x			Present at Pokegama Carnegie.
Eurasian bush honeysuckle ^R	<i>Lonicera sp. (L. x bella, L. morrowii, L. maackii, L. tatarica)</i>	x	x		x		Abundant throughout forested areas of Clough I.
Eurasian water-milfoil ^R	<i>Myriophyllum spicatum</i>					x	Present in St. Louis and Red Rivers.
garden-heliotrope	<i>Valeriana officinalis</i>	x	(light shade)				Common at Clough I. Present at Pokegama Carnegie.
Japanese barberry ^{PR}	<i>Berberis thunbergii</i>		x				Uncommon at Clough Island.
Kentucky bluegrass	<i>Poa pratensis</i>	x					Common at Clough I. Present at Pokegama Carnegie.
leafy spurge ^R	<i>Euphorbia esula</i>	x					Present at Red River Breaks along S boundary ATV trail.
meadow hawkweed	<i>Hieracium caespitosum</i>	x					Present at Pokegama Carnegie.
narrow-leaf cattail, hybrid cat-tail	<i>Typha angustifolia, Typha x glauca</i>			x			Present on east side of Clough I., uncommon on west. Common at Fond du Lac Islands.

Common Name	Latin Name	Upland Habitats		Wetland Habitats		Aquatic	Comments
		Open	Wooded	Open	Wooded		
Plants							
Phragmites ^R	<i>Phragmites australis</i>			x			Common at SW corner of Clough I., and between Clough and small island to SE.
purple loosestrife ^R	<i>Lythrum salicaria</i>			x			Uncommon at Clough I. and Fond du Lac Islands. Present at Pokegama Carnegie.
reed canary grass ^{NR}	<i>Phalaris arundinacea</i>	x		x	x		Present at Fond du Lac Islands, Clough I., Red River Breaks, Pokegama Carnegie.
tansy ^R	<i>Tanacetum vulgare</i>	x					Common at Clough I. Present at Pokegama Carnegie and Red River Breaks.
wild parsnip ^R	<i>Pastinaca sativa</i>	x		x			Rare at Clough I.
yellow sweet clover	<i>Melilotus officinalis</i>	x					Present at Pokegama Carnegie.
Animals							
Asian clam	<i>Corbicula fluminea</i>					x	Present in St. Louis River.
quagga mussel ^P	<i>Dreissena bugensis</i>					x	Present in St. Louis River.
New Zealand mudsnail ^P	<i>Potamopyrgus antipodarum</i>					x	Present in St. Louis River; potentially a native biotype?
Lumholtz waterflea ^P	<i>Daphnia lumholtzi</i>					x	Present in St. Louis River.
zebra mussel ^R	<i>Dreissena polymorpha</i>					x	Present in St. Louis River.

Table 10. Watch Species for the St. Louis River Planning Group

Chapter NR 40 classification codes in superscript: P = Prohibited, R = Restricted, PR = Proposed Restricted, PP = Proposed Prohibited, PPR = Proposed Prohibited/Restricted

Common Name	Latin Name	Upland Habitats		Wetland Habitats		Aquatic	Comments
		Open	Wooded	Open	Wooded		
Plants							
Amur cork tree ^{PP}	<i>Phellodendron amurense</i>	x	x				
Balfour's touch-me-not ^{PR}	<i>Impatiens balfourii</i>	x	x	x			
black swallow-wort ^{PP}	<i>Vincetoxicum nigrum</i>	x	x				
Didymo (rock snot)	<i>Didymosphenia geminata</i>					x	Known from north shore of Lake Superior
garlic mustard ^R	<i>Alliaria petiolata</i>		x		x		Small population found in 2010 (?) on property adjacent to Pokegama Carnegie, at Logan Ave.
giant hogweed ^P	<i>Heracleum mantegazzianum</i>			x	x		
Grecian foxglove ^{PPR}	<i>Digitalis lanata</i>	x	x				
Japanese hedge parsley ^{P/R}	<i>Torilis japonica</i>		x				
Japanese hops ^P	<i>Humulus japonicus</i>	x		x	x		
Japanese stilt grass ^P	<i>Microstegium vimineum</i>			x	x		
Japanese, giant, and Bohemian knotweed ^P	<i>Fallopia japonica, F. sachalinense, F. x bohemicum</i>	x		x			Known elsewhere in Douglas Co.
lesser celandine ^P	<i>Ranunculus ficaria</i>	x		x			
oriental bittersweet ^P	<i>Celastrus orbiculata</i>	x	x	x			
pale swallow-wort*	<i>Vincetoxicum rossicum</i>	x	x				
poison hemlock ^P	<i>Conium maculatum</i>	x		x			
porcelain berry ^P	<i>Ampelopsis brevipedunculata</i>			x	x		
purple moor grass	<i>Molinia caerulea</i>			x			
queen-of-the-meadow ^{PR}	<i>Filipendula ulmaria</i>			x	x		Present in other coastal wetlands in Douglas Co.
Siberian peashrub ^P	<i>Caragana arborescens</i>		x				
tall manna grass ^P	<i>Glyceria maxima</i>			x			
tree-of-heaven ^R	<i>Ailanthus altissima</i>	x					
wild chervil ^{P/R}	<i>Anthriscus sylvestris</i>	x	x				
winged euonymous ^{PR}	<i>Euonymus alatus</i>	x	x				
Animals							
Asian long-horned beetle ^P	<i>Anoplophora glabripennis</i>		x				
Emerald ash borer ^P	<i>Agrilus planipennis</i>		x		x		Discovered in Superior in 2013.

Common Name	Latin Name	Upland Habitats		Wetland Habitats		Aquatic	Comments
		Open	Wooded	Open	Wooded		
Hemlock woolly adelgid ^P	<i>Adelges tsugae</i>		x				
Gypsy moth ^P	<i>Lymantria dispar</i>		x		x		Present in Bayfield and Ashland Cos. and counties further east and south.
rusty crayfish ^R	<i>Orconectes rusticus</i>					x	Detected in Duluth-Superior Harbor.
Fungus & Other Pathogens							
oak wilt	<i>Ceratocystis fagacearum</i>		x		x		Uncommon in northern Wisconsin, known to occur in Burnett County.

For recommendations on controlling specific invasive species consult with DNR staff, refer to websites on invasive species, such as that maintained by the DNR (<http://dnr.wi.gov/topic/Invasives/>) and by the Invasive Plants Association of Wisconsin (<http://www.ipaw.org>), and seek assistance from local invasive species coordinators and groups:

- Douglas County Aquatic Invasive Species Coordinator - Farrah Wirtz: fwirtz@uwsuper.edu, (715) 394-8334. <http://www.douglascountywi.org/index.aspx?NID=637>
- Lake Superior Research Institute Outreach Specialist - Carrie Sanda. 715-394-8525. csanda@uwsuper.edu.
- Northwoods Cooperative Weed Management Area (CWMA) - Pam Roberts, Coordinator: info@northwoodscwma.org, <http://www.northwoodscwma.org/>
- St. Louis River Alliance - Julene Boe (218) 733-9520. slrcac@stlouisriver.org, <http://www.stlouisriver.org>
- Project RED: Riverine Early Detectors, River Alliance of Wisconsin – Laura McFarland. (608) 257-2424 x110. lmcfarland@wisconsinrivers.org. <http://www.wisconsinrivers.org/our-work/project-red>

Emerald Ash Borer

The emerald ash borer (EAB) (*Agrilus planipennis*), an invasive, wood-boring beetle that attacks ash trees, was positively identified for the first time in Wisconsin in 2008, and as of November 2013, has been found in 21 counties, including Douglas County, with an infestation confirmed in the city of Superior in 2013. The beetle attacks all species of ash (*Fraxinus* spp.) in Wisconsin, and the risk to forests is high: models predict that a healthy forest could lose 98% of its ash trees in six years of being infested (<http://www.emeraldashborer.wi.gov>).

The lowland forests, including hardwood swamps and riparian forests of the SLRPG are vulnerable to the effects of emerald ash borer. Both black ash and green ash are important tree species within these ecosystems. Large-scale loss of ash in this area, especially in hardwood swamps where black ash is the dominant tree, could cause a cascade of negative impacts. Degradation of diverse, high-quality forests and loss of forest cover could further lead to diminishment of important habitat for plants and animals (especially forest interior birds), elevated water tables, and infestation of disturbance-loving invasives such as reed canary grass (WDNR 2010a). It is important to note that removal of all ash as a stopgap measure against EAB is not recommended (WDNR 2010c).

Reed canary grass

Reed canary grass is currently present in scattered pockets and is not having widespread impacts. However, disturbance resulting from erosion, logging of forested wetlands, ATV trails, and loss of ash canopy due to EAB could increase the abundance and distribution of reed canary grass. Nutrient inputs and sedimentation also encourage invasion and proliferation of reed canary grass.

Reed canary grass is a cool-season, sod-forming, perennial wetland grass native to temperate regions of Europe, Asia, and North America. The Eurasian ecotype has been selected for its vigor and has been planted throughout the U.S. since the 1800's for forage and erosion control. Hatch and Bernthal (2008) determined that approximately 500,000 acres of wetlands in Wisconsin are dominated by reed canary grass, with additional acres with a mix of reed canary grass and native species. In addition to incurring devastating impacts on native plants and animals, reed canary grass can also alter hydrology by trapping silt and constricting waterways, and reduce the carbon sequestration capacity of wetlands (Wisconsin Reed Canary Grass Management Working Group 2009).

Reed canary grass is extremely difficult to eradicate due to a number of factors: 1) A formidable seed bank may persist on a restoration site for many years; 2) A dense network of persistent rhizomes are difficult to eliminate; 3) Recolonization from proximal sites is likely, given the ubiquitous distribution of this species; and 4) Establishment of desirable native vegetation may be costly and difficult (especially in a riparian setting that is prone to flashy flooding). No single control method is universally applicable, and in fact a combination of approaches applied over many years may be necessary. Each site has to be evaluated based on agricultural history, hydrological alteration, landscape context, and invasion pattern. Development of a comprehensive restoration plan is recommended to address not just reed canary grass control but also rapid re-establishment of desirable native vegetation and long-term monitoring.

A working group of Wisconsin natural resource professionals with experience in reed canary grass control have been meeting since the fall of 2005 to develop guidelines for the control of this invasive grass in Wisconsin wetlands. Their management guide is an excellent reference for land managers (Wisconsin Reed Canary Grass Management Working Group 2009), and includes information on how to set up a management plan using a combination of practices and timing of treatments that's tailored to specific site conditions, a table of available control techniques, and a listing of native plant species and seed mixes that will compete with reed canary grass. Additionally, the herbicide Sethoxydim is showing great promise for reed canary grass control in Wisconsin (Annen et al. 2005, Annen 2008).

Game Species

The following information was provided by WDNR wildlife and fisheries managers

The SLRPG provides good opportunities for hunting, trapping, and fishing. Major game species found here are white-tailed deer, gray wolf (*Canis lupus*), black bear (*Ursus americanus*), eastern gray squirrel (*Sciurus carolinensis*), snowshoe hare (*Lepus americanus*), and in low numbers, the eastern cottontail (*Sylvilagus floridanus*). Lesser game species known to be present at SLRPG based upon museum records, inventory, or tracks include numerous upland furbearers such as long-tailed weasel (*Mustela frenata*), short-tailed weasel (*Mustela erminea*), fisher (*Martes pennant*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), bobcat (*Lynx rufus*), and coyote (*Canis latrans*). Upland gamebird species found here are mourning dove (*Zenaida macroura*), ruffed grouse (*Bonasa umbellus*), and American woodcock. Wetlands and aquatic areas provide habitat for river otter (*Lontra canadensis*), muskrat (*Ondatra zibethicus*), mink (*Neovison vison*), and beaver (*Castor canadensis*) along with Wilson's snipe (*Gallinago delicata*), sora rail (*Porzana carolina*), and Virginia rail (*Rallus limicola*). Waterfowl are

present in very high numbers with abundance and variety in the St. Louis River estuary and western tip of Lake Superior, likely one of the best areas in Wisconsin. Douglas County frequently ranks in the top five counties for waterfowl harvest, largely due to the St. Louis Estuary system and migration patterns through this area.

The lower portion of the St. Louis River below the Fond du Lac dam receives a fair amount of fishing pressure, but also gets used seasonally by fish migrating up from Lake Superior. Walleye (*Sander vitreus*) and lake sturgeon (*Acipenser fulvescens*) are two primary migratory species from Lake Superior that use the property group waters as a corridor to upstream spawning grounds. Walleye also inhabit the lower reach of the river during the summer months. Other game fishes within the property group currently include smallmouth bass (*Micropterus dolomieu*), muskellunge (*Esox masquinongy*), and northern pike. Largemouth bass (*Micropterus salmoides*) also exist, although are less sought by anglers. Recreationally important panfish species include black crappie (*Pomoxis nigromaculatus*) and yellow perch (*Perca flavescens*). On occasion, lake sturgeon are incidentally caught by anglers seeking other species.

