



Rapid Ecological Assessment for the Glacial Lake Grantsburg Planning Group

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

Properties included in this report are:

Amsterdam Sloughs Wildlife Area	Danbury Wildlife Area
Blomberg Lake State Natural Area	Fish Lake Meadow State Natural Area
Crex Meadows Wildlife Area	Fish Lake Pines State Natural Area
Crex Sand Prairie State Natural Area	Fish Lake Wildlife Area
	Reed Lake Meadow and Barrens State Natural Area

Wisconsin's Natural Heritage Inventory Program
Bureau of Endangered Resources
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Cover Photo: Wet meadow margin at Crex Meadows Wildlife Area. Photo by Barbara Delaney.

Table of Contents

Introduction	6
Purpose and Objectives.....	6
Overview of Methods	6
Background on Past Efforts	9
Special Management Designations	10
Regional Ecological Context	11
Northwest Sands Ecological Landscape	11
Regional Biodiversity Needs and Opportunities.....	13
Rare Species of the Northwest Sands Ecological Landscape	14
Description of the Study Area	15
Location and Size.....	15
Ecoregion	15
Physical Environment	18
Vegetation	19
Rare Species and High Quality Natural Communities of the Glacial Lake Grantsburg Planning Group	26
Management Considerations and Opportunities for Biodiversity Conservation... 29	
Large Wetlands	30
Prairie and Barrens.....	31
Migratory Birds.....	32
Ecological Priorities for SGCN	33
Natural Community Management Opportunities.....	33
Invasive Plants	33
Primary Sites: Site-specific Opportunities for Biodiversity Conservation..... 35	
Future Needs	36
Glossary.....	37
Species List	38
Reference List	42
Additional Resources	44

List of Figures

Figure 1. Location of Properties within the Glacial Lakes Grantsburg Planning Group.....	8
Figure 2. Ecological Landscapes of Wisconsin and the Study Area.....	11
Figure 3. Landtype Associations of the Study Area.....	17
Figure 4. Vegetation for the study area prior to Euro-American settlement.....	20
Figure 5. Cover types for the GLGPG from WISFIRS.....	24
Figure 6. Landcover for the GLGPG from the Wisconsin DNR Wiscland GIS coverage (WDNR 1993).....	25

List of Tables

Table 1. Major Natural Communities Management Opportunities in the Northwest Sands Ecological Landscape.....	13
Table 2. Listing Status for rare species in the Northwest Sands Ecological Landscape.....	14
Table 3. Documented rare species and high-quality natural communities for the Glacial Lake Grantsburg Planning Group.....	26

Appendices

A. Natural Heritage Inventory Methods Overview	
B. Map of Conservation Opportunity Areas for the Northwest Sands Ecological Landscape	
C. Documented rare species and high-quality natural communities for the Glacial Lake Grantsburg Planning Group listed by property (<i>internal version only</i>)	
D. Descriptions for Rare Species and High Quality Natural Communities Documented on the Glacial Lake Grantsburg Planning Group	
E. Glacial Lake Grantsburg Planning Group Species of Greatest Conservation Need	
F. Wisconsin Natural Heritage Working List Explanation	
G. Primary Sites within the Glacial Lake Grantsburg Planning Group (<i>internal version only</i>)	
H. Documented rare species and high-quality natural communities for the Glacial Lake Grantsburg Planning Group listed by primary site. (<i>internal version only</i>)	

The Glacial Lake Grantsburg Planning Group At a Glance

Exceptional Characteristics of the Study Area

- **Rare Animals and Plants.** The diverse habitats of the Glacial Lakes Grantsburg Planning Group (GLGPG) support numerous rare species. Seventy-one rare animal species are known from the GLGPG, including two State Endangered, four State Threatened, and 65 Special Concern species. Two animal species are Federally Endangered. Sixteen rare plant species are known from the GLGPG, including one State Endangered, one State Threatened, and 14 Special Concern species.
- **Large Wetlands.** The large wetlands of the GLGPG provide important habitat for rare species, including birds and amphibians. A large majority of the impressive diversity of rare birds found on the GLGPG is due to this abundance of large, high-quality wetland habitats. In addition, their connection to the open upland grasslands and barrens makes this one of the premiere open landscapes in the entire state for birds. The importance of this landscape scale concept for preserving biodiversity holds true for other taxa as well, including reptiles, insects (including moths and butterflies), and mammals.
- **Prairies and Barrens.** The barrens habitats provide a substantial proportion of the remaining large barrens habitat patches in northwestern Wisconsin. These remnants of the globally rare barrens natural communities are critical to the long-term survival of many species.
- **Migratory Birds.** The diversity of habitats on the GLGPG, from large wetlands and flowages to brush prairie, oak barrens, and pine and oak forests offer important resources for numerous bird groups. Large numbers of individuals from many species accumulate here during migration because these areas offer food, water, and shelter, the most important resources to migrating birds.

Site Specific Opportunities for Biodiversity Conservation

Five ecologically important sites were identified on the GLGPG. 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.

- **Crex Meadows Wildlife Area.** This very large primary site encompasses the majority of Crex Meadows Wildlife Area, including Crex Sand Prairie State Natural Area and Reed Lake Meadow and Barrens State Natural Area. This site provides significant wetland habitat for large populations of breeding and migrating birds.
- **Amsterdam Sloughs Sedge Meadow.** This site is dominated by a Northern Sedge Meadow wetland complex on glacial, water-washed plain. This large, wiregrass sedge-dominated site diversifies the habitat within the GLGPG and provides habitat for several declining bird assemblages.
- **Blomberg Lake and Woods.** This site, in the southwest part of Amsterdam Sloughs Wildlife Area contains Blomberg Lake State Natural Area. Uncommon forest and wetland types, including Ephemeral Ponds, Northern Mesic Forest, and forested wetlands, increase the biodiversity of the GLGPG.
- **Fish Lake Northern Dry-mesic Forest.** This site contains the largest stand of mature Northern Dry-mesic Forest on Fish Lake Wildlife Area and provides habitat for forest interior birds.
- **Fish Lake Meadows, Prairies, and Forests.** This site, in Fish Lake Wildlife Area, includes Fish Lake Meadow and Fish Lake Pines State Natural Areas. This site provides landscape level connectivity between large meadows and brush prairies.

Introduction

Purpose and Objectives

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

- Amsterdam Sloughs Wildlife Area
- Blomberg Lake State Natural Area
- Crex Meadows Wildlife Area
- Crex Sand Prairie State Natural Area
- Danbury Wildlife Area
- Fish Lake Meadow State Natural Area
- Fish Lake Pines State Natural Area
- Fish Lake Wildlife Area
- Reed Lake Meadow and Barrens State Natural Area

The primary objectives of this project were to collect biological inventory information relevant to the development of a master plan for the GLGPG 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 GLGPG 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.

Overview of Methods

The Wisconsin Natural Heritage Inventory (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 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 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*).

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.