Primary Sites: Site-specific Opportunities for Biodiversity Conservation

Four ecologically important sites, or “Primary Sites,” were identified within the SLRPG (Table 11 and Figure 9). Primary Sites are delineated because they generally encompass the best examples of:

- 1) Rare and representative natural communities,
- 2) Documented occurrences of rare species populations, and/or
- 3) Opportunities for ecological restoration or connections.

These sites warrant high protection and/or restoration consideration during the development of the property master plan. This report is meant to be considered along with other information when identifying opportunities for various management designations during the master planning process.

A complete description of the Primary Sites can be found in Appendix G. Information provided in the summary paragraphs includes location information, a site map, a brief summary of the natural features present, the site’s ecological significance, and management considerations. Appendix H lists the rare species and high-quality natural communities currently known from these Primary Sites in the SLRPG.

Table 11. St. Louis River Planning Group Primary Sites.

Code	Name
SLRPG01	Red River Breaks Boreal Forest and Forested Swamp
SLRPG02	St. Louis River Dry-mesic Forest
SLRPG03	Fond du Lac Marshes
SLRPG04	Pokegama – Carnegie Wetlands State Natural Area

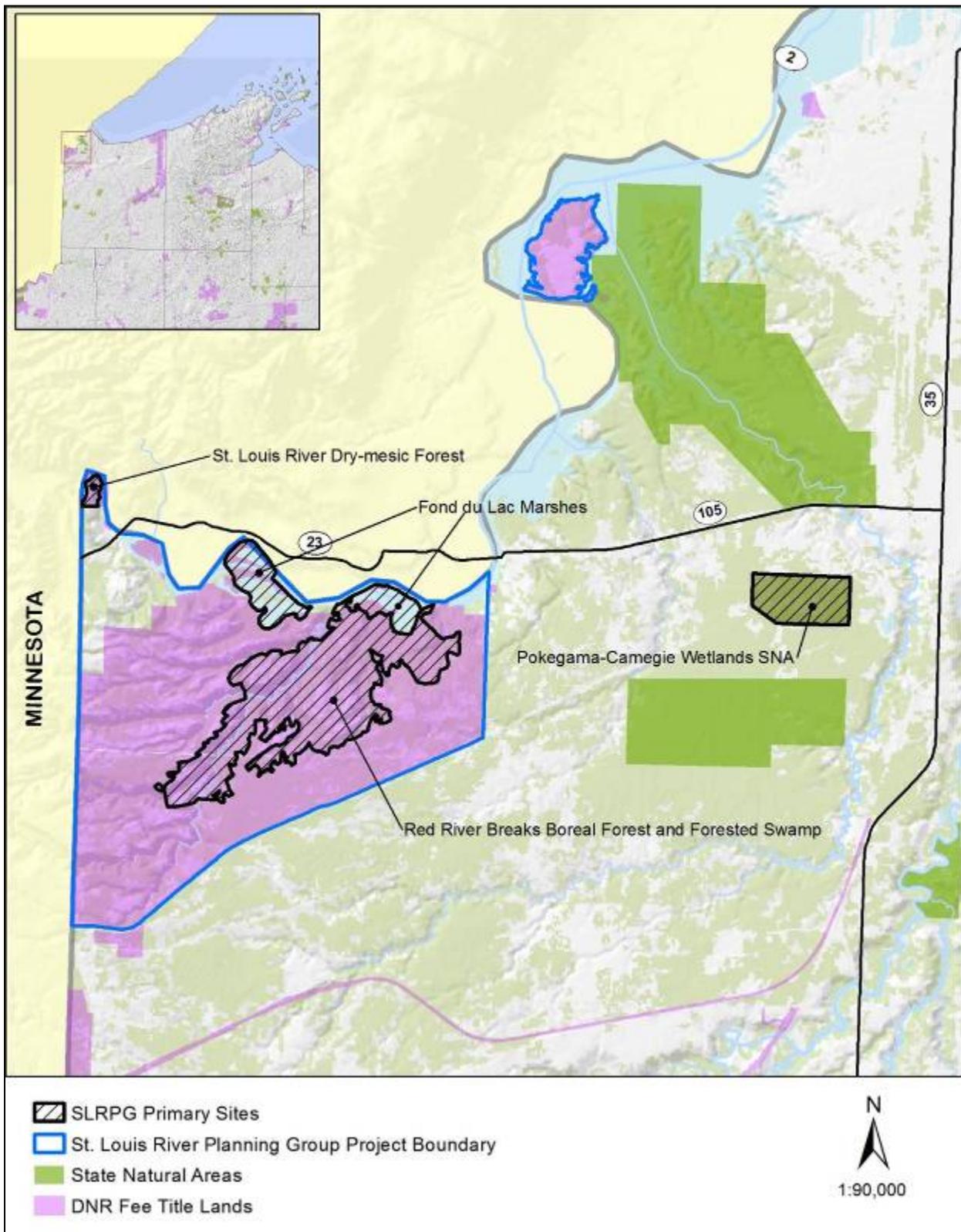


Figure 9. Primary Sites of the St. Louis River Planning Group.

Future Needs

This project was designed to provide a rapid assessment of the biodiversity values for the St. Louis River Planning Group. Although the report should be considered adequate for master planning purposes, additional efforts could help to inform future adaptive management and research efforts, along with providing useful information regarding the natural communities and rare species of the SLRPG.

- A comprehensive invasive species inventory is needed at Pokegama Carnegie and Red River Breaks, along with development of an invasive species management plan. Clough Island received a thorough invasive species inventory in 2013. A comprehensive management plan should include a monitoring strategy for detecting and rapidly responding to new invasive threats.
- Qualitative mussel surveys of the St. Louis River should be considered.
- More inventory work is needed to verify presence/absence of wood turtles (*Glyptemys insculpta*) in the lower St. Louis River and its tributaries below the Fond du Lac dam. An unverified report of nesting wood turtles along the St. Louis River in close proximity to the city of Superior was received in 2013, but no photos were taken for documentation. Local biologists and researchers from Wisconsin and Minnesota have not been able to verify the presence of this State Threatened species in this portion of the St. Louis River, but there is reason to believe a small population could be present.
- Additional frog and toad calling or visual encounter surveys may be beneficial in the SLRPG to try and document the presence of pickerel frog and mink frog. Habitat exists in the planning group for these species, but they were not found in 2013.
- Acoustical bat surveys should be run in the lower St. Louis River for use by migratory and resident bats. A bat atlas route has been established on the St. Louis River, but no surveys have been performed to date. There is potential for several state listed bat species to be present here and habitat also exists for the northern long-eared bat (*Myotis septentrionalis*), recently proposed for Federal Endangered.
- Rare plants in the region would benefit from monitoring population levels and response to changing environmental conditions (hydrology, climate, succession, invasive species, etc.). The SLRPG supports several rare plants that are endemic to the Superior Clay Plain as well as several others that reach their highest level of abundance in the state.
- Annual monitoring of wild rice populations would be beneficial to determine the need for wild rice restoration and to inform management.
- Research on sediment contaminants are needed, particularly near islands on the Wisconsin side of the St. Louis River from the Fond du Lac dam to the Oliver Bridge (M. Steiger, pers. communication).

Glossary

Ecological Landscape - landscape units developed by the WDNR to provide an ecological framework to support natural resource management decisions. The boundaries of Wisconsin's sixteen Ecological Landscapes correspond to ecoregional boundaries from the National Hierarchical Framework of Ecological Units, but sometimes combine subsections to produce a more manageable number of units.

Element - the basic building blocks of the Natural Heritage Inventory. They include natural communities, rare plants, rare animals, and other selected features such as colonial bird rookeries, bat hibernacula, and mussel beds. In short, an element is any biological or ecological entity upon which we wish to gather information for conservation purposes.

Element occurrence - an Element Occurrence (EO) is an area of land and/or water in which a rare species or natural community is, or was, present. An EO should have practical conservation value for the Element as evidenced by potential continued (or historic) presence and/or regular recurrence at a given location. For species, the EO often corresponds with the local population, but when appropriate may be a portion of a population (e.g., a single nest territory or long distance dispersers) or a group of nearby populations (e.g., metapopulation). For communities, the EO may represent a stand or patch of a natural community or a cluster of stands or patches of a natural community. Because they are defined on the basis of biological information, EOs may cross jurisdictional boundaries.

Landtype Association (LTA) - a level in the National Hierarchical Framework of Ecological Units (see next entry) representing an area of 10,000 – 300,000 acres. Similarities of landform, soil, and vegetation are the key factors in delineating LTAs.

Natural community – an assemblage of plants and animals, in a particular place at a particular time, interacting with one another, the abiotic environment around them, and subject to primarily natural disturbance regimes. Those assemblages that are repeated across a landscape in an observable pattern constitute a community type. No two assemblages, however, are exactly alike.

Representative - native plant species that would be expected to occur in native plant communities influenced primarily by natural disturbance regimes in a given landscape - e.g., see Curtis (1959).

SGCN (or “Species of Greatest Conservation Need”) – native wildlife species with low or declining populations that are most at risk of no longer being a viable part of Wisconsin's fauna (from the “Wisconsin Wildlife Action Plan,” WDNR 2006a).

Witness tree – trees documented during surveys of Wisconsin between 1832 and 1866 by the federal General Land Office, which established the township, range and section grid. The location of each section corner referenced with up to four nearby trees by which the section corner could be relocated. At each section corner, the witness tree species and DBH, as well as the distance and bearing to the section corner, was noted. Utilizing the data from these witness trees, ecologists can reconstruct vegetation patterns in the state during the mid-1800s.

Species List

The following is a list of species referred to by common name in the report text.

Common Name	Scientific Name
Plants	
Arctic sweet-colts-foot	<i>Petasites frigidus</i>
balsam fir	<i>Abies balsamea</i>
balsam poplar	<i>Populus balsamifera</i>
basswood	<i>Tilia americana</i>
Bebb's oval sedge	<i>Carex bebbii</i>
beaked hazelnut	<i>Corylus cornuta</i>
big-leaf aster	<i>Aster macrophyllus</i>
black ash	<i>Fraxinus nigra</i>
black currant	<i>Ribes americanum</i>
blue-bead-lily	<i>Clintonia borealis</i>
bluejoint grass	<i>Calamagrostis canadensis</i>
bracken fern	<i>Pteridium aquilinum</i>
broad-leaved arrowhead	<i>Sagittaria latifolia</i>
bullhead pond-lily	<i>Nuphar variegata</i>
bunchberry	<i>Cornus canadensis</i>
bush honeysuckle	<i>Diervilla lonicera</i>
Canada mayflower	<i>Maianthemum canadense</i>
common bladderwort	<i>Utricularia vulgaris</i>
common buckthorn	<i>Rhamnus cathartica</i>
common bur-reed	<i>Sparganium eurycarpum</i>
common cat-tail	<i>Typha latifolia</i>
common fox sedge	<i>Carex stipata</i>
common horsetail	<i>Equisetum arvense</i>
common pondweed	<i>Potamogeton natans</i>
common spike-rush	<i>Eleocharis palustris</i>
common waterweed	<i>Elodea canadensis</i>
coon tail	<i>Ceratophyllum demersum</i>
drooping woodland sedge	<i>Carex arctata</i>
dwarf red raspberry	<i>Rubus pubescens</i>
false melic grass	<i>Schizachne purpurascens</i>
flat-stem pondweed	<i>Potamogeton zosteriformis</i>
floating bur-reed	<i>Sparganium fluctuans</i>
green ash	<i>Fraxinus pennsylvanica</i>
hawthorn	<i>Crataegus</i> sp
high-bush cranberry	<i>Viburnum trilobum</i>
honeysuckle	<i>Lonicera</i> spp.
hybrid cat-tail	<i>Typha X glaucophylla</i>
Kentucky bluegrass	<i>Poa pratensis</i>
lake sedge	<i>Carex lacustris</i>
large yellow lady's-slipper	<i>Cypripedium parviflorum</i> var. <i>pubescens</i>
marsh bluegrass	<i>Poa palustris</i>
marsh marigold	<i>Caltha palustris</i>