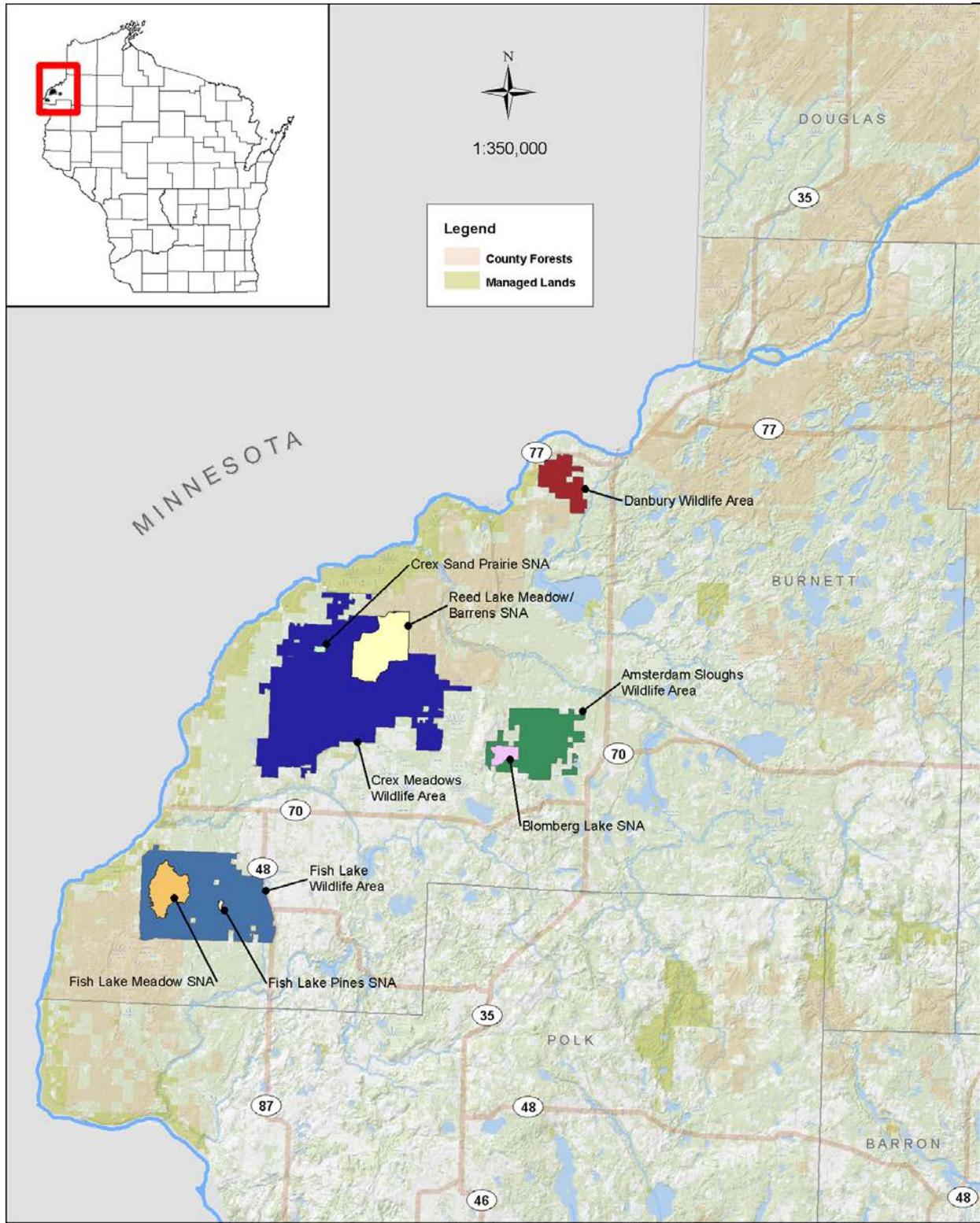
Existing NHI data are often the starting point for conducting a biotic inventory to support master planning. Prior to this project, NHI data for the GLGPG were limited to: 1) the Statewide Natural Area Inventory, a county-by-county effort conducted by WDNR's Bureaus of Research and Endangered Resources between 1969 and 1984 that focused on natural communities but include some surveys for rare plants and animals, 2) breeding bird surveys on State Natural Areas, 3) surveys conducted for the *Biodiversity in Selected Natural Communities Related to Global Climate Change* (Peatlands Project; Anderson et al. 2008), and 4) taxa specific surveys.

The most recent taxa-specific field surveys for the study area were conducted during 2010. Surveys were limited in scope and focused on documenting high quality natural communities, rare plants, breeding birds, herptiles, and, for some properties, aquatic and terrestrial invertebrates. The collective results from all of these surveys were used, along with other information, to identify ecologically important areas (Primary Sites) on the GLGPG.

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 GLGPG, key inventory considerations included the identification of high quality barrens, forests, and wetland communities and the location of habitats that had the potential to support rare species. Private lands surrounding the GLGPG were not surveyed.

Scientific names for all species mentioned in the text are included in a list on page 38.

Figure 1. Location of Properties within the Glacial Lake Grantsburg Planning Group



Background on Past Efforts

Various large-scale research and planning efforts have identified a number of locations within the GLGPG as being ecologically significant. The following are examples of such projects and the significant features identified.

Land Legacy Report

The Land Legacy Report (WDNR 2006a) was designed to identify Wisconsin's most important conservation and recreation needs for the next 50 years. The Danbury to Sterling Corridor (including all of the properties within this group) was identified as important for waterfowl and shorebirds using the large and high-quality wetlands, sharp-tailed grouse (*Tympanuchus phasianellus*), and the Federally Endangered karner blue butterfly (*Lycaeides melissa samuelis*). Crex Meadows was also recognized as an important site for its diverse habitats that support wildlife populations. Both sites were assigned a score of five points on their five-point scale, meaning it possesses "outstanding ecological qualities, is of adequate size to meet the needs of the critical components, and/or harbors natural communities or species of global or continental significance" (WDNR 2006a).

Important Bird Area

Important Bird Areas (IBA; WDNR 2007) are critical sites for the conservation and management of Wisconsin's birds.

- The Fish Lake Wetlands and Barrens IBA includes Fish Lake Wildlife Area and Fish Lake Meadow and Fish Lake Pines State Natural Areas and was recognized for its importance to sedge meadow bird species and potential for Pine Barrens restoration.
- Crex Meadows Wildlife Area was recognized as an IBA because it contains critical habitat for a number of priority bird species. It is also an important concentration area in the spring and fall for waterfowl, shorebirds, and waterbirds.

Wisconsin Wildlife Action Plan: Conservation Opportunity Areas

The Wisconsin Wildlife Action Plan (WAP; WDNR 2006b) recognized six Conservation Opportunity Areas (COA) within the GLGPG (see Appendix B). Conservation Opportunity Areas are places in Wisconsin that contain 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 Amsterdam Sloughs, Crex, and Fish Lake COAs were recognized because of their large sedge meadows, fens, and prairies.
- The Crex Barrens and Wetlands and Fish Lake Barrens and Wetlands COAs were recognized because of the pine-oak barrens present.
- The St. Croix Ridge COA was recognized because of the medium-sized river systems and adjacent terrace communities present.

The Nature Conservancy's Superior Mixed Forest Ecoregion Conservation Plan

The Nature Conservancy's (TNC) Superior Mixed Forest Ecoregion Conservation Plan (TNC 2002) covers an area that encompasses much of northern Wisconsin, northern Minnesota, a small portion of Michigan's Upper Peninsula, and parts of southern Manitoba and southern Ontario. The plan resulted in a set of terrestrial and aquatic "Conservation Areas" that represent viable natural community types, globally rare native species, and other selected features.

The GLGPG is included within the Fish Lake / Crex Meadows Conservation Area. This site is over 139,000 acres and corresponds roughly with the 212Ka01 (Grantsburg Dunes) Landtype Association, surrounding numerous state, county, and private ownerships in western Burnett and northwest Polk counties.

Wisconsin Wetland Association Wetland Gems

The GLGPG was recognized by the Wisconsin Wetlands Association (WWA) as having several “wetland gems” (WWA 2010). These habitats are critically important to Wisconsin’s biodiversity, provide nearby communities with valuable functions and services, and serve as recreational and educational opportunities.

- The Blomberg Lake Wetland Gem is within Amsterdam Sloughs Wildlife Area and Blomberg Lake State Natural Area. This area has high quality wetlands that provide exceptional wildlife habitats for a variety of birds, amphibians, and mammals.
- The Crex Meadows and Rice Lake Wetland Gem has thousands of acres of wetlands that provide habitat for over 270 species of birds, and a variety of reptiles, amphibians, and invertebrates.
- The Fish Lake Meadow Wetland Gem comprises several thousand acres of wetlands within Fish Lake Wildlife Area and Fish Lake Meadow State Natural Area. There is a diversity of wetland types at this site that provide habitat to and abundance of wildlife.

Grassland Bird Habitat Management

The Crex Meadows / Fish Lake Complex was recognized as a Priority Landscape for Grassland Bird Management (Sample and Mossman 1997) because it contains the most permanently managed grassland habitat in the state. The report noted that coordination of planning and management for habitats including prairies, sedge meadows, surrogate grasslands, upland shrub, savannas, and closed forests should be explored.

Forest Certification

All DNR-managed lands, including state parks, wildlife areas, and natural areas, 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 forestlands, supporting economic activities, protecting wildlife habitat, and providing recreational opportunities.

Special Management Designations

State Natural Areas 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. State Natural Areas within the GLGPG are:

- Blomberg Lake State Natural Area
- Crex Sand Prairie State Natural Area
- Fish Lake Meadow State Natural Area
- Fish Lake Pines State Natural Area
- Reed Lake Meadow and Barrens State Natural Area

Regional Ecological Context

Northwest Sands Ecological Landscape

This section is largely reproduced from the Ecological Landscapes of Wisconsin Handbook (WDNR In Prep.). This Handbook, being developed by the WDNR Ecosystem Management Planning Team (EMPT), identifies the best areas of the state to manage for natural communities, key habitats, aquatic features, native plants, and native animals from an ecological perspective. The Ecological Landscapes of Wisconsin Handbook describes 16 Ecological Landscapes in Wisconsin

The majority of the GLGPG is located in the Northwest Sands Ecological Landscape (WDNR In Prep.) (Figure 2). Small amounts of the study area are located in the Northwest Lowlands and Forest Transition Ecological Landscapes. The Northwest Sands Ecological Landscape is a large glacial outwash system in northwest Wisconsin. Major landforms of the landscape include flat plains or terraces along glacial meltwater channels, and pitted or "collapsed" outwash plains containing kettle lakes. Soils are predominantly deep sands, low in organic material and nutrients.

Historic vegetation for the Northwest Sands Ecological Landscape at the time of the General Land Office survey was predominantly jack pine (*Pinus banksiana*) and scrub oak (*Quercus spp.*) forest and barrens. Eastern white pine (*Pinus strobus*) and red pine (*Pinus resinosa*) forests were also a sizable component of the Ecological Landscape. Numerous barrens occurred in the southwest half, the portion where the GLCPG is now located, and a few large barrens within the northeast half. Most of the trees in the barrens were jack pine, but red pine savannas were present and oak savannas occurred in the south central section.

Current vegetation is a mix of forest, agriculture, grassland and barrens, with some wetlands in the river valleys. Within the forested portion, pine (*Pinus sp.*), aspen (*Populus sp.*), birch (*Betula sp.*) and oak (*Quercus sp.*) are equally dominant. The maple (*Acer sp.*), basswood (*Tilia americana*), spruce (*Picea sp.*), fir (*Abies sp.*), and lowland hardwood forest type groups occupy small percentages. Within the open lands, there is a relatively large proportion of grassland and shrubland, a small but significant amount of emergent/wet meadow and open water in the southern part of the Northwest Sands, and very little row-crop agriculture.

Several hundred kettle lakes occur in the pitted outwash plain. The headwaters of the St. Croix-Namekagon and Brule River systems are located here amid flat plains, sedge

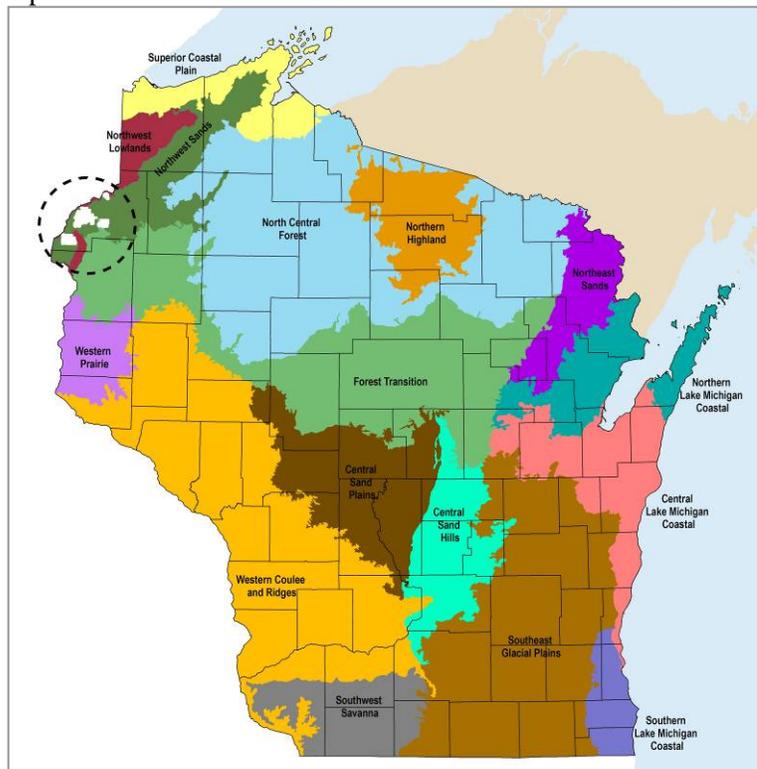


Figure 2. Ecological Landscapes of Wisconsin and the study area.

meadows, bog complexes, and major barrens. Water quality in seepage lakes is generally very good. Groundwater conditions are among the least polluted yet most vulnerable in the state.



Lake margin on floating sphagnum/shrub mat surrounding small lake northwest of Blomberg Lake. Within the Blomberg Lake and Woods Primary Site. Photo by Barbara Delaney.

Regional Biodiversity Needs and Opportunities

Opportunities for sustaining natural communities in the Northwest Sands Ecological Landscape were developed by the Ecosystem Management Planning Team (EMPT 2007) and later presented in the Wisconsin Wildlife Action Plan (WDNR 2006b). The goal of sustaining natural communities is to manage for natural community types that 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 the Northwest Sands Ecological Landscape.

There are management opportunities for 26 natural communities in the Northwest Sands Ecological Landscape. Of these, 16 are considered “major” opportunities (Table 1). A “major” opportunity indicates that the natural communities can be sustained in the Ecological Landscape, either because many significant occurrences of the natural community have been recorded in the landscape or major restoration activities are likely to be successful in maintaining the community’s composition, structure, and ecological function over a longer period of time. An additional five natural communities are considered “important” in this landscape. An “important” opportunity indicates that although the natural community does not occur extensively or commonly in the Ecological Landscape, one to several occurrences are present and are important in sustaining the community in the state. In some cases, important opportunities may exist because the natural community may be restricted to just one or a few Ecological Landscapes within the state and there may be a lack of opportunities elsewhere.

Table 1. Major Natural Communities Management Opportunities in the Northwest Sands Ecological Landscape (EMPT 2007 and WDNR 2006b)

Coldwater streams	Inland Beach	Northern Sedge Meadow	Pine Barrens
Coolwater streams	Inland lakes	Northern Wet Forest	Submergent Marsh
Emergent Marsh	Northern Dry Forest	Oak Barrens	Surrogate
Emergent Marsh - Wild Rice	Northern Dry-mesic Forest	Open Bog*	Grasslands*
			Warmwater rivers

*Natural Communities that were listed in the Wisconsin Wildlife Action Plan only.

Rare Species of the Northwest Sands Ecological Landscape

Numerous rare species are known from the Northwest Sands Ecological Landscape. “Rare” species include all of those species that appear on the WDNR’s NHI Working List (*Wisconsin Natural Heritage Working List*) classified as “Endangered,” “Threatened,” or “Special Concern.” Table 2 lists the number of species known to occur in the Northwest Sands Ecological Landscape based on information stored in the NHI database as of April 2010.

Table 2. Listing Status for rare species in the Northwest Sands Ecological Landscape as of 2009. Source is the NHI database.

Listing Status	Birds	Fishes	Herptiles	Invertebrates	Mammals	Plants	Total Fauna	Total Flora	Total Rare
WI Endangered	1	0	0	3	0	4	4	4	8
WI Threatened	5	3	2	1	0	9	11	9	20
WI Special Concern	22	3	5	40	4	33	74	33	107
U.S. Endangered	1	0	0	1	1	0	3	0	3
U.S. Threatened	0	0	0	0	0	0	0	0	0
U.S. Candidate	0	0	0	0	0	0	0	0	0

The Wisconsin Wildlife Action Plan denoted Species of Greatest Conservation Need (SGCN). 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 42 vertebrate SGCN significantly associated with the Northwest Sands Ecological Landscape (See Appendix E). This means that the species is (and/or historically was) significantly associated with the Ecological Landscape, and restoration of natural communities this species is associated with in the Ecological Landscape would significantly improve conditions for the species.

Description of the Study Area

Location and Size

The GLGPG is a cluster of Wildlife Areas located in Burnett county (Figure 1). Comprising ca. 49,900 acres, the properties occur within the St. Croix River basin.

Properties included in the GLGPG are:

- **Amsterdam Sloughs Wildlife Area** (6,138 acres), containing **Blomberg Lake State Natural Area**, is located in south-central Burnett County between the Clam and Wood rivers about one mile northwest of the town of Siren.
- **Crex Meadows Wildlife Area** (28,079 acres), containing **Crex Sand Prairie State Natural Area** and **Reed Lake Meadow and Barrens State Natural Area**, is located in west-central Burnett County between the Clam and Wood rivers, just north of the town of Grantsburg.
- **Danbury Wildlife Area** (2,245 acres) is located in northwest Burnett County at the north end of Governor Knowles State Forest, about 6 miles northwest of the town of Webster along STH 77.
- **Fish Lake Wildlife Area** (13,438), containing **Fish Lake Meadow State Natural Area** and **Fish Lake Pines State Natural Area**, is located in southwest Burnett County along the North Fork Trade River and south of the Wood River about two miles southwest of the town of Grantsburg along STHs 48 and 87.

Ecoregion

From the NHFEU, the Bayfield Sand Plains Subsection covers most of the GLGPG, and the St. Croix Moraine Subsection and the Mille Lacs Uplands Subsections covering small amounts of the study areas. Seven Landtype Associations (LTA; Figure 3) are present within the study area. Landtype Associations represent an area of 10,000 – 300,000 acres and contain similarities of landform, soil, and vegetation.