Common Name	Scientific Name
meadow willow	<i>Salix petiolaris</i>
mountain-ash	<i>Sorbus americana</i>
nannyberry	<i>Viburnum. lentago</i>
narrow-leaved cat-tail	<i>Typha angustifolia</i>
northern red oak	<i>Quercus rubra</i>
northern white-cedar	<i>Thuja occidentalis</i>
ostrich fern	<i>Matteuccia struthiopteris</i>
pagoda dogwood	<i>Cornus alternifolia</i>
paper birch	<i>Betula papyrifera</i>
purple loosestrife	<i>Lythrum salicaria</i>
pussy willow	<i>Salix discolor</i>
red maple	<i>Acer rubrum</i>
red pine	<i>Pinus resinosa</i>
red raspberry	<i>Rubus idaeus</i>
reed canary grass	<i>Phalaris arundinacea</i>
retorse sedge	<i>Carex retrorsa</i>
rice-grass	<i>Oryzopsis asperifolia</i>
Richardson's pondweed	<i>Potamogeton richardsonii</i>
river bulrush	<i>Bolboschoenus fluviatilis</i>
rose twisted-stalk	<i>Streptopus roseus</i>
sensitive fern	<i>Onoclea sensibilis</i>
speckled alder	<i>Alnus incana</i>
spiral pondweed	<i>Potamogeton spirillus</i>
starflower	<i>Trientalis borealis</i>
sweet-colts-foot	<i>Petasites x vitifolius</i>
sweet gale	<i>Myrica gale</i>
soft-stem bulrush	<i>Schoenoplectus tabernaemontani</i>
stiff arrow-head	<i>Sagittaria rigida</i>
sugar maple	<i>Acer saccharum</i>
tall manna grass	<i>Glyceria grandis</i>
tall meadow-rue	<i>Thalictrum dasycarpum</i>
tamarack	<i>Larix laricina</i>
thimbleberry	<i>Rubus parviflorus</i>
timothy	<i>Phleum pratense</i>
trembling aspen	<i>Populus tremuloides</i>
water-celery	<i>Vallisneria canadensis</i>
white pine	<i>Pinus strobus</i>
white spruce	<i>Picea glauca</i>
white water-lily	<i>Nymphaea odorata</i>
wild ginger	<i>Asarum canadense</i>
wild plum	<i>Prunus americana</i>
wild rice	<i>Zizania palustris</i>
wild sarsaparilla	<i>Aralia nudicaulis</i>
wood anemone	<i>Anemone quinquefolia</i>
Animals	
American woodcock	<i>Scolopax minor</i>
beaver	<i>Castor canadensis</i>

Common Name	Scientific Name
black bear	<i>Ursus americanus</i>
black crappie	<i>Pomoxis nigromaculatus</i>
bobcat	<i>Lynx rufus</i>
boreal chorus frog	<i>Pseudacris maculata</i>
brook trout	<i>Salvelinus fontinalis</i>
burbot	<i>Lota lota</i>
coyote	<i>Canis latrans</i>
creek chub	<i>Semotilus atromaculatus</i>
eastern cottontail	<i>Sylvilagus floridanus</i>
eastern gray squirrel	<i>Sciurus carolinensis</i>
eastern gray treefrog	<i>Hyla versicolor</i>
eastern wild turkey	<i>Meleagris gallopavo</i>
fisher	<i>Martes pennant</i>
gray fox	<i>Urocyon cinereoargenteus</i>
gray wolf	<i>Canis lupus</i>
lake sturgeon	<i>Acipenser fulvescens</i>
largemouth bass	<i>Micropterus salmoides</i>
long-tailed weasel	<i>Mustela frenata</i>
mink	<i>Neovison vison</i>
mink frog	<i>Lithobates septentrionalis</i>
mourning dove	<i>Zenaida macroura</i>
muskellunge	<i>Esox masquinongy</i>
muskrat	<i>Ondatra zibethicus</i>
northern leopard frog	<i>Lithobates pipiens</i>
northern long-eared bat	<i>Myotis septentrionalis</i>
northern pike	<i>Esox lucius</i>
ovenbird	<i>Seiurus aurocapillus</i>
pickerel frog	<i>Lithobates palustris</i>
red fox	<i>Vulpes vulpes</i>
river otter	<i>Lontra canadensis</i>
rock bass	<i>Ambloplites rupestris</i>
ruffed grouse	<i>Bonasa umbellus</i>
short-tailed weasel	<i>Mustela erminea</i>
smallmouth bass	<i>Micropterus dolomieu</i>
snowshoe hare	<i>Lepus americanus</i>
sora rail	<i>Porzana carolina</i>
spring peeper	<i>Pseudacris crucifer</i>
Virginia rail	<i>Rallus limicola</i>
walleye	<i>Sander vitreus</i>
white sucker	<i>Catostomus commersonii</i>
white-tailed deer	<i>Odocoileus virginianus</i>
Wilson's snipe	<i>Gallinago delicata</i>
wood frog	<i>Lithobates sylvatica</i>
wood turtle	<i>Glyptemys insculpta</i>
yellow perch	<i>Perca flavescens</i>

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Additional Resources

Numerous online resources are available for learning more about the rare species, natural communities, and ecological concepts contained within this report. These are just a few of the resources that we recommend.

- 1. Bureau of Natural Heritage Conservation's Animals, Plants, and Communities Web Pages**
Information for plants, animals, and natural communities on the Wisconsin Working List, as well as Species of Greatest Conservation Need from the Wisconsin Wildlife Action Plan. For reptiles and amphibians, information for more common species is also provided here. At this time, the level of detail available varies among species; some have detailed factsheets while others have only a short paragraph or a map. These pages will continue to evolve as more information becomes available and are the Bureau of Natural Heritage Conservation's main source of information for species and communities. dnr.wi.gov keyword "*biodiversity*"
- 2. Wisconsin Natural Heritage Inventory Working List**
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. This Web page offers a printable pdf file and a key to the Working List for use in conjunction with the information provided in #1 above. dnr.wi.gov keyword "*working list*"
- 3. Ecological Landscapes of Wisconsin Handbook**
Wisconsin's 16 Ecological Landscapes have unique combinations of physical and biological characteristics such as climate, geology, soils, water, or vegetation. This handbook will contain a chapter for each of these landscapes with detailed information about their ecology, socioeconomics, and ecological management opportunities. An additional introductory chapter will compare the 16 landscapes in numerous ways, discuss Wisconsin's ecology on the statewide scale, and introduce important concepts related to ecosystem management in the state. The full handbook is in development as of this writing, and chapters will be made available online as they are published. Currently, a set of Web pages provide brief Ecological Landscape descriptions, numerous maps, and other useful information, including management opportunities for natural communities and Species of Greatest Conservation Need. dnr.wi.gov keyword "*landscapes*"
- 4. The Wisconsin Wildlife Action Plan**
This plan is the result of a statewide effort to identify native Wisconsin animal species of greatest conservation need. The plan also presents priority conservation actions to protect the species and their habitats. The plan itself is available online, and there are several online tools to explore the data within the plan. The Web pages are closely integrated with the pages provided in items #1 and #3 above. The Wildlife Action Plan Web pages are quite numerous, so we recommend the following links as good starting points for accessing the information.
 - the plan itself: dnr.wi.gov keyword "*wildlife action plan*"
 - explore Wildlife Action Plan data by County:
dnr.wi.gov/topic/WildlifeHabitat/county.asp
 - Wildlife Action Plan Implementation: dnr.wi.gov keyword "*wap implementation*"

5. **Wisconsin's Biodiversity as a Management Issue - A Report to Department of Natural Resources Managers**

This now out-of-print report presents a department strategy for conserving biological diversity. It provides department employees with an overview of the issues associated with biodiversity and provides a common point of reference for incorporating the conservation of biodiversity into our management framework. The concepts presented in the report are closely related to the material provided in this report, as well as the other resources listed in this section.

dnr.wi.gov/files/PDF/pubs/rs/rs0915.pdf

6. **Wisconsin's Statewide Forest Strategy**

Wisconsin's Statewide Forest Strategy is a collection of many strategies and actions designed to address major issues and priority topics over the next five to ten years. It provides a long-term, comprehensive, coordinated approach for investing resources to address the management and landscape priorities identified in the Statewide Forest Assessment. Several of the strategies contain issues related to biodiversity and ecosystem management.

dnr.wi.gov keyword "*forest strategy*"

7. **2010 Wisconsin's Statewide Forest Assessment**

The goal of this project was to assess the "state of affairs" of Wisconsin's public and private forests and analyze the sustainability of our forested ecosystems. The Statewide Forest Assessment helps to explain trends, identify issues, and present an updated view of the status of forests in Wisconsin. The first chapter deals with biological diversity in Wisconsin's forests, and the major conclusions from this assessment were used to develop the strategies in # 6 above.

dnr.wi.gov keyword "*forest assessment*"

8. **WNHI Species Guidance Documents**

Species guidance documents are peer-reviewed publications with comprehensive information for rare species tracked by the Natural Heritage Inventory or identified in the Wisconsin Wildlife Action Plan as a Species of Greatest Conservation Need (SGCN). They contain identification, life history, management guidelines, screening guidance and avoidance measures and are intended for a wide variety of users, including resource managers, private landowners, contractors, students and the general public.

dnr.wi.gov keyword "*species guidance*"

9. **Lower St. Louis River Habitat Plan (2002)**

The Habitat Plan was prepared to facilitate protection of the ecological diversity of the Lower St. Louis River. The Habitat Plan was prepared by the St. Louis River Citizens Action Committee (CAC) using a modified version of The Nature Conservancy's "Site Conservation Planning" methodology and includes:

1. A detailed and comprehensive synthesis of existing information.
2. An estuary-wide guide for resource management and conservation that would lead to adequate representation, function, and protection of ecological systems in the St. Louis River, so as to sustain biological productivity, native biodiversity, and ecological integrity.
3. A list of conservation and management objectives that reflects a consensus of the Habitat Committee members.
4. A suite of specific, obtainable, prioritized conservation and management actions that address specific threats.

<http://www.stlouisriver.org/IAhabitatplan/habitatplan.html>

10. St. Louis and Lower Nemadji River Watershed Plan

The 2010 Water Quality Management Plan Update contains information on the St. Louis and Nemadji River watershed, including priority issues, water quality goals, overall condition, and partnership activities. http://dnr.wi.gov/water/basin/superior/wtplans/ls01/ls01_wtplan.pdf.

11. St. Louis River Area of Concern Implementation Framework: Roadmap to Delisting (Remedial Action Plan Update).

Published in 2013, this document presents a comprehensive plan for delisting the St. Louis River Area of Concern (AOC). The AOC Delisting Roadmap contained herein details the actions necessary to remove each of the beneficial use impairments (BUIs) identified for the St. Louis River AOC. <http://www.pca.state.mn.us/index.php/view-document.html?gid=19677>

Appendix A

Natural Heritage Inventory Overview and General Methodology

This biotic inventory and analysis was conducted by the Wisconsin Natural Heritage Inventory (NHI) program. The Wisconsin NHI program is part of the Wisconsin DNR's Bureau of Endangered Resources and a member of 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 standardized methods for collecting, processing, and managing data for rare species, natural communities, and certain other natural features (e.g., bird rookeries). NatureServe, an international non-profit organization, coordinates the network. This appendix provides a general overview of the methodology we use for these projects. Please see the NatureServe Web site for more detailed information about standard methods used by the Heritage Network (www.NatureServe.org) for locating, documenting, and ranking rare species and natural community occurrences.

General Process Used when Conducting Biotic Inventories for Master Planning

The Wisconsin NHI Program typically uses a "coarse filter-fine filter" approach to conducting biotic inventory projects for master planning. This approach begins with a broad assessment of the natural communities and aquatic features present, along with their relative quality and condition. The area's landforms, soils, topography, hydrology, current land uses, and the surrounding matrix are also evaluated using Geographic Information Systems (GIS) and other electronic and hardcopy data sources. Data that describe conditions for the area prior to Euro-American settlement are often used during this step and at other times to further understand the ecological capabilities of the area. Often, we consult with local managers, biologists, or others familiar with the ecology of the area when preparing for an inventory project. The goals for this step are to identify the important ecological attributes and biological processes present, as well as to focus our inventory efforts.

The level of survey intensity varies based on the size and ecological complexity of the property or group of properties, as well as the resources available. For larger properties such as state forests, biotic inventory efforts typically take more than one year. Ideally, taxa surveys are conducted following a coarse-filter analysis that sometimes include extensive natural community surveys. There is often time for "mop-up work" during the year following the completion of the main survey effort, whereby additional surveys are conducted for areas that could not be reached the first year or for which new information has become available. For smaller properties, a "Rapid Ecological Assessment" often takes the place of a full-scale biotic inventory. The level of effort for these projects varies based on the needs of the study area, although surveys are almost always completed during one field season. Coarse filter work for rapid assessments is often done based on GIS data, aerial photos, data acquired from previous efforts, and information from property managers and others knowledgeable about the area.

Taxa-specific surveys can be costly and intensive and sometimes must be completed during a very narrow period of time. For example, bird surveys must be completed within an approximately one-month time window. For this and several other reasons, ***our surveys cannot locate every rare species occurrence within a given area.*** Therefore, it is important to use resources as efficiently as possible, making every effort to identify the major habitats present in the study area from the start. This approach concentrates inventory efforts on those sites most likely to contain target species to maximize efficient use of resources. Communication among biologists during the field season can help identify new areas of interest or additional priorities for surveys. The goal is to locate species populations with the highest conservation value whenever possible.

After all of the data are collected, occurrences of rare species, high-quality natural communities, and certain other features are documented, synthesized, and incorporated into the NHI Database. The NHI program refers to this process as “mapping” the data and uses a tabular and spatial database application designed specifically for the Heritage Network. Other secondary databases are also used by the Wisconsin NHI Program for storing additional species and community information such as species lists, GPS waypoints, photos, and other site documentation.

Once the data mapping and syntheses are completed, the NHI Program evaluates data from the various department biologists, contractors, and other surveyors. This information is examined along with many other sources of spatial and tabular information including topographic maps, various types of aerial photography, digital soil and wetland maps, hydrological data, forest reconnaissance data, and land cover data. Typically, GPS waypoints and other spatial information from the various surveys are superimposed onto these maps for evaluation by NHI biologists.

In addition to locating important rare species populations and high-quality natural community occurrences, the major products culminating from all of this work are the “Primary Sites.” These areas contain relatively undisturbed, high-quality, natural communities; provide important habitat for rare species; offer opportunities for restoration; could provide important ecological connections; or some combination of the above factors. The sites are meant to highlight, based on our evaluation, the best areas for conserving biological diversity for the study area. They often include important rare species populations, High Conservation Value Forests, or other ecologically important areas.

The final report describes the Primary Sites, as well as rare or otherwise notable species, and other ecological opportunities for conserving or enhancing the biological diversity of the study area. The report is intended for use by department master planning teams and others and strives to describe these opportunities at different scales, including a broad, landscape context that can be used to facilitate ecosystem management.

Select Tools Used for Conducting Inventory

The following are descriptions of standard tools used by the NHI Program for conducting biotic inventories. Some of these may be modified, dropped, or repeated as appropriate to the project.

File Compilation: Involves obtaining existing records of natural communities, rare plants and animals, and aquatic features for the study area and surrounding lands and waters from the NHI Database. Other databases with potentially useful information may also be queried, such as: forest reconnaissance data; the DNR Surface Water Resources series for summaries of the physical, chemical, and biological characteristics of lakes and streams (statewide, by county); the Milwaukee Public Museum's statewide Herp Atlas; the Wisconsin Breeding Bird Atlas; other NHI “atlas” and site databases; museum/herbarium collections for various target taxa; soil surveys; geological surveys; and the department's fish distribution database.

Additional data sources are sought out as warranted by the location and character of the site, and the purpose of the project. Manual files maintained within the Bureau of Endangered Resources, including the State Natural Area files, often contain information on a variety of subjects relevant to the inventory of natural features for an area.

Literature Review: Field biologists involved with a given project consult basic references on the natural history and ecology of the area, as well as any documented rare species. This sometimes broadens and/or sharpens the focus of the inventory efforts.

Target Elements: Lists of target elements including natural communities, rare plants and animals, and aquatic features are developed for the study area. Field inventory is then scheduled for the times when these elements are most identifiable or active. Inventory methods follow accepted scientific standards for each taxon.

Compilation of Maps and Other Spatial Data: USGS 7.5 minute topographic quadrangles, most often in digital form, serve along with aerial photos as the base maps for field survey and often yield useful clues regarding access, extent of area to be surveyed, developments, and the presence and location of special features. These are used in conjunction with numerous GIS layers, which are now a basic resource tool for the efficient and comprehensive planning of surveys and the analysis of their results.

WDNR wetland maps consist of aerial photographs upon which all wetlands down to a scale of 2 or 5 acres have been delineated. Each wetland polygon is classified based on characteristics of vegetation, soils, and water depth. These polygons have been digitized for most counties, and the resulting GIS layers can be superimposed onto other maps.

Ecoregion GIS layers are useful for comprehensive projects covering large geographic areas such as counties, national and state forests, and major watersheds. These maps integrate basic ecological information on climate, landforms, geology, soils, and vegetation. Ecological Landscapes provide the broad framework most often used in Wisconsin; however smaller units, including Landtype Associations, can be very helpful for evaluating ecoregions at finer scales.

Aerial photographs: These provide information on a study area not available from maps, paper files, or computer printouts. Examination of both current and historical photos, taken over a period of decades, can be especially useful in revealing changes in the environment over time. The Wisconsin NHI Program uses several different types of both color and black and white air photos. Typically, these are in digital format, although paired photos in print format can be valuable for stereoscopic viewing. High-resolution satellite imagery is often cost-prohibitive but is available for some portions of the state and is desirable for certain applications.

Original Land Survey Records: The surveyors who laid out the rectilinear Town-Range-Section grid across the state in the mid-nineteenth century recorded trees by species and size at all section corners and along section lines. Their notes also included general impressions of vegetation, soil fertility, and topography, and note aquatic features, wetlands, and recent disturbances such as windthrow and fire. As these surveys typically occurred prior to extensive settlement of the state by Europeans, they constitute a valuable record of conditions prior to extensive modification of the landscape by European technologies and settlement patterns. The tree data are available in GIS format as raw points or interpreted polygons, and the notes themselves can provide helpful clues regarding the study area's potential ecological capabilities.

Interviews: Interviews with scientists, naturalists, land managers or others knowledgeable about the area to be surveyed often yield invaluable information.

Global Positioning Systems (GPS): Small, portable GPS units are now a routine piece of field equipment used for virtually all NHI survey work. Collecting coordinates (waypoints) facilitates mapping and makes it easy to quickly communicate specific locations among biologists. Often waypoints are paired with photos and/or other information and stored in a waypoint tracking database.

Aerial Reconnaissance: Fly-overs are desirable for large sites, and for small sites where contextual issues are especially important. When possible, this should be done both before and after ground level work. Flights are scheduled for those times when significant features of the study area are most easily identified and

differentiated. They are also useful for observing the general lay of the land, vegetation patterns and patch sizes, aquatic features, infrastructure, and disturbances within and around the site

Appendix B



Appendix D

Descriptions of Rare Species and High Quality Natural Communities Documented at St. Louis River Planning Group

The following paragraphs give brief summary descriptions for some of the rare species documented within the St. Louis River Planning Group and mapped in the NHI Database. More information can be found on the Endangered Resources Web site (dnr.wi.gov, keyword “ER”) for several of these species. Not all species documented on the properties have descriptive paragraphs available.

Rare Animals

American Bittern

American Bittern (*Botaurus lentiginosus*) is a Special Concern bird species in Wisconsin. It is a medium-sized wading bird with a stout body, long neck and bill. It has brown plumage on the back and is streaked with brown and white stripes on the chest and throat. The plumage does not change seasonally. Most distinctive is an elongated, black patch extending from below the eye down the side of the neck. The species can be found in shallow marshes, meadows and wetlands of many sizes but prefers large open marshes and meadows. During the breeding season, from 25 Apr - 31 July, it nests in areas with thick, emergent vegetation like cattails, sedges, reed, and bulrushes. One to five buff-brown to olive-brown colored eggs are laid and incubated by the female for 24-28 days. The species is threatened by the degradation and destruction of wetlands from drainage, filling and conversion to agriculture.

American Eel

American eel (*Anguilla rostrata*), a State Special Concern fish, prefers large streams, rivers and lakes with muddy bottoms and still waters. To reach these conditions the eel has to traverse a wide variety of less suitable habitat including swift-flowing waters with a wide variety of substrates. Spawning occurs in the Sargasso Sea.

Bald Eagle

Bald Eagle (*Haliaeetus leucocephalus*), a bird listed as Special Concern in Wisconsin and Federally protected by the Bald & Golden Eagle Protection Act, prefers large trees in isolated areas in proximity to large areas of surface water, large complexes of deciduous forest, coniferous forest, wetland, and shrub communities. Large lakes and rivers with nearby tall pine trees are preferred for nesting. In southern Wisconsin, the recommended avoidance period extends from February 15 - July 1. In northern Wisconsin, the recommended avoidance period is from March 15 - August 1.

Black-billed Cuckoo

Black-billed cuckoo (*Coccyzus erythrophthalmus*) is a Special Concern species in Wisconsin. They typically nest in deciduous and mixed deciduous-coniferous woodlands near lakes or streams, and less often in coniferous forests. Their breeding season occurs from mid-May to late August.

Blue-winged Teal

Blue-winged teal (*Anas discors*), a Special Concern bird, prefers idle grasslands, wet meadows, and alfalfa fields during breeding season. They typically build their nests in upland habitats with residual cover from the previous year. Their breeding season occurs from mid April to mid July.

Canada Warbler

Canada Warbler (*Wilsonia canadensis*), a State Special Concern bird and a Species of Greatest Conservation Need, is typically most abundant in moist, mixed coniferous-deciduous forests with a well-

developed understory. They nest in dense vegetation, often in areas with mosses, ferns, and decaying stumps or logs.

Cape May Warbler

Cape May Warblers (*Dendroica tigrina*) breed in northern Wisconsin, primarily in somewhat open coniferous forests of spruce, balsam fir, cedar, and tamarack. Nests are usually placed near the top or crown of spruce or fir trees and near the main stem. Locating nests from the ground or trying to follow females to the nest are difficult, as nest is usually 30-60 feet high in thick foliage and females tend to land near base and work up through the tree. Populations are generally uncommon for this highly insectivorous species but strong localized populations can occur in areas associated with spruce budworm.

Connecticut Warbler

Connecticut Warbler (*Oporornis agilis*), a bird listed as Special Concern, prefers mature, multi-layered pine stands, particularly jack pine, and occasionally in tamarack-pine stands with dense hardwood understory. The recommended avoidance period is from June 1 - August 25.

Eastern Elliptio

Eastern or Atlantic elliptio (*Elliptio complanata*), a State Special Concern mussel, is confined to the Lake Superior drainage of the a northwest part of the state. It lives in streams, lakes, impoundments and bays of Lake Superior. The known host fish include a number of common species (killifish, sunfish, bass, crappie, perch).

Lake Sturgeon

Lake Sturgeon (*Acipenser fulvescens*), a fish listed as Special Concern, prefers large rivers and lakes. It also lives in the shoal waters of the Great Lakes. Inland it shows a preference for the deepest mid-river areas and pools. Spawning occurs from late April through early June in cold, shallow fast water.

Least Bittern

Least Bittern (*Ixobrychus exilis*), a Special Concern bird in Wisconsin. This species prefers freshwater marshes where cattails and reeds predominate in swamps and marshes and dense emergent vegetation. The recommended avoidance period is from 25 Apr - 31 July.

Least Flycatcher

The Least Flycatcher (*Empidonax minimus*) is a State Special Concern species that is found in almost every major type of deciduous and mixed forest, although less commonly in conifers. Although Least Flycatcher historically bred throughout Wisconsin, the breeding range shifted mostly to the northern part of the state as deciduous forest cover was lost in the south. Nesting occurs from mid-May to mid-July.

Le Conte's Sparrow

Le Conte's Sparrow (*Ammodramus leconteii*), a Special Concern species, is a small, chunky sparrow with an orange-yellow face and chest. Its head is marked by a white crown stripe between two black streaks. Black streaks also mark the sides and flanks. Its nape is pinkish-brown. An uncommon migrant to Wisconsin, the species is found nesting throughout the central and northern portions of the state. Le Conte's Sparrow is found in habitats with tall, dense, moist vegetation such as sedge meadows, wet hayfields and prairies. Other breeding habitats include marshy meadows and open bogs. Most individuals have been documented in the northern one-third of the state. The avoidance period is from May 5 to early September. Two to six pale greenish covered eggs with fine brown specks are laid in open cup nests, composed of fine grasses, on or above the ground. The females incubate the eggs for 11 to 13 days.

Merlin

Merlin (*Falco columbarius*), a bird listed as Special Concern, prefers coniferous forests especially stands of spruce, along lakeshores, but may be observed in agricultural areas. The recommended avoidance period is from early June through mid-August.

Northern Harrier

Northern Harrier (*Circus cyaneus*), a bird listed as Special Concern, prefer retired cropland (timothy/quackgrass), old field habitat, sedge meadow, and restored prairies. The recommended avoidance period is from early April through late August.

Northern Leopard Frog

The northern leopard frog (*Lithobates pipiens*) is a Special Concern species in Wisconsin. They are light-green to greenish-brown with circular dark spots on their back, sides, and legs. There is generally a white or yellow color that borders the spots. Most notably, the species has white dorsolateral folds that run from the back of each eye to the end of the body. Northern leopard frogs are found in a variety of wetland habitats, especially in fishless waters including springs, ponds, bogs, marshes, and lakes. The species may forage a far distance from water in old fields and prairies.

Upland Sandpiper

Upland Sandpiper (*Bartramia longicauda*), a bird listed as Special Concern, prefers tallgrass prairies, sedge meadows, unmowed alfalfa/timothy fields and scattered woodlands. The recommended avoidance period is from April 25 - Aug 10.