The following Landtype Associations are within the study area:

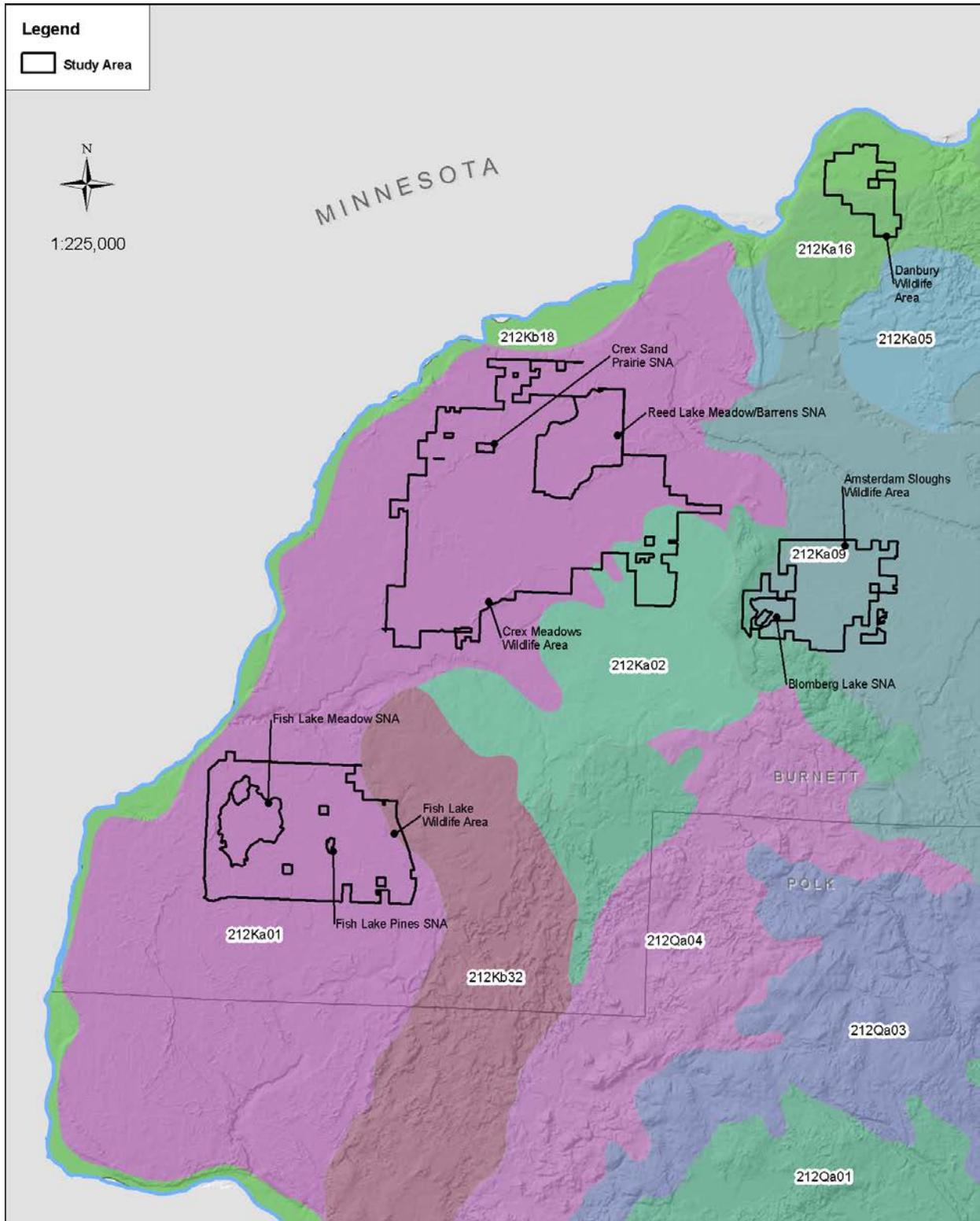
- **Grantsburg Dunes (212Ka01)**. The characteristic landform pattern is undulating outwash plain with dunes, marshes, and swamps common. Soils are predominantly excessively drained fine sand over outwash. This LTA comprises 78% of the GLGPG.
- **Siren Plains (212Ka09)**. The characteristic landform pattern is undulating outwash plain and lake plain complex. Soils are predominantly moderately well drained sand over outwash or clayey lacustrine. This LTA comprises 11% of the GLGPG.
- **Grantsburg Lake Plain (212Ka02)**. The characteristic landform pattern is nearly level lake plain with common sand ridges. Soils are predominantly poorly drained clay loam over calcareous clayey lacustrine. This LTA comprises 4% of the GLGPG.
- **St. Croix Plains (212Kb18)**. The characteristic landform pattern is undulating outwash plain and outwash-veneered moraine. Soils are predominantly excessively drained sand over acid sandy loam till or outwash. This LTA comprises 3% of the GLGPG.
- **Danbury-Trego Plains (212Ka16)**. The characteristic landform pattern is undulating outwash plain with fans and stream terraces common. Soils are predominantly excessively drained sand over acid sand outwash. This LTA comprises 2% of the GLGPG.
- **Almelund Moraine (212Kb32)**. The characteristic landform pattern is rolling collapsed moraine with scattered lake plains. Soils are predominantly moderately well drained fine sandy loam over calcareous sandy loam till. This LTA comprises 1% of the GLGPG.

- **Late St. Croix Moraines (212Qa01).** The characteristic landform pattern is rolling collapsed moraine interlaced with outwash terraces and intermixed with ice-walled lake plains. Soils are predominantly moderately well drained sandy loam over dense, acid sandy loam till. This LTA comprises 1% of the GLGPG.



View of Dike 6 Flowage in Crex Meadows Wildlife Area. Photo by Barbara Delaney.

Figure 3. Landtype Associations for the area comprising the Glacial Lake Grantsburg Planning Group.



Physical Environment

Geology and Geography

Based on general broad-scale bedrock maps, the GLGPG overlies Cambrian sandstone (Vogl 1964). Bedrock is between 50 and 100 feet from surface throughout and is primarily covered with sand and gravel deposits and peat.

The level topography of the GLGPG is the result of glacial activity and specifically the many glacial lakes that occupied this area. Glacial Lake Grantsburg existed in most of Burnett County about 14,000 years ago. Lake Grantsburg formed when a sublobe of the large Des Moines Lobe in Minnesota blocked the St. Croix Valley and impounded glacial meltwater. When the glacial lake drained about 12,300 years ago, much of the lacustrine surface was eroded or buried when outwash from Glacial Lake Superior flowed through the St. Croix Valley. This resulted in terraces close to the river and a thin layer of outwash covering the original lakebed further from the spillway. Another glacial lake, Lake Lind, existed at an even earlier stage and deposited the lacustrine materials that underlie parts of the GLGPG.

Soils

GLGPG soil drainage classes range from very poorly drained (the most extensive class at 33% of the property acreage) to moderately well drained (12% of the GLGPG). There are 72 different soil map units found within the GLGPG boundaries.

Lacustrine deposits from Glacial Lake Grantsburg impeded drainage and developed the hydric muck soils that dominate the large wetlands on the properties. The hydric muck soils vary from very deep, over 80 inches, to a thin layer that overlays the clay- and silt-textured lakebed that remains.

The low sand hills scattered over the area were produced as the waters of the glacial lake receded and wind action occurred on the exposed beach lines and bare tracts and built up low dunes.(Vogl 1964). The soils in these areas are deep sand, greater than 60 inches deep.

Hydrology

All of the GLGPG is within the Mississippi River basin and the Trade River, Wood River, Clam River, and Yellow River (Burnett Co.) watersheds. The flat topography and impeded drainage has resulted in an abundance of large wetlands. Dikes and water control structures within the study area flood thousands of acres of wetlands. Potholes have also been dug to function as breeding ponds for wildlife.

There are seven natural lakes within the GLGPG: Blomberg, Buggert, Fish, Fuhrman, Little Doctor, Reeds, Rices, and Zalesky Pond. Blomberg Lake is a 68-acre shallow, seepage lake. The shallow lake (4 foot maximum depth) supports only a few aquatic plants including white (*Nymphaea odorata*) and yellow water-lily (*Nuphar advena*), and large-leaved pondweed (*Potamogeton amplifolius*). Fish Lake (Amsterdam Sloughs Wildlife Area) is a 175-acre seepage lake with a sand and muck bottom. Rices and Reeds are permanent open waters without emergent aquatic plant species. Buggert and Fuhrman have abundant emergent aquatic species.

Two streams, Logging Creek and North Fork Trade River, flow through Fish Lake Wildlife Area, where they are dammed to create flowages, and then flow south into the Trade River and eventually the St. Croix River.

Waters in the GLGPG that flow into the Wood River, a warm water stream that drains into the St. Croix River, are: Hay Creek, Whiskey Creek, ditches, flowages, and several unnamed creeks.

The headwaters of Black Brook, a warm water stream that feeds the Clam River and eventually the St. Croix River, are in Amsterdam Sloughs Wildlife Area.