Western Meadowlark

The Western Meadowlark (*Sturnella neglecta*), a Special Concern species, is medium-sized bird that is a chunkier equivalent to a robin. It is distinguishable by its bright yellow throat and breast marked by a black "V". The rest of the body is intricately patterned with a multitude of brown, black spots and stripes. The species is typically found in open landscapes like pastures and hay fields, grasslands, prairies and meadows where there is a mix of short to medium-high grasses. During the avoidance period from April 20 - August 15, nests are constructed by the females from weaving grass and shrub stems in a 7-8 inch wide depression in the soil. Five to six eggs are laid that are white with brown, rust and lavender spots. Incubation lasts 13-16 days. The Western Meadowlark has suffered from significant population decline over the past three decades, likely due to loss of habitat caused by fragmentation, land use conversion and succession from grasslands to brush or forests.

Wood Thrush

The Wood Thrush (*Hylocichla mustelina*) is a Special Concern species that prefers large blocks of upland moist forests with mature trees, moderate to dense canopy cover, moderate undergrowth, and ample leaf litter. Nesting occurs from mid-May to late July.

Wood Turtle

Wood turtles (*Clemmys insculpta*), a Threatened species in Wisconsin, prefer clean rivers and streams with moderate to fast flows and adjacent riparian wetlands and upland deciduous forests. This species often forages in open wet meadows or in shrub-carr habitats dominated by speckled alder. They overwinter in streams and rivers in deep holes or undercut banks where there is enough water flow to prevent freezing. This semi-terrestrial species tends to stay within about 300 meters of rivers and streams but exceptions certainly occur, especially within the driftless area of southwestern and western Wisconsin. This species becomes active in spring as soon as the ice is gone and air temperatures reach around 50 degrees in March or April. They can remain active into mid-October but have been seen breeding under the ice. Wood turtles can breed at any time of year, but primarily during the spring or fall. Nesting usually begins in late May in northern WI and early June in southern WI and continues through June. This species nests in sand or gravel, usually very close to the water, although it is known to nest

along sand and gravel roads or in abandoned gravel pits some distance from water. Hatching occurs in 55-75 days (August) depending on air temperatures. This species does not overwinter in nests, unlike other WI turtles.

Rare Plants

Arrow-leaved Sweet-coltsfoot

Arrow-leaved Sweet-coltsfoot (*Petasites sagittatus*), a State Threatened plant, is found in cold marshes and swamp openings, often forming large clones. Blooming occurs throughout May; fruiting occurs throughout June. The optimal identification period for this species is late May through late August.

Fairy Slipper

Fairy Slipper (*Calypso bulbosa*), a State Threatened plant, is found only in old growth white cedar swamps. Blooming occurs early May through July; fruiting occurs late June through late July. The optimal identification period for this species is late May through early June.

Floating Marsh-marigold

Floating Marsh-marigold (*Caltha natans*), a State Endangered plant, is found in shallow water in creeks, pools, ditches, and sheltered lake margins. It typically roots in mud, silt, or clay, and spreads by rooting at the nodes (Coffin & Pfannmuller, 1988). In Wisconsin, it has only been found in a small beaver-dammed stream within a boreal forest. Blooming occurs throughout July; fruiting occurs throughout August. The optimal identification period for this species is early July through late August.

Mamillate Spike-rush

Mamillate Spike-rush (*Eleocharis mamillata*), a State Special Concern plant, is found on the edge between wet meadow and shrub-carr and on sphagnum-sedge bog mat in Wisconsin. Rangewide, it has been found on fresh lakeshores, shallow ponds, streams, floating mats, bogs, fens, and ditches. Blooming occurs mid-May through late August; fruiting occurs mid-June through late September. The optimal identification period for this species is mid-June through late September.

Marsh Grass-of-Parnassus

Marsh Grass-of-Parnassus (*Parnassia palustris*), a State Threatened plant, is found on clay bluffs along Lake Superior, and in cold northern fens, and calcareous sand or gravel pits. Blooming occurs early August through early September; fruiting occurs throughout September. The optimal identification period for this species is throughout August.

Marsh Horsetail

Marsh Horsetail (*Equisetum palustre*), a State Special Concern plant, is found in fens, alder tickets, wet sedge meadows, bog and swamp margins, and wet swales near the Great Lakes. The optimal identification period for this species is late May through late September.

Northern Bur-reed

Northern Bur-reed (*Sparganium glomeratum*), a State Threatened plant, is found in cold ditches and pools within sedge meadows, willow-alder thickets and, occasionally, tamarack stands on the Lake Superior clay plain. Blooming occurs late June through late July; fruiting occurs late July through early September. The optimal identification period for this species is early July through early September.

Northern Yellow Lady's-slipper

Northern Yellow Lady's-slipper (*Cypripedium parviflorum* var. *makasin*), a State Special Concern plant, is found in fens, calcareous swales, and rich springy forest edges. Blooming occurs late May through late

June; fruiting occurs late June through late July. The optimal identification period for this species is late May through early July.

Northwestern Sticky Aster

Northwestern Sticky Aster (*Aster modestus*), a State Special Concern plant, is found in a single wetland in Douglas county but may be found elsewhere in the boreal region in moist wooded or open areas, including bogs, alder thickets and swamps. Blooming occurs from late summer to early fall. The optimal identification period for this species is Late August to early September.

Seaside Crowfoot

Seaside Crowfoot (*Ranunculus cymbalaria*), a State Threatened plant, is found in sandy or muddy shores and marshes, ditches and harbors along Lake Michigan, and salted roadsides near the city of Superior. Blooming occurs early June through late August; fruiting occurs late July through late August. The optimal identification period for this species is early June through late August.

Showy Lady's-slipper

Showy Lady's-slipper (*Cypripedium reginae*), a State Special Concern plant, is found in neutral to alkaline forested wetlands. It is also found in rich upland forests in seeps and moist to dry clay bluffs. Blooming occurs late June through late July; fruiting occurs late July through late August. The optimal identification period for this species is late June through late July.

Slender Spike-rush

Slender Spike-rush (*Eleocharis nitida*), a State Endangered plant, is found on wet exposed clay in ditches and openings in alder thickets and marshes, only near Superior. Blooming occurs throughout June; fruiting occurs late June through early September. The optimal identification period for this species is late June through late August.

Slim-stem Small Reed Grass

Slim-stem Small Reed Grass (*Calamagrostis stricta*), a State Special Concern plant, is found in usually moist meadows, sandy or peaty lake margins, dolomite or sandstone ledges, as well as calcareous wetlands and sedge meadows. Blooming occurs throughout June; fruiting occurs early July through late August. The optimal identification period for this species is early July through late August.

Small Yellow Water Crowfoot

Small Yellow Water Crowfoot (*Ranunculus gmelinii*), a State Endangered plant, is found in cold brooks and springs and in the shallow water and muddy shores of ditches, streams, and lakes. Blooming occurs late June through late August; fruiting occurs early July through early September. The optimal identification period for this species is late June through early September.

Tea-leaved Willow

Tea-leaved Willow (*Salix planifolia*), a State Threatened plant, is found near Lake Superior, including on bedrock shorelines in the Apostle Islands. Blooming occurs throughout May; fruiting occurs throughout June. The optimal identification period for this species is early June through early September.

Torrey's Bulrush

Torrey's Bulrush (*Scirpus torreyi*), a State Special Concern plant, is found on the sandy shores of shallow lakes and lagoons. Blooming occurs late June through late July; fruiting occurs throughout August. The optimal identification period for this species is early July through late August.

Vasey's Rush

Vasey's Rush (*Juncus vaseyi*), a State Special Concern plant, is found in moist old fields, ditches, and prairies. It has been most commonly found on the Lake Superior clay plain. Blooming occurs early July through late August; fruiting occurs early August through early September. The optimal identification period for this species is early July through late August.

White Mandarin

White Mandarin (*Streptopus amplexifolius*), a State Special Concern plant, is found in rich, hardwood or coniferous forests, often in ravine bottoms. Blooming occurs throughout June; fruiting occurs throughout July. The optimal identification period for this species is early June through late September.

Natural Communities

Boreal Forest

In Wisconsin, mature stands of this forest community are dominated by white spruce (*Picea glauca*) and balsam-fir (*Abies balsamea*), often mixed with white birch (*Betula papyrifera*), white cedar (*Thuja occidentalis*), white pine (*Pinus strobus*), balsam-poplar (*Populus balsamifera*) and quaking aspen (*Populus tremuloides*). Mountain-ash (*Sorbus* spp.) may also be present. Common understory herbs are large-leaved aster (*Aster macrophyllus*), bluebead lily (*Clintonia borealis*), Canada mayflower (*Maianthemum canadense*), wild sarsaparilla (*Aralia nudicaulis*), and bunchberry (*Cornus canadensis*). Most Wisconsin stands are associated with the Great Lakes, especially the clay plain of Lake Superior, and the eastern side of the northern Door Peninsula on Lake Michigan. Of potential interest from the perspectives of vegetation classification and restoration, white pine had the highest importance value of any tree in the Lake Superior region, as recorded during the original land survey of the mid-1800's.

Emergent Marsh

These open, marsh, lake, riverine and estuarine communities with permanent standing water are dominated by robust emergent macrophytes, in pure stands of single species or in various mixtures. Dominants include cat-tails (*Typha* spp.), bulrushes (particularly *Scirpus acutus*, *S. fluviatilis*, and *S. validus*), bur-reeds (*Sparganium* spp.), giant reed (*Phragmites australis*), pickerel-weed (*Pontederia cordata*), water-plantains (*Alisma* spp.), arrowheads (*Sagittaria* spp.), and the larger species of spikerush such as (*Eleocharis smallii*).

Ephemeral Pond

These ponds are depressions with impeded drainage (usually in forest landscapes), that hold water for a period of time following snowmelt but typically dry out by mid-summer. Common aquatic plants of these habitats include yellow water crowfoot (*Ranunculus flabellaris*), mermaid weed (*Proserpinaca palustris*), Canada bluejoint grass (*Calamagrostis canadensis*), floating manna grass (*Glyceria septentrionalis*), spotted cowbane (*Cicuta maculata*), smartweeds (*Polygonum* spp.), orange jewelweed (*Impatiens capensis*), and sedges. Ephemeral ponds provide critical breeding habitat for certain invertebrates, as well as for many amphibians such as frogs and salamanders.

Forested Seep

These are shaded seepage areas with active spring discharges in (usually) hardwood forests that may host a number of uncommon to rare species. The overstory dominant is frequently black ash (*Fraxinus nigra*), but yellow birch (*Betula allegheniensis*), American elm (*Ulmus americana*) and many other tree species may be present including conifers such as hemlock (*Tsuga canadensis*) or white pine (*Pinus strobus*). Understory species include skunk cabbage (*Symplocarpus foetidus*), water-pennywort (*Hydrocotyle americana*), marsh blue violet (*Viola cucullata*), swamp saxifrage (*Saxifraga pennsylvanica*), golden saxifrage (*Chrysosplenium americanum*), golden ragwort (*Senecio aureus*), silvery spleenwort (*Athyrium thelypteroides*) and the rare sedges (*Carex scabrata* and *C. prasina*). Most documented occurrences are in the Driftless Area, or locally along major rivers flanked by steep bluffs.

Floodplain Forest

This is a lowland hardwood forest community that occurs along large rivers, usually stream order 3 or higher, that flood periodically. The best-development occurs along large rivers in southern Wisconsin, but this community is also found in the north. Canopy dominants may include silver maple (*Acer saccharinum*), river birch (*Betula nigra*), green ash (*Fraxinus pennsylvanica*), hackberry (*Celtis occidentalis*), swamp white oak (*Quercus bicolor*), and cottonwood (*Populus deltoides*). Northern stands are often species poor, but balsam-poplar (*Populus balsamifera*), bur oak (*Quercus macrocarpa*), and box elder (*Acer negundo*) may replace some of the missing "southern" trees. Buttonbush (*Cephalanthus occidentalis*) is a locally dominant shrub and may form dense thickets on the margins of oxbow lakes, sloughs and ponds within the forest. Nettles (*Laportea canadensis* and *Urtica dioica*), sedges, ostrich fern (*Matteuccia struthiopteris*) and gray-headed coneflower (*Rudbeckia laciniata*) are important understory herbs, and lianas such as Virginia creepers (*Parthenocissus* spp.), grapes (*Vitis* spp.), Canada moonseed (*Menispermum canadense*), and poison-ivy (*Toxicodendron radicans*) are often common. Among the striking and characteristic herbs of this community are cardinal flower (*Lobelia cardinalis*) and green dragon (*Arisaema dracontium*).

Northern Sedge Meadow

This open wetland community is dominated by sedges and grasses. There are several common subtypes: Tussock meadows, dominated by tussock sedge (*Carex stricta*) and Canada bluejoint grass (*Calamagrostis canadensis*); Broad-leaved sedge meadows, dominated by the robust sedges (*Carex lacustris* and/or *C. utriculata*); and Wire-leaved sedge meadows, dominated by such species as woolly sedge (*Carex lasiocarpa*) and few-seeded sedge (*C. oligosperma*). Frequent associates include marsh bluegrass (*Poa palustris*), manna grasses (*Glyceria* spp.), panicled aster (*Aster lanceolatus*), joy-pye-weed (*Eupatorium maculatum*), and the bulrushes (*Scirpus atrovirens* and *S. cyperinus*).