Vegetation

Historic Vegetation

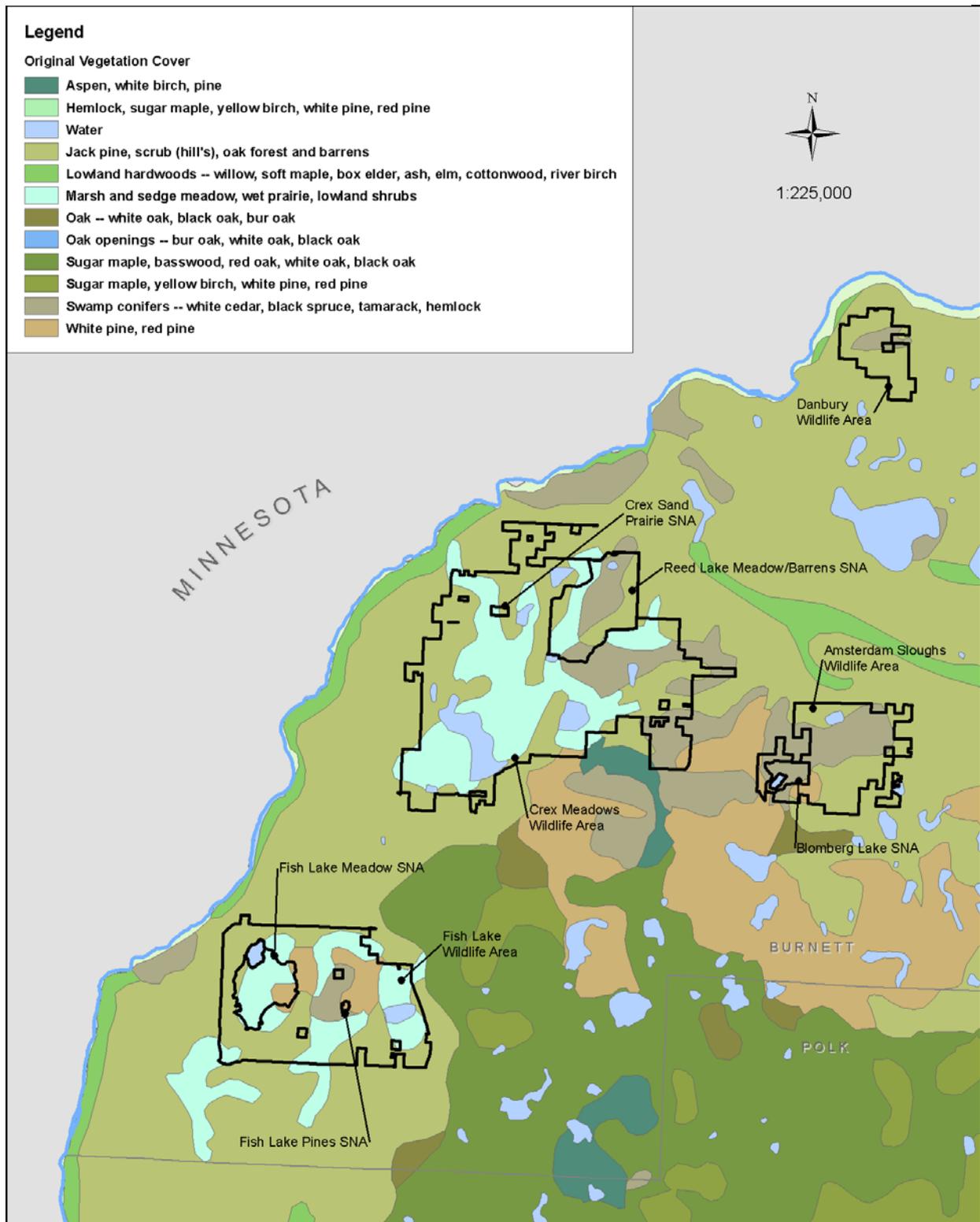
All of the properties of the GLGPG, except Fish Lake Wildlife Area, are located north of the tension zone, a zone that separates two floristic provinces, the prairie-forest province and the northern hardwoods province (Curtis 1959). Fish Lake Wildlife Area is located with the tension zone. Many species are found at their range limits within the tension zone, i.e., the southern limits of many northern species and the northern limits of many southern species.

Data from the original Public Land Surveys are often used to infer forest composition and tree species dominance for large areas in Wisconsin prior to widespread Euro-American settlement. 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 (for example, by constructing dams, or suppressing fires). Although data are limited to a specific snapshot in time, they provide valuable insights into Wisconsin's ecological capabilities. 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.). Public Land Surveys for the area comprising the GLGPG were conducted between 1851 and 1855.

Finley's (1976) Pre-settlement Vegetation map (Figure 4) identifies the uplands of the GLGPG as jack pine, scrub (northern pin) oak forest, and barrens. The GLGPG was located at the western edge of the largest expanse of barrens in the state corresponding to the current location of the Northwest Sands Ecological Landscape. Also present in the uplands were forests of white and red pine, aspen, and white birch (*Betula papyrifera*). The wetlands were dominated by marsh and sedge meadow, wet prairie, and lowland shrubs. Swamp conifers, including northern white-cedar (*Thuja occidentalis*), black spruce (*Picea mariana*), tamarack (*Larix laricina*), and hemlock (*Tsuga canadensis*), were present on each property.

Vogl (1964) concluded that at Crex Meadows Wildlife Area, Public Land Survey records indicate that at the time of the survey, the uplands were dominated by a jack pine savanna consisting of large open-grown trees scattered across a level to rolling landscape with even fewer large red pines towering above them. Oak grubs, small bushes, were common and the result of repeated fires. The lowlands at Crex Meadows Wildlife Area were mainly wet open marshes dominated by sedges (*Carex sp.*). Tamarack occurred in the eastern part of the property indicating that some of the lowland was wooded. A few black spruce were recorded with the tamarack.

Figure 3. Vegetation for the study area prior to Euro-American settlement. Data are from Finley (1976).



Current Vegetation

Current vegetation of the GLGPG has been influenced by many historical factors including grazing, homesteads, unsustainable logging during the “cutover” period, and wildfires; as well as current factors including fire suppression, invasive species, ecological restoration, and hydrological manipulation; and environmental factors including geology, soils, hydrology, and climate.

Forest Reconnaissance data for the GLGPG (Figure 5) shows the result of many years of management to decrease forest cover in favor of more open types. A decrease in forested wetlands is likely the result of early timber cutting and hydrological manipulation. Jack pine, once a more common component of the barrens landscape of the GLGPG has also declined significantly.

The GLGPG is at the eastern edge of the forests, barrens, and wetlands of the St. Croix River Valley. East of the GLGPG, the landscape is dominated by agriculture with scattered lakes, wetlands, and forests (Figure 6).

Amsterdam Sloughs Wildlife Area

The highest quality natural communities at Amsterdam Wildlife Area are within the wetland complexes and include Northern Sedge Meadow and Tamarack (poor) Swamp.

Northern Sedge Meadow quality is variable with the highest-quality examples being large in size and having a diverse herbaceous layer dominated by common tussock sedge (*Carex stricta*), fen star sedge (*C. sterilis*), other broad leaf sedges (*Carex spp.*), swamp loosestrife (*Lysimachia thyrsiflora*), marsh fern (*Thelypteris palustris*), spotted Joe-Pye-weed (*Eupatorium maculatum*), horsetail (*Equisetum spp.*), swamp milkweed (*Asclepias incarnata*), tall cotton-grass (*Eriophorum viridi-carinatum*), and marsh marigold (*Caltha palustris*). Shrubby areas are present with willow (*Salix spp.*), speckled alder (*Alnus incana*), bog birch (*Betula pumila*), and bridal-wreath (*Spiraea spp.*). Low-quality areas are dominated by reed canary grass (*Phalaris arundinacea*) with common reed grass (*Phragmites australis*) is also present.

Tamarack (poor) Swamps are minerotrophic, have a canopy dominated by tamarack with red maple (*Acer rubrum*) and a shrub layer of speckled alder. They are generally of good quality. The understory varies locally, from Labrador-tea (*Ledum groenlandicum*) to three-fruited sedge (*Carex trisperma*), to speckled alder. Sphagnum and other mosses cover woody-peat hummocks with abundant cinnamon fern (*Osmunda cinnamomea*) and royal fern (*O. regalis*).

Around Blomberg Lake and a small, un-named lake is a narrow floating peat mat with a narrow rim of tamarack, black spruce, speckled alder, and bog birch with varying densities over sphagnum moss, cranberry (*Vaccinium sp.*), tawny cotton-grass (*Eriophorum virginicum*), pod-grass (*Scheuchzeria palustris*), and three-way sedge (*Dulichium arundinaceum*).

Northern Mesic Forests at Amsterdam Sloughs are rare and the best-quality example consists of 90% canopy cover of sugar maple (*Acer saccharum*) and red maple, with lesser amounts of northern red oak (*Quercus rubra*), white oak (*Quercus alba*), basswood, bigtooth aspen (*Populus grandidentata*), and white birch. All canopy trees are 4 – 18 in. diameter at breast height (dbh). The understory is quite open and dominated by hop-hornbeam (*Ostrya virginiana*) and red maple saplings, with occasional Hill’s oak (*Quercus ellipsoidalis*) and northern red oak saplings. The ground layer has areas of Pennsylvania sedge (*Carex pennsylvanica*), round-lobed hepatica (*Anemone americana*), bracken fern (*Pteridium aquilinum*), maidenhair fern (*Adiantum pedatum*), black snakeroot (*Sanicula marilandica*), bottlebrush grass (*Elymus hystrix*), hairy sweet cicely (*Osmorhiza claytonii*), and blueberry (*Vaccinium sp.*). Scarce amounts of coarse and fine woody debris are present and very old tip up mounds are common. Ephemeral ponds are

scattered, with standing water resulting from late season rain. The ponds are dominated by broad leaf sedges; some ponds have speckled alder and black ash (*Fraxinus nigra*) also.

Crex Meadows Wildlife Area

Northern Sedge Meadows, pine-oak barrens, Northern Dry Forests, and Northern Dry-mesic Forests are the highest-quality natural communities at Crex Meadows Wildlife Area.

Northern Sedge Meadows are generally dominated by woolly-fruit sedge (*Carex lasiocarpa*), few-seeded sedge (*C. oligosperma*), and blue-joint grass (*Calamagrostis canadensis*) with a Sphagnum groundlayer. These areas appear to have contained more peat in the past with recent droughts and possible past disturbances resulting in less peat and a more uniform cover of sedges. Wetland edges are diverse and may have prairie willow (*Salix humilis*), slender willow (*S. petiolaris*), early low blueberry (*Vaccinium angustifolium*), leather-leaf (*Chamaedaphne calyculata*), steplebush (*Spiraea tomentosa*), and black chokeberry (*Aronia melanocarpa*).

The pine-oak barrens is better described as brush prairie and is not currently well-represented by an NHI natural community type. The barrens/brush prairie vegetation that is being managed is generally a continuum from open and brush/oak grub dominated to oak savanna to oak woodland. The brush prairie is generally characterized by Hill's oak grubs over a sand prairie understory. Another open variant is a low shrub dominated area of early low blueberry, sweet-fern (*Comptonia peregrina*), and bracken fern. The oak savanna has scattered Hill's oak trees (9-15 in. dbh) with about 10% canopy cover, oak brush about 20% cover, and shrub patches of New Jersey tea (*Ceanothus americanus*), American hazelnut (*Corylus americana*), prairie willow, and sand cherry (*Prunus pumila*). Herbs within the oak savanna generally include little blue-stem (*Schizachyrium scoparium*), June grass (*Koeleria macrantha*), prairie goldenrod (*Solidago ptarmicoides*), rough blazing-star (*Liatris aspera*), western sunflower (*Helianthus occidentalis*), and wild lupine (*Lupinus perennis*). The oak woodland type generally has 80% canopy cover of Hill's oak (9-15 in. dbh), thickets of American hazelnut, and a Pennsylvania sedge-dominated understory.

Northern Dry Forests, currently not common at Crex Meadows Wildlife Area, are important in the continuum from open prairie to closed-canopy forest. The best examples are dominated by jack pine and Hill's oak with about 80% tree cover. Other species present include prairie tickseed (*Coreopsis palmata*), wood-betony (*Pedicularis canadensis*), Pennsylvania sedge, American hazelnut, and wood anemone (*Anemone quinquefolia*). Prairie plants are present in openings and along trails.

Northern Dry-mesic Forests are rare at Crex Meadows Wildlife Area and the best example has variable quality and patchy composition from past cutting, although native species dominate. Forested swales and other wetlands are present within the forest. Canopy gaps are dominated by Pennsylvania sedge and early low blueberry.

Danbury Wildlife Area

The highest quality natural communities types at Danbury Wildlife Area are represented by wetlands, including Alder Swamps and Hardwood Forests, and upland forests, including pine-oak barrens.

The Alder Swamp present is a unique variant that is currently not recognized in the NHI classification system, but which Wisconsin's Wildlife Action Plan notes as a Natural Community with Information Needs (WDNR 2006b). This large wetland complex is dominated by bog birch and speckled alder with open areas dominated by common lake sedge (*Carex lacustris*) with common yellow lake sedge (*Carex utriculata*) and sphagnum patches. This complex also includes upland rises with bur oak (*Quercus macrocarpa*), red maple, trembling aspen (*Populus tremuloides*) and small groves of tamarack on woody peat.

The forested wetlands present are also unique in that the variants present are generally restricted to the St. Croix River Valley. These wetlands are present on low river terraces and in glacial meltwater spillways. Small canopy gaps are common and wet swales are frequent. Canopy trees are bur oak, red maple, trembling aspen, basswood, balsam fir (*Abies balsamea*), and black ash. These areas have been impacted by timber cutting resulting in dense aspen regeneration.

Also present on low terraces in the St. Croix River Valley is a distinct hardwood swamp type and tamarack swamp. Much of this community type has been altered by cutting of oak and aspen. Some water seepage is present at the toe of the adjacent upland sand plain.

Pine-oak barrens are present, although even the best examples are succeeding to closed-canopy forest and the invasive leafy spurge (*Euphorbia esula*) is common. Canopy cover and structure varies with some areas having a savanna-like canopy of 20 - 30% cover of Hill's oak and jack pine. Openings within these areas may be dominated by dense patches of American hazelnut and prairie willow, early low blueberry, prairie plants, including big blue-stem (*Andropogon gerardii*), showy goldenrod (*Solidago speciosa*), and wild lupine; and leafy spurge. Low swales within the barrens are forested with trembling aspen.

Fish Lake Wildlife Area

The highest quality natural communities at Fish Lake Wildlife Area are Northern Sedge Meadows, Oak Barrens, and Northern Dry-mesic Forests.

Good quality Northern Dry-mesic Forests are characterized by a canopy of Hill's oak, white pine, and red maple. The average dbh of the canopy trees is 15 inches. White pine forms a supercanopy in some areas with those trees greater than 15 in. dbh. Coarse woody debris, including large diameter stems is present. The cover of the tall shrub layer varies and includes American hazelnut. Herbaceous species vary in diversity and abundance and generally include: three-leaved gold-thread (*Coptis trifolia*), partridgeberry (*Mitchella repens*), large-leaved shin-leaf (*Pyrola elliptica*), bunchberry (*Cornus canadensis*), hairy sweet cicely, broad-leaf enchanter's-nightshade (*Circaea lutetiana*), American starflower (*Trientalis borealis*), and wintergreen (*Gaultheria procumbens*).

Northern Sedge Meadows, within a wetland complex of bog birch and tamarack dominated areas, are generally good quality with few invasive species. The highest quality Northern Sedge Meadow is a vast open meadow dominated by the narrow leaved sedges woolly-fruit sedge, few-seeded sedge, and creeping sedge (*Carex chordorrhiza*). Small patches of shrubby vegetation are scattered throughout the meadow, some with heath vegetation dominant, others with bridal-wreath, dogwoods (*Cornus sp.*), or speckled alder.

Pine-oak barrens occur on rolling dune topography and flat outwash within a complex of wet swales. The best examples of barrens are managed as brush prairie and have oak brush with variable cover and some diversity of prairie plants in more open areas. Prairie plants found are wild lupine, bird's-foot violet (*Viola pedata*), round-headed bush-clover (*Lespedeza capitata*), whip nutrush (*Scleria triglomerata*), false heather (*Hudsonia tomentosa*), and prairie onion (*Allium stellatum*). Lower quality areas have an herbaceous layer dominated by Pennsylvania sedge. Wet swales are generally dominated by trembling aspen.

Figure 5. Cover types for the GLGPG. Data are from the Division of Forestry WISFIRS (accessed August 19, 2010).