Appendix E

The St. Louis River Planning Group Species of Greatest Conservation Need

The following are vertebrate Species of Greatest Conservation Need (SGCN) associated with natural community types that are present on the St. Louis River Planning Group in the Superior Coastal Plain Ecological Landscape. A key to interpretation of the tables is provided below.

	Major									
	Bog Rehit	Carareous Fen	Dry Prairie	Dry-mesic Prairie	Emergent Marsh	Floodplain Forest	Oak Opening	Oak Woodland	Shrub Carr	Southern Dry Forest
Species that are Significantly Associated with the Southeast Glacial Plains Landscape										
Acadian Flycatcher						2				1
American Bittern					3				1	
American Golden Plover				2	2					
American Woodcock	2	2				1	1		3	1
Black Tern					3					
Black-billed Cuckoo						2	1		3	
Blanding's Turtle			3	2	3	2	3	2	2	
Blue-winged Teal			1	2	3	2				
Blue-winged Warbler	2					2	2	2	2	2
Bobolink		1		3			1			
Brown Thrasher			2	2			3			
Buff-breasted Sandpiper				2	2					

Natural communities that are present in the property group and that are identified as major or important opportunities in the Wildlife Action Plan.

Numbers indicate the degree to which each species is associated with a particular habitat type (3=significant association, 2=moderate association, and 1=low association). Animal-community combinations shown here that are assigned as either "3" or "2" are high conservation priorities.

SGCN with a moderate or high probability of occurring in the ecological landscape. Species that were detected during surveys are highlighted in yellow. Since there is a moderate or high probability that the non-highlighted species may also occur on the SRGP, they should be acknowledged as potential conservation targets by planners and managers.

Sample interpretations:

Acadian flycatcher is significantly associated with the Southeast Glacial Plains Ecological Landscape. It has a moderate association with Floodplain Forest and a low association with Southern Dry Forest. Protecting this species and associated Floodplain Forest is a priority conservation action. This species was detected on the property group during surveys.

Buff-breasted sandpiper is also significantly associated with the Southeast Glacial Plains Ecological Landscape. It has a moderate association with Dry-mesic Prairie and Emergent Marsh. Protecting this species and associated prairie and marsh is a priority conservation action. Although it was not detected during surveys on the property group, this species represents a conservation target.

Table 1. Priority Species of Greatest Conservation Need of the St. Louis River Planning Group Properties that are significantly associated with the Superior Coastal Plain Ecological Landscape.

	Major				Important						
	Boreal Forest	Coolwater streams	Emergent Marsh	Submergent Marsh	Alder Thicket	Floodplain Forest	Northern Dry-mesic Forest	Northern Hardwood Swamp	Northern Sedge Meadow	Shrub Carr	Warmwater rivers
Species that are Significantly Associated with the Superior Coastal Plain Landscape											
American Bittern			3		1				3	1	
American Golden Plover			2						1		
American Woodcock	1				3	1	1	2	1	3	
Bald Eagle				2		1					3
Black Tern			3	2					2		
Black-billed Cuckoo	1				3	2	1	1	1	3	
Black-throated Blue Warbler	1						2				
Blue-winged Teal			3	2		2			2		1
Bobolink									3		
Boreal Chorus Frog			3						3		
Buff-breasted Sandpiper			2								
Canada Warbler	3				2		2	3		1	
Common Tern			2	1							
Dunlin			2								2
Four-toed Salamander	2	2	3		3	3		2	2	3	
Golden-winged Warbler	1				3		2	2		3	
Gray Wolf	3				3	2	3	2	1	2	
Lake Sturgeon											3
Le Conte's Sparrow									3		
Least Flycatcher	2					2	2	2		1	
Lesser Scaup			1	3							2
Marbled Godwit			3	1							
Mink Frog	1	3	3	3	2			1	3	2	3
Mudpuppy		1									3
Northern Flying Squirrel	3					2	3	2			
Northern Harrier			1		1				3	1	
Short-billed Dowitcher			3	1							
Trumpeter Swan			3	3					1		1
Upland Sandpiper									1		
Veery	3				3	2	2	3		3	
Water Shrew	3	3			2	2		3	1	1	1
Whimbrel			2								
Wood Thrush						2	1	1			
Wood Turtle		3		3	3	3		2	2	3	3
Woodland Jumping Mouse	2				1	2	1	2	1	1	

Table 2. Priority Species of Greatest Conservation Need of the St. Louis River Planning Group Properties that are moderately associated with the Superior Coastal Plain Ecological Landscape.

	Major				Important						
	Boreal Forest	Coolwater streams	Emergent Marsh	Submergent Marsh	Alder Thicket	Floodplain Forest	Northern Dry-mesic Forest	Northern Hardwood Swamp	Northern Sedge Meadow	Shrub Carr	Warmwater rivers
Species that are Moderately Associated with the Superior Coastal Plain Landscape											
American Marten	3					1	3	1			
Black-backed Woodpecker	2						1				
Canvasback			1	3							3
Eastern Red Bat	2	3	2	2	2	2	2	2	2	2	2
Hoary Bat	2	3	2	2	2	2	2	2	2	2	2
Hudsonian Godwit			3	1							
Moose	3	1	3	3	3	2	1	3	2	3	2
Northern Long-eared Bat	1	3	2	2	2	2	2	2	2	2	2
Olive-sided Flycatcher	2				1		1			1	
Pickereel Frog		3	3	3	2	2			3	2	3
Red Crossbill	1						3				
Rusty Blackbird			2		2	3				2	
Sharp-tailed Grouse									2	1	
Silver-haired Bat	2	3	2	2	2	2	2	2	2	2	2
Solitary Sandpiper		2	3		1	3			1	1	
Yellow Rail									3		

Appendix F

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 G

Primary Sites within the St. Louis River Planning Group

Four ecologically important sites were identified on the St. Louis River Planning Group (SLRPG). These “Primary Sites” were delineated because they generally encompass the best examples of:

- 1) rare and representative natural communities,
- 2) documented occurrences of rare species populations, and/or
- 3) opportunities for ecological restoration or connections.

These sites warrant high protection and/or restoration consideration during the development of the property master plan. This report is meant to be considered along with other information when identifying opportunities for various management designations during the master planning process.

Information provided in the summary paragraphs includes location information, a site map, a brief summary of the natural features present, important plant and animal species¹, the site’s ecological significance, and management considerations. For a table of rare species and natural communities associated with each Primary Site, please see Appendix H.

Primary Sites	Page
SLRPG01. Red River Breaks Boreal Forest and Forested Swamp.....	2
SLRPG02. St. Louis River Dry-mesic Forest.....	6
SLRPG03. Fond du Lac Marshes	7
SLRPG04. Pokegama-Carnegie Wetlands State Natural Area.....	9
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Species List.....	13

¹ A list of species referred to by common name is found at the end of this appendix.

SLRPG01. RED RIVER BREAKS BOREAL FOREST AND FORESTED SWAMP

Location

Property:	St. Louis and Red Rivers Streambank Protection Area
Counties:	Douglas
Landtype Association:	212Ya01. Douglas Lake-Modified Till Plain.
Approximate Size:	1549 acres
Ownership:	WDNR

Description of Site

This site borders the Red River and associated Wisconsin tributaries that run into the lower St. Louis River above the city of Oliver. It occurs on deeply incised and heavily eroded ravines of red clay soils and contains an extensive block of undeveloped and roadless forest.

The dominant cover type is Boreal Forest, dominated by a mix of trembling aspen (*Populus tremuloides*), white birch (*Betula papyrifera*), white pine (*Pinus strobus*), and white spruce (*Picea glauca*). The latter three tree species, along with northern white-cedar (*Thuja occidentalis*), are all characteristic of the northern Wisconsin "white forest", a unique type of Boreal Forest found near Lake Superior. Conifers, which were formerly dominant in this area, presently occur as scattered individuals or in small stands, with white spruce, white pine, and balsam fir (*Abies balsamea*) the most important species. The lower slopes of the steep-sided ravines are often springy, sometimes supporting remnant stands of northern white cedar and unusual herbs. Several springs were flowing with brightly colored orange water, the result of the presence of iron bacteria. Another spring was noted in which a deposition of tufa (calcium carbonate) occurred. Small but mature stands of large white spruce, black ash (*Fraxinus nigra*), and balsam poplar (*Populus balsamifera*) occur on small terraces above the streams in the ravine bottoms. The subcanopy of the Primary Site is mostly trembling aspen with paper birch and white pine. The shrub layer includes beaked hazelnut (*Corylus cornuta*), mountain maple (*Acer spicatum*), speckled alder (*Alnus incana*), northern bush-honeysuckle (*Diervilla lonicera*), and thimbleberry (*Rubus parviflorus*). Over 80 ground layer plants are found in the Primary Site and include wild sarsaparilla (*Aralia nudicaulis*), big-leaved aster (*Aster macrophyllus*), five sedge species (*Carex spp*), northern bluebells (*Mertensia paniculata*), liver-leaf wintergreen (*Pyrola asarifolia*), nodding trillium (*Trillium cernuum*), American fly honeysuckle (*Lonicera canadensis*), and blue-bead lily (*Clintonia borealis*), many of which are Boreal Forest indicator species (Curtis 1959).

Small areas of Clay Seepage Bluffs occur in the upper portions of some of the ravines where groundwater seepage and steep slopes combine to form relative open, moist clay slopes dominated by speckled alder and paper birch along with less common species such as russet buffalo-berry (*Shepherdia canadensis*), big-leaved aster, thimbleberry, pearly everlasting (*Anaphalis margaritacea*), golden sedge (*Carex aurea*), and bunchberry (*Cornus canadensis*).

In poorly drained "flats" on the level ridges between ravines there are patches of black ash-dominated hardwood swamp and thickets of speckled alder and other tall wetland shrubs. A large black ash-dominated swamp also occurs along the St. Louis River. Areas of standing water are infrequent, but where present support small emergent marshes and broad-leaved sedge meadows. A few patches of well-drained mesic hardwood forest occur on the ridges, with sugar maple (*Acer saccharum*) and yellow birch (*Betula alleghaniensis*), but these are not extensive and, in general, the "northern hardwoods" community is rare on the site.

Significance of Site

The Fond Du Lac Marshes Primary Site (SLRPG03) and Red River Breaks Boreal Forest and Forested Swamp Primary Site are an integral part of one of the largest freshwater estuaries on the western Great Lakes. The lower St. Louis River offers unique large scale protection and restoration opportunities directly adjacent to urbanized areas and a major shipping port. These Primary Sites and surrounding forest are considered a high priority owing to its large size, public lands within the area, and its significance to water quality in the estuary.

The importance of the site to water quality cannot be overemphasized; protecting water quality was one of the primary reasons the Wisconsin DNR acquired the St. Louis and Red Rivers Streambank Protection Area property. In addition to providing several thousand acres of forested cover, the conifer component of the forests slows spring snowmelt, which reduces runoff rates and decreases in erosion and sedimentation (Verry et al. 1983, Jereczek et al. 2011)

Boreal Forests are extremely rare in Wisconsin, occurring in the state at their southernmost global extent. Forests that survived or recovered from the cutover period are now imperiled due to climate change. Very few good-quality examples of Boreal Forest remain in the state. Identification and protection of remaining Boreal Forest is of critical importance. The Superior Coastal Plain offers the best opportunities in the state to manage for Boreal Forest and Clay Seepage Bluffs, as noted in the Wisconsin Wildlife Action Plan (WDNR 2006)

Several bird Species of Greatest Conservation Need (SGCN) breed within the Primary Site: black-billed cuckoo (*Coccyzus erythrophthalmus*), veery (*Catharus fuscescens*), wood thrush (*Hylocichla mustelina*), least flycatcher (*Empidonax minimus*), yellow-bellied flycatcher (*Empidonax flaviventris*), golden-winged warbler (*Vermivora chrysoptera*), and Canada warbler (*Wilsonia canadensis*). In addition, the area supports a representative diversity of the region's birds, including large populations of many neotropical migrants (e.g. wood warblers, vireos, flycatchers, and thrushes). Four rare plants have been documented on this site, inhabiting Boreal Forests and poorly drained red clay flats.

Management Considerations

The site's forests, soils, and waters were seriously damaged during past catastrophic logging episodes (Epstein et al. 1997). Many of the fragile springs and seeps in the steep valleys are eroding, leading to excessive sedimentation in the lower drainages. Conifers are generally not reproducing well, due to loss of seed source, unstable and possibly waterlogged substrates, overbrowsing by white-tailed deer (*Odocoileus virginianus*), and possible past damage to soil structure (WDNR 1997). Thickets of tall shrubs and dense stands of blue-joint grass (*Calamagrostis canadensis*) may be inhibiting the establishment of seedlings of some species (WDNR 1997).