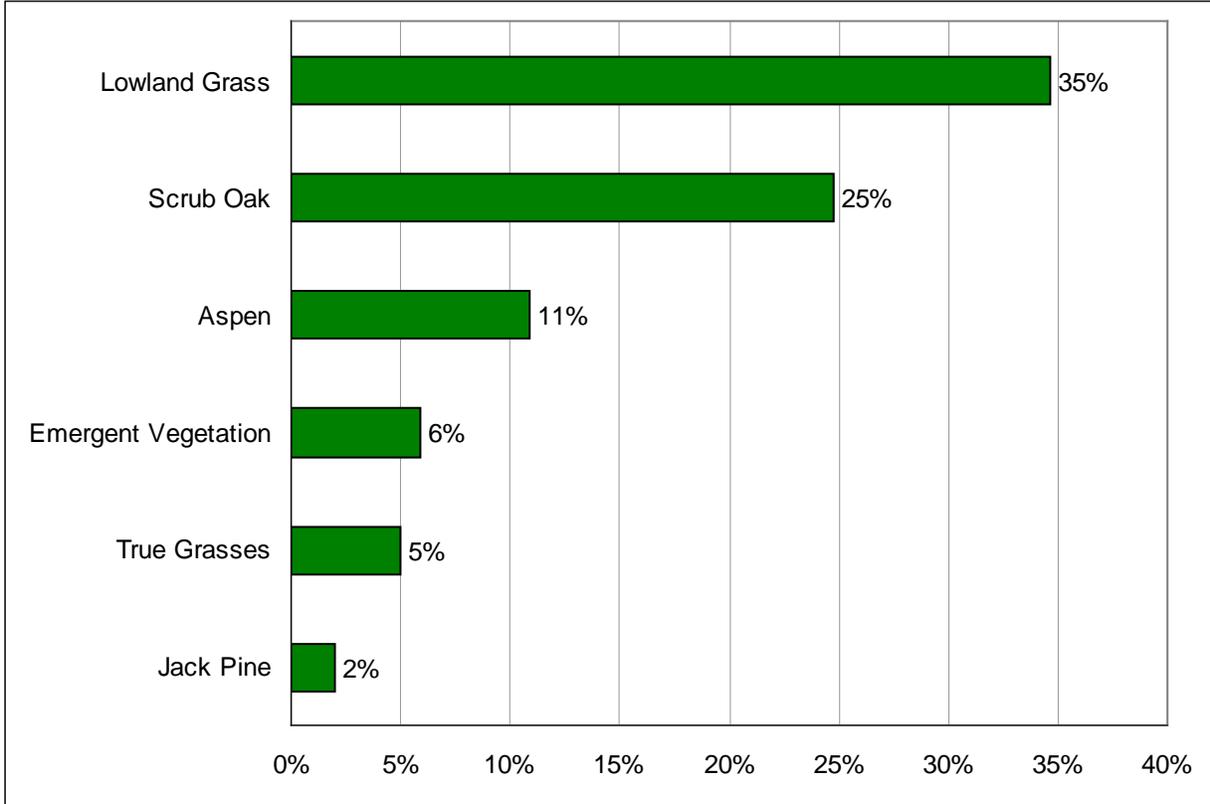
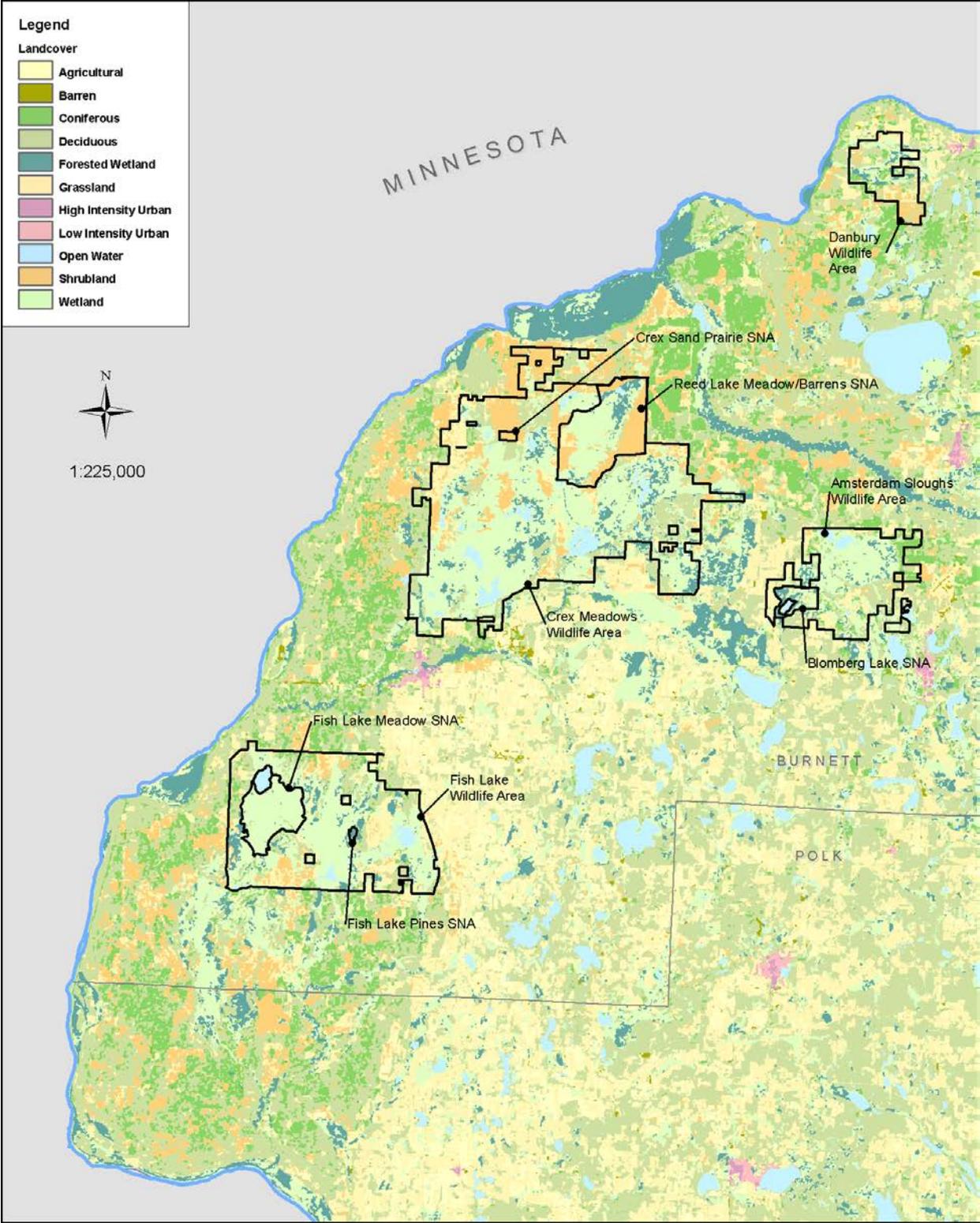


Figure 6. Landcover for the Glacial Lake Grantsburg Planning Group from the Wisconsin DNR Wiscland GIS coverage (WDNR 1993).



Rare Species and High Quality Natural Communities of the Glacial Lake Grantsburg Planning Group

Numerous rare species and high-quality examples of native communities have been documented within the GLGPG. Table 3 shows the rare species and high-quality natural communities currently known from the GLGPG. Appendix C shows the rare species and high-quality natural communities currently known from the GLGPG listed by property. See Appendix D for summary descriptions for the species and natural communities that occur on the GLGPG.

Table 3. Documented rare species and high-quality natural communities for the Glacial Lake Grantsburg Planning Group. For an explanation of state and global ranks, as well as state status, see Appendix A. 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 Observed Date	State Rank	Global Rank	State Status	Federal Status	SGCN	Tracked by NHI
Animal								
A Predaceous Diving Beetle	<i>Rhantus sinuatus</i>	2004	S3S4	GNR	SC/N		Y	W
A Tiger Beetle	<i>Cicindela patruela patruela</i>	1999	S2	G3T3	SC/N		Y	Y
An Issid Planthopper	<i>Fitchiella robertsoni</i>	2006	S1	GNR	SC/N		Y	Y
American Bittern	<i>Botaurus lentiginosus</i>	2010	S3B	G4	SC/M		Y	Y
American Bullfrog	<i>Lithobates catesbeianus</i>	1989	S3	G5	SC/H		N	Y
American Woodcock	<i>Scolopax minor</i>	2010	S4B	G5	SC/M		Y	W
An Issid Planthopper	<i>Fitchiella robertsoni</i>	2006	S1?	GNR	SC/N		Y	Y
Bald Eagle	<i>Haliaeetus leucocephalus</i>	2010	S4B,S2N	G5	SC/P		Y	Y
Black Tern	<i>Chlidonias niger</i>	2010	S2B	G4	SC/M		Y	Y
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	2010	S4B	G5	SC/M		Y	W
Blanding's Turtle	<i>Emydoidea blandingii</i>	2010	S3	G4	THR		Y	Y
Blue-winged Teal	<i>Anas discors</i>	2010	S4B	G5	SC/M		Y	W
Blue-winged Warbler	<i>Vermivora pinus</i>	2010	S4B	G5	SC/M		Y	W
Bobolink	<i>Dolichonyx oryzivorus</i>	2010	S4B	G5	SC/M		Y	W
Broadwinged Skipper*	<i>Poanes viator</i>	2010	S3	G5	SC/N		N	W
Brown Thrasher	<i>Toxostoma rufum</i>	2010	S4B	G5	SC/M		Y	W
Canada Warbler	<i>Wilsonia canadensis</i>	2010	S3B	G5	SC/M		Y	Y
Club-horned Grasshopper	<i>Aeropedellus clavatus</i>	2006	S2	G5	SC/N		Y	Y

Common Name	Scientific Name	Last Observed		Global Rank	State Status	Federal Status	SGCN	Tracked by NHI
		Date	State Rank					
Columbine Dusky Wing	<i>Erynnis lucilius</i>	1988	S2	G4G5	SC/N		Y	Y
Dickcissel*	<i>Spiza americana</i>	1992	S3B	G5	SC/M		Y	Y
Dusted Skipper	<i>Atrytonopsis hianna</i>	2010	S3	G4G5	SC/N		N	Y
Eastern Meadowlark	<i>Sturnella magna</i>	2010	S4B	G5	SC/M		Y	W
Field Sparrow	<i>Spizella pusilla</i>	2010	S4B	G5	SC/M		Y	W
Franklin's Ground Squirrel	<i>Spermophilus franklinii</i>	2010	S2	G5	SC/N		Y	Y
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	2010	S4B	G4	SC/M		Y	W
Gophersnake	<i>Pituophis catenifer</i>	2010	S2S3	G5	SC/P		Y	Y
Gorgone Checker Spot*	<i>Chlosyne gorgone</i>	2009	S3	G5	SC/N		N	Y
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	2010	S4B	G5	SC/M		Y	W
Gray Copper	<i>Lycaena dione</i>	1995	S2	G5	SC/N		N	Y
Gray Wolf	<i>Canis lupus</i>	2008	S2	G4	SC/FL	LE	Y	Y
Great Blue Heron	<i>Ardea herodias</i>	2010	S4B	G5	SC/M		N	W
Greater Prairie-chicken	<i>Tympanuchus cupido</i>	1979	S1B,S2N	G4	THR		Y	Y
Henry's Elfin*	<i>Callophrys henrici</i>	2010	S1S2	G5	SC/N		N	W
Karner Blue	<i>Lycaeides melissa samuelis</i>	2010	S3	G5T2	SC/FL	LE	Y	Y
Lake Darner	<i>Aeshna eremita</i>	2002	S3	G5	SC/N		N	Y
Lakota Crescent	<i>Phyciodes batesii lakota</i>	1978	S3	G4T4	SC/N		N	Y
Le Conte's Sparrow	<i>Ammodramus leconteii</i>	2010	S2S3B	G4	SC/M		Y	Y
Least Bittern	<i>Ixobrychus exilis</i>	2010	S3B	G5	SC/M		N	Y
Least Flycatcher	<i>Empidonax minimus</i>	2010	S4B	G5	SC/M		Y	W
Leonard's Skipper*	<i>Hesperia leonardus</i>	2009	S3	G4	SC/N		N	W
Long-eared Owl	<i>Asio otus</i>	2003	S2B	G5	SC/M		N	Y
Mink Frog	<i>Lithobates septentrionalis</i>	2010	S3S4	G5	SC/H		Y	Y
Mottled Dusky Wing	<i>Erynnis martialis</i>	2010	S2	G3	SC/N		Y	Y
Mulberry Wing*	<i>Poanes massasoit</i>	2010	S3	G4	SC/N		N	W
Nelson's Sparrow	<i>Ammodramus nelsoni</i>	2010	S1B	G5	SC/M		Y	Y
Northern Harrier	<i>Circus cyaneus</i>	2010	S3B,S2N	G5	SC/M		Y	W
Osprey	<i>Pandion haliaetus</i>	2010	S4B	G5	SC/M		Y	Y
Persius Dusky wing	<i>Erynnis persius</i>	2010	S2	G5	SC/N		Y	Y
Phlox Moth	<i>Schinia indiana</i>	2010	S2S3	G2G4	END		Y	Y
Prairie Skink	<i>Plestiodon septentrionalis</i>	2010	S3	G5	SC/H		Y	Y

Common Name	Scientific Name	Last Observed Date	State Rank	Global Rank	State Status	Federal Status	SGCN	Tracked by NHI
Pygmy Shrew*	<i>Sorex hoyi</i>	1997	S3S4	G5	SC/N		N	Y
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	1991	S3B	G5	SC/M		Y	W
Red-necked Grebe	<i>Podiceps grisegena</i>	2007	S1B	G5	END		Y	Y
Red-shouldered Hawk	<i>Buteo lineatus</i>	1978	S3S4B,S1N	G5	THR		Y	Y
Sedge Wren	<i>Cistothorus platensis</i>	2010	S4B	G5	SC/M		N	W
Sharp-tailed Grouse	<i>Tympanuchus phasianellus</i>	2010	S1B,S2N	G4	SC/H		Y	Y
Short-eared Owl	<i>Asio flammeus</i>	2010	S1B	G5	SC/M		Y	Y
Slender Clearwing	<i>Hemaris gracilis</i>	2010	S3	S3G4	SC/N		Y	Y
Spotted-winged Grasshopper	<i>Orphulella pelidna</i>	2004	S2S3	G5	SC/N		Y	Y
Trumpeter Swan*	<i>Cygnus buccinator</i>	2010	S4B	G4	SC/M		Y	Y
Two-Spotted Skipper*	<i>Euphyes bimacula</i>	2010	S3	G4	SC/N		N	W
Upland Sandpiper	<i>Bartramia longicauda</i>	2010	S2B	G5	SC/M		Y	Y
Veery	<i>Catharus fuscescens</i>	2010	S4B	G5	SC/M		Y	W
Vesper Sparrow	<i>Poocetes gramineus</i>	2010	S4B	G5	SC/M		Y	W
Whip-poor-will	<i>Caprimulgus vociferus</i>	2010	S3B	G5	SC/M		Y	W
Wild Indigo Duskywing*	<i>Erynnis baptisiae</i>	1996	S2S3	G5	SC/N		Y	W
Willow Flycatcher	<i>Empidonax traillii</i>	2010	S4B	G5	SC/M		Y	W
Wilson's Phalarope	<i>Phalaropus tricolor</i>	2002	S1B	G5	SC/M		Y	Y
Wood Thrush	<i>Hylocichla mustelina</i>	2010	S4B	G5	SC/M		Y	W
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	2008	S3B	G5	SC/M		Y	Y
Yellow Rail	<i>Coturnicops noveboracensis</i>	2007	S1B	G4	THR		Y	Y
Plant								
Adder's-tongue	<i>Ophioglossum pusillum</i>	1966	S2	G5	SC		N/A	Y
Brook grass*	<i>Catabrosa aquatica</i>	1991	S1	G5	END		N/A	Y
Cross-leaf milkwort*	<i>Polygala cruciata</i>	1971	S3	G5	SC		N/A	Y
Downy willow-herb*	<i>Epilobium strictum</i>	1979	S2S3	G5	SC		N/A	Y
Dwarf Milkweed	<i>Asclepias ovalifolia</i>	2007	S3	G5?	THR		N/A	Y
Farwell's water-milfoil*	<i>Myriophyllum farwellii</i>	1985	S3	G5	SC		N/A	Y
Prickly Hornwort	<i>Ceratophyllum echinatum</i>	1955	S2	G4?	SC		N/A	Y
Purple bladderwort*	<i>Utricularia purpurea</i>	1991	S3	G5	SC		N/A	Y
Silky Prairie-clover	<i>Dalea villosa var. villosa</i>	2007	S2	G5	SC		N/A	Y
Slender bulrush*	<i>Schoenoplectus heterochaetus</i>	1955	S1	G5	SC		N/A	Y

Common Name	Scientific Name	Last Observed Date	State Rank	Global Rank	State Status	Federal Status	SGCN	Tracked by NHI
Sparse-flowered Sedge	<i>Carex tenuiflora</i>	2007	S3	G5	SC		N/A	Y
Vasey's pondweed*	<i>Potamogeton vaseyi</i>	1985	S2S3	G4	SC		N/A	Y
Vasey's rush*	<i>Juncus vaseyi</i>	2008	S3	G5	SC		N/A	Y
Water-thread pondweed*	<i>Potamogeton diversifolius</i>	1985	S2S3	G5	SC		N/A	Y
Whip Nutrush	<i>Scleria triglomerata</i>	2010	S2S3	G5	SC		N/A	Y
Yellow screw-stem*	<i>Bartonia virginica</i>	2009	S3	G5	SC		N/A	Y
Natural Community								
Alder Thicket		2010	S4	G4			N/A	Y
Lake--Soft Bog		1979	S4	GNR			N/A	Y
Northern Dry Forest		2010	S3	G3?			N/A	Y
Northern Dry-mesic Forest		2010	S3	G4			N/A	Y
Northern Mesic Forest		2010	S4	G4			N/A	Y
Northern Sedge Meadow		2010	S3	G4			N/A	Y
Oak Barrens		2010	S2	G2?			N/A	Y
Sand Barrens		1977	SU	GNR			N/A	Y
Sand Prairie		2010	S2	GNR			N/A	Y
Tamarack (Poor) Swamp		2010	S3	G4			N/A	Y
Other								
Bird Rookery		2008	SU	G5	SC		N/A	Y

*This record is not yet mapped in the NHI database or the last observation date is more recent than what is in the NHI database.

Management Considerations and Opportunities for Biodiversity Conservation

Large Wetlands

The wetlands of the GLGPG have undergone significant changes since Euro-American settlement. Early peat-dominated wetlands with sedges, emergent marsh vegetation and tamarack were converted to a dry wiregrass-dominated wetland through ditching, harvesting of tamarack, and cutting of sedges for commercial use.

Since 1945, when the Wisconsin Conservation Department (now the Wisconsin DNR) took control of a large portion of the region that would become Crex Meadows Wildlife Area, management of the wetlands has focused on waterfowl production. This management currently consists of 22 miles of dikes, creating 29 flowage areas of open water and emergent vegetation that flood 6,000 acres.

The large wetlands of the GLGPG provide important habitat for rare species, including birds and amphibians. A large majority of the impressive diversity of rare birds found on the GLGPG is due to this abundance of large, high-quality wetland habitats in addition to their connection to the open upland grasslands and barrens. This makes this one of the premiere open landscapes in the entire state for birds. The importance of this landscape-scale