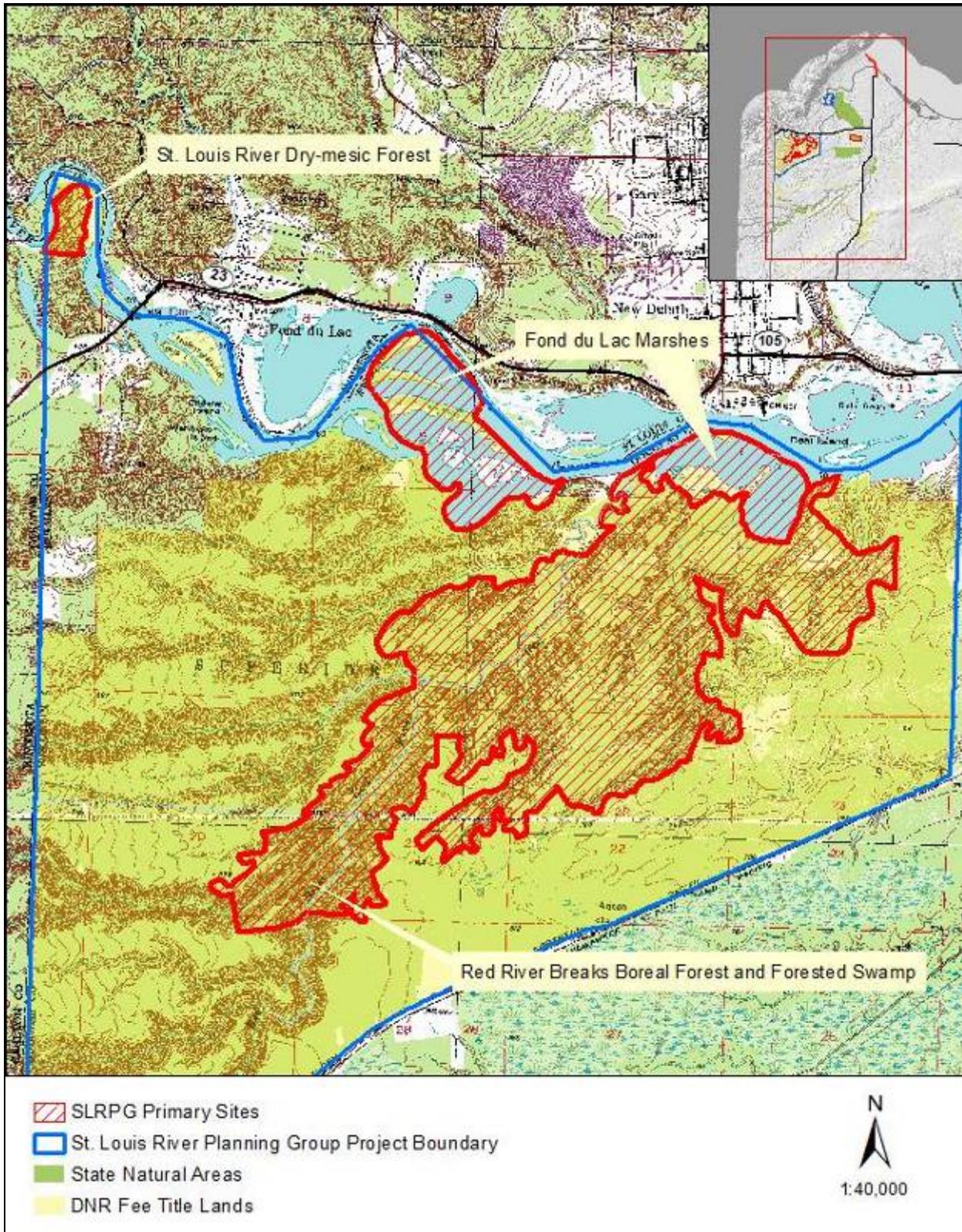
Clay Seepage Bluffs are present along the southwest "arm" of the Primary Site (Figure 1). Open, eroding clay banks are a natural part of this geologically young landscape, and slope failure and bank slumping has been correlated with major rainstorms. A June 2012 "500 year flood" caused nearly twice as many landslide events in the Red River watershed as the previous 61 years combined, with nearly 1,000 mapped sloped failures depositing as much as 16 feet (5 meters) of sediment in the river valleys (Kotz et al. 2014). Additional research is needed regarding the impact of tree species composition and forest maturity on slope failure.

Enhancement of the site's high-quality Boreal Forests and protection of the roadless condition would help protect the rare plants and animals occurring here. Water quality would benefit from forest management that focuses on stabilization of eroding areas and conversion from aspen to conifer-dominated forest. Eradication of the non-native invasive species garden-heliotrope (*Valeriana officinalis*) and common tansy (*Tanacetum vulgare*) while they are still in manageable numbers would also be beneficial to the long-term viability of the site.



Mature Boreal Forest Remnant at Red River Breaks Streambank Protection Area. Photo by R. Staffen.

**This appendix contains locational information on rare species and is for internal use only.



**SLRPG01: Red River Breaks Boreal Forest and Forested Swamp,
SLRPG02: St. Louis River Dry-mesic Forest, and
SLRPG03: Fond du Lac Marshes.**

SLRPG02. ST. LOUIS RIVER DRY-MESIC FOREST

Location

Property:	St. Louis and Red Rivers Streambank Protection Area
County:	Douglas
Landtype Association:	212Ya01. Douglas Lake-Modified Till Plain.
Approximate Size:	28 acres
Ownership:	WDNR

Description of Site

This Primary Site lies on a peninsula on the south side of the St. Louis River formed by a sandstone and clay ridge. The west side has steep, tall slopes (about 150 feet high) rising abruptly from the river. The slopes are partially forested with white pine, red pine (*Pinus resinosa*), northern white-cedar, white spruce, and paper birch with bare, eroded areas and exposed clay and sandstone. The groundlayer is sparsely vegetated. The narrow ridge top and eastern slopes are primarily forested with red oak (*Quercus rubra*), white and red pine, white spruce, and paper birch, with small areas of sugar maple. Alluvial deposits on the east side support a forest dominated by green ash (*Fraxinus pennsylvanica*) and balsam poplar with black ash and white spruce. The northern end of the peninsula shoreline is rocky with areas of exposed sandstone present.

Northern Dry-mesic Forest is the primary forest type on the peninsula with lesser areas of Floodplain Forest and Boreal Forest (on steep slopes) also present. The Northern Dry-mesic Forest canopy is dominated by white spruce, red and white pine and red oak with northern white-cedar, white birch, green and black ash, balsam poplar, and sugar maple as canopy associates. The shrub layer includes speckled alder, alternate-leaved dogwood (*Cornus alternifolia*), beaked hazelnut, black currant (*Ribes americanum*), thimbleberry, and red raspberry (*Rubus idaeus*). The ground layer is dominated by false melic grass (*Schizachne purpurascens*), ostrich fern (*Matteuccia struthiopteris*), sensitive fern (*Onoclea sensibilis*), wood anemone (*Anemone quinquefolia*), Canada mayflower (*Maianthemum canadense*), and starflower (*Trientalis borealis*).

Significance of Site

The site represents the northwestern-most point in Wisconsin with mature, good-quality forests present. It is adjacent to Jay Cooke State Park in Minnesota and is a small part of a relatively large block of mature forest in the region. The uncommon plants American stickseed (*Hackelia deflexa*) and purple clematis (*Clematis occidentalis*) occur here with the potential for other rare species to be found with additional survey effort. The Primary Site harbors unusual features including steep rocky slopes, exposed clay bluffs, sandstone cliffs, river terraces and a former river channel.

Management Considerations

There is an old, small quarry on the northeast portion of the site that is succeeding to forest. This area and the entire peninsula should be monitored for non-native invasive plants, which are presently minimal. Common buckthorn (*Rhamnus cathartica*) and reed canary grass (*Phalaris arundinacea*) were noted during natural community surveys and should be controlled before they become widespread.

This area experienced major flooding in 2012 and areas of the Primary Site are eroding or have the potential for erosion because of the steep terrain. Reforestation or re-vegetation may be considered to protect these areas from further erosion, including around the old quarry area. The Fond du Lac dam lies just upriver from the site and development pressures, particularly on the Minnesota side, could diminish value of this area as a movement corridor for plants and animals. The site was not surveyed for birds or other fauna. Additional surveys are recommended.

SLRPG03. FOND DU LAC MARSHES

Location

Property:	St. Louis and Red Rivers Streambank Protection Area
County:	Douglas
Landtype Association:	212Ya01. Douglas Lake-Modified Till Plain.
Approximate Size:	362 acres
Ownership:	WDNR

Description of Site

Upper portions of the St. Louis River Estuary from Fond du Lac, MN downstream to Oliver, WI feature extensive emergent and submergent marshes. These are typically located inside the main channel's meanders, but also occur in protected, shallow bays along the upland shore bordering the St. Louis and Red Rivers Streambank Protection Area. Important emergent aquatics include arrowheads (*Sagittaria latifolia*, *S. rigida*), bulrushes (*Schoenoplectus pungens*, *S. tabernaemontani*), bur-reed (*Sparganium eurycarpum*), lake sedge (*Carex lacustris*), and cattail (*Typha* spp.). Wild rice (*Zizania aquatica*) and sweet flag (*Acorus calamus*) are locally common. Deeper waters of the marsh complexes support submergent and floating-leaved macrophytes such as coontail (*Ceratophyllum demersum*), waterweed (*Elodea canadensis*), yellow water lily (*Nuphar variegatum*), wild celery (*Vallisneria americana*), and pondweeds (*Potamogeton natans*, *P. richardsonii*).

The patches of marsh associated with the main channel are often bordered by a natural levee adjoining the flowing river. Where well-developed, the levees are vegetated with tall wetland shrubs and lowland hardwoods, especially speckled alder, red-osier dogwood (*Cornus stolonifera*), meadowsweet (*Spiraea alba*), willows (*Salix* spp.), ashes (*Fraxinus nigra* and *F. pennsylvanica*), and box elder (*Acer negundo*).

Significance of Site

The St. Louis River Marshes and Red River Breaks are an integral part of one of the largest freshwater estuaries on the western Great Lakes, and the lower St. Louis River offers unique large scale protection and restoration opportunities in an urban setting. The Primary Site and much of the surrounding landscape down to the estuary are largely undeveloped adding to the significance of the area. Other significant wetlands here are below the Village of Oliver and on the Minnesota side of the St. Louis River including remnant patches of wire-leaved sedge fen at the Oliver Bridge, downstream at Grassy Point, Pokegama Bay, and around Clough Island. Additionally, red clay wetlands represented within the Pokegama Carnegie Wetlands SNA are important ecological features found in the Superior Coastal Plain Ecological Landscape.

Embayments created by horseshoe-shaped islands provide important migratory stopover habitat for water birds, including tundra swan (*Cygnus columbianus*), white pelican (*Pelecanus erythrorhynchos*), and numerous waterfowl species. Species of Greatest Conservation Need noted using the marshes or along the river are foraging common terns (*Sterna hirundo*), northern harrier (*Circus cyaneus*) observed hunting over larger marsh areas, bald eagle (*Haliaeetus leucocephalus*), merlin (*Falco columbarius*), veery in shrubby wetlands, and blue-winged teal (*Anas discors*). Emergent Marsh areas support common marsh bird species: sora (*Porzana carolina*) and Virginia rails (*Rallus limicola*), marsh wren (*Cistothorus palustris*), common yellowthroat (*Geothlypis trichas*), swamp sparrow (*Melospiza georgiana*), and red-winged blackbird (*Agelaius phoeniceus*). A significant population of a rare plant is also found in the marshes.

Management Considerations

Dams upstream from the Primary Site limit movement of aquatic species and may diminish biodiversity in the lower portion of the St. Louis River. Development pressures, dredging of the river, excessive boat traffic, and urban industrial runoff threatens the viability of this area.

Purple loosestrife (*Lythrum salicaria*) is present on the levees and shoreline wetlands, but it is still uncommon, while narrow-leaved cattail (*Typha angustifolia*) is a dominant species here. Both are in need of controlling as resources allow.

A wetland functional analysis of wetlands in the St. Louis River estuary is currently being conducted by the Lake Superior NERR and when complete, should aid conservation, management, and restoration (S. Schooler, pers. communication).

SLRPG04. POKEGAMA-CARNEGIE WETLANDS STATE NATURAL AREA

Location

Property:	Pokegama-Carnegie Wetlands State Natural Area
County:	Douglas
Landtype Association:	212Ya01. Douglas Lake-Modified Till Plain.
Approximate Size:	311 acres
Ownership:	WDNR

Description of Site

Situated on level clay flats between the Pokegama and Little Pokegama Rivers, Pokegama-Carnegie Wetlands State Natural Area features an extensive mosaic of wetland vegetation. The extensive, poorly drained, red clay flats support shrub swamp, Northern Sedge Meadow, Emergent Marsh, and small ponds. Tiny, upland "islets" of white spruce, white pine, red pine, balsam poplar, and trembling aspen punctuate the flats. The shrub wetlands are composed mostly of speckled alder and willows (*Salix petiolaris*, *S. discolor*, *S. pyrifolia*, etc.). The more open wet meadows are dominated by sedges (*Carex lacustris* and *C. stricta*) and blue-joint grass. Widely scattered small pools support a variety of emergent and submergent aquatic macrophytes.

Significance of Site

Of special significance are the many populations of rare plants occurring in the site's wetlands (see Appendix H). Many of the rarities are represented by large and/or multiple populations. It is important to recognize that some of these species are not widespread in the Lake Superior region but are concentrated here in the vicinity of the City of Superior. In addition, Pokegama-Carnegie is the largest site, has the greatest floristic diversity, supports some of the largest populations of rare species, and may be less likely in the short-term to suffer destruction or fragmentation owing to expanded development, disrupted hydrology, or incursions of aggressive species. Additional habitat and rare species occur to the south in the county-owned portion of the SNA, which is not included in this analysis.

The large size of the site as well as the quality and diversity of open and shrub wetland types also support a diverse assemblage of birds including golden-winged warbler, American woodcock (*Scolopax minor*), as well as a rare animal. Common amphibians and birds found here include: wood frog (*Lithobates sylvatica*), spring peeper (*Pseudacris crucifer*), green frog (*Lithobates clamitans*), eastern gray tree frog (*Hyla versicolor*), American toad (*Anaxyrus americanus*), yellow warbler (*Setophaga petechial*), gray catbird (*Dumetella carolinensis*), alder flycatcher (*Empidonax alnorum*), white-throated sparrow (*Zonotrichia albicollis*), swamp sparrow, song sparrow (*Melospiza melodia*), sora rail, Virginia rail, common snipe (*Gallinago gallinago*), sharp-shinned hawk (*Accipiter striatus*), and common raven (*Corvus corax*). Small mammal surveys in 2013 captured meadow vole (*Microtus pennsylvanicus*) and ermine (*Mustela erminea*).

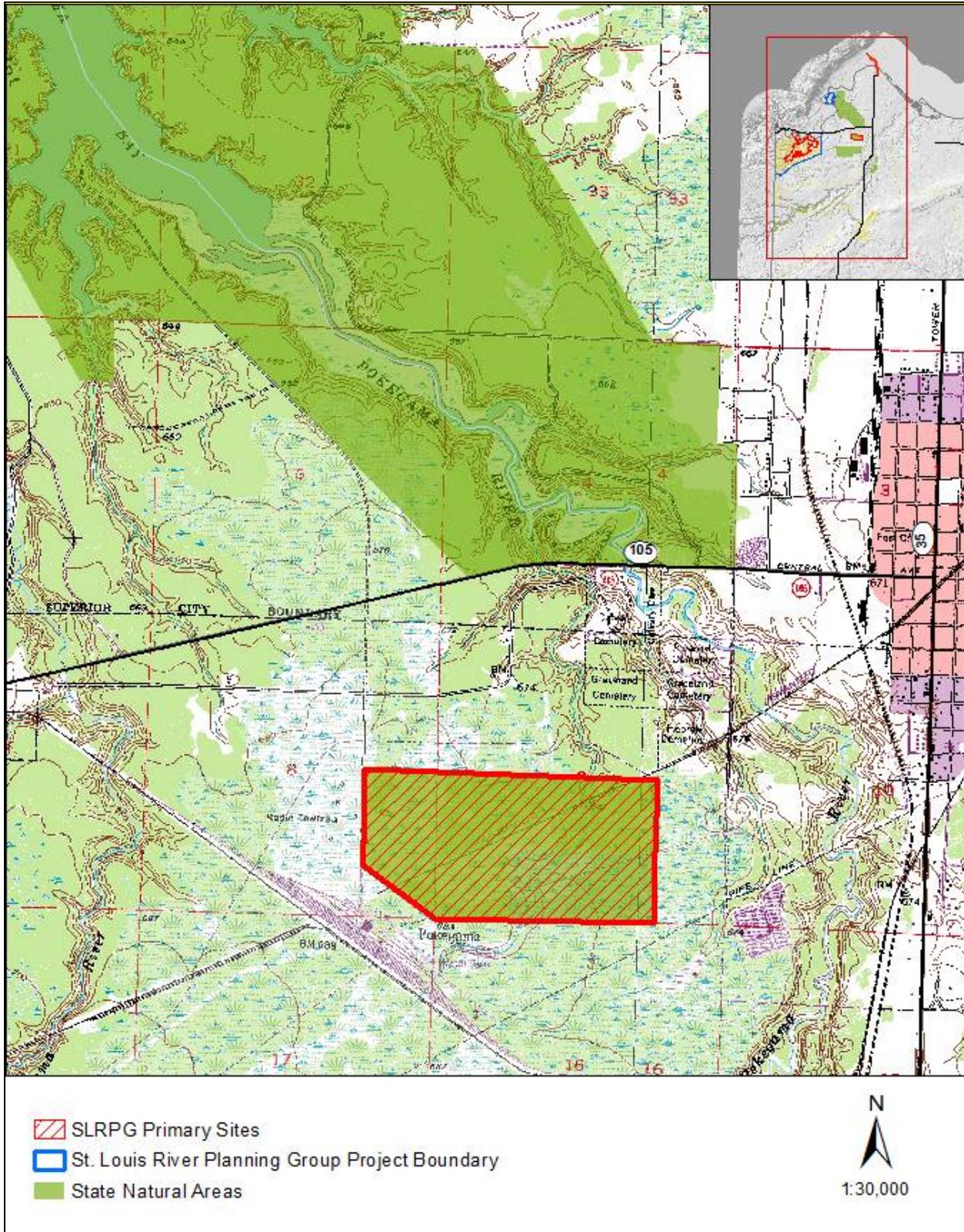
Management Considerations

The Primary Site is managed as a reserve for Tamarack (poor) Swamp, Alder Thicket, and Northern Sedge Meadow, as a Boreal Forest and wetland restoration site, as an aquatic reserve, and as a rare plant habitat site. The former forested wetland areas that were historically logged are being converted back to Boreal Forest through brushing and native tree planting. The sedge meadow is actively managed through

tree/shrub control using tree harvest, brushing and fire to mimic natural disturbance patterns. Rare plants are most often found in managed corridors; mowing of the corridor should enhance the rare plant populations.

Appropriate management and protection of this site is critically important. Study of the site's hydrology is needed, as several right-of-ways cross the wetland and may be having impacts which are not clearly understood. Several of these right-of-ways are currently managed via brush-cutting, which appears to be an effective and appropriate means of maintaining conditions to the liking of at least some of the rare plants. Examination of the original land survey notes, as well as historical and current aerial photographs, would be helpful in understanding changes in land use and vegetation composition and structure, which could have management implications. Invasive exotic species are not a problem at present, but should be looked for periodically. At least one of the corridors crossing this wetland carries petroleum. A spill could have a devastating impact on the biota.

**This appendix contains locational information on rare species and is for internal use only.



SLRPG04. Pokegama – Carnegie Wetlands State Natural Area Primary Site.

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SPECIES LIST

List of species referred to by common name in Appendix G.

Common Name	Scientific Name
Plants	
American fly honeysuckle	<i>Lonicera canadensis</i>
American stickseed	<i>Hackelia deflexa</i>
balsam fir	<i>Abies balsamea</i>
balsam poplar	<i>Populus balsamifera</i>
balsam willow	<i>Salix pyrifolia</i>
beaked hazelnut	<i>Corylus cornuta</i>
big-leaved aster	<i>Aster macrophyllus</i>
black ash	<i>Fraxinus nigra</i>
black currant	<i>Ribes americanum</i>
bluejoint grass	<i>Calamagrostis canadensis</i>
blue-bead lily	<i>Clintonia borealis</i>
box elder	<i>Acer negundo</i>
broad-leaved arrow-head	<i>Sagittaria latifolia</i>
bunchberry	<i>Cornus canadensis</i>
bur-reed	<i>Sparganium eurycarpum</i>
Canada mayflower	<i>Maianthemum canadense</i>
cattail	<i>Typha spp.</i>
chair-maker's rush	<i>Schoenoplectus pungens</i>
common buckthorn	<i>Rhamnus cathartica</i>
common pondweed	<i>Potamogeton natans</i>
common tansy	<i>Tanacetum vulgare</i>
coontail	<i>Ceratophyllum demersum</i>
false melic grass	<i>Schizachne purpurascens</i>
garden-heliotrope	<i>Valeriana officinalis</i>
green ash	<i>Fraxinus pensylvanica</i>
golden sedge	<i>Carex aurea</i>
lake sedge	<i>Carex lacustris</i>
liver-leaf wintergreen	<i>Pyrola asarifolia</i>
meadow sweet	<i>Spiraea alba</i>
narrow-leaved cattail	<i>Typha angustifolia</i>
mountain maple	<i>Acer spicatum</i>
nodding trillium	<i>Trillium cernuum</i>
northern bluebells	<i>Mertensia paniculata</i>
northern bush-honeysuckle	<i>Diervilla lonicera</i>
northern white-cedar	<i>Thuja occidentalis</i>
ostrich fern	<i>Matteuccia struthiopteris</i>
pagoda dogwood	<i>Cornus alternifolia</i>
pearly everlasting	<i>Anaphalis margaritacea</i>
purple clematis	<i>Clematis occidentalis</i>
purple loosestrife	<i>Lythrum salicaria</i>
pussy willow	<i>Salix discolor</i>
red oak	<i>Quercus rubra</i>
red pine	<i>Pinus resinosa</i>

Common Name	Scientific Name
red raspberry	<i>Rubus idaeus</i>
red-osier dogwood	<i>Cornus stolonifera</i>
reed canary grass	<i>Phalaris arundinacea</i>
Richardson's pondweed	<i>Potamogeton richardsonii</i>
sensitive fern	<i>Onoclea sensibilis</i>
sessile-fruited arrow-head	<i>Sagittaria rigida</i>
soft-stem bulrush	<i>Schoenoplectus tabernaemontani</i>
speckled alder	<i>Alnus incana</i>
starflower	<i>Trientalis borealis</i>
sugar maple	<i>Acer saccharum</i>
sweet flag	<i>Acorus calamus</i>
thimbleberry	<i>Rubus parviflorus</i>
trembling aspen	<i>Populus tremuloides</i>
tussock sedge	<i>Carex stricta</i>
waterweed	<i>Elodea canadensis</i>
white birch	<i>Betula papyrifera</i>
white pine	<i>Pinus strobus</i>
white spruce	<i>Picea glauca</i>
wild sarsaparilla	<i>Aralia nudicaulis</i>
wild celery	<i>Vallisneria americana</i>
wild rice	<i>Zizania aquatica</i>
wood anemone	<i>Anemone quinquefolia</i>
yellow birch	<i>Betula alleghaniensis</i>
yellow water lily	<i>Nuphar variegatum</i>

**This appendix contains locational information on rare species and is for internal use only.

Animals	
alder flycatcher	<i>Empidonax alnorum</i>
American toad	<i>Anaxyrus americanus</i>
American woodcock	<i>Scolopax minor</i>
bald eagle	<i>Haliaeetus leucocephalus</i>
black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>
blue-winged teal	<i>Anas discors</i>
Canada warbler	<i>Wilsonia canadensis</i>
common raven	<i>Corvus corax</i>
common snipe	<i>Gallinago gallinago</i>
common tern	<i>Sterna hirundo</i>
common yellowthroat	<i>Geothlypis trichas</i>
eastern gray treefrog	<i>Hyla versicolor</i>
ermine	<i>Mustela erminea</i>
golden-winged warbler	<i>Vermivora chrysoptera</i>
gray catbird	<i>Dumetella carolinensis</i>
green frog	<i>Lithobates clamitans</i>
least flycatcher	<i>Empidonax minimus</i>
marsh wren	<i>Cistothorus palustris</i>
meadow vole	<i>Microtus pennsylvanicus</i>
merlin	<i>Falco columbarius</i>
northern harrier	<i>Circus cyaneus</i>
red-winged blackbird	<i>Agelaius phoeniceus</i>
Sharp-shinned hawk	<i>Accipiter striatus</i>
song sparrow	<i>Melospiza melodia</i>
sora rail	<i>Porzana carolina</i>
spring peeper	<i>Pseudacris crucifer</i>
swamp sparrow	<i>Melospiza georgiana</i>
tundra swan	<i>Cygnus columbianus</i>
veery	<i>Catharus fuscescens</i>
Virginia rail	<i>Rallus limicola</i>
white pelican	<i>Pelecanus erythrorhynchos</i>
white-tail deer	<i>Odocoileus virginianus</i>
white-throated sparrow	<i>Zonotrichia albicollis</i>
wood frog	<i>Lithobates sylvatica</i>
wood thrush	<i>Hylocichla mustelina</i>
yellow-bellied flycatcher	<i>Empidonax flaviventris</i>
yellow warbler	<i>Setophaga petechia</i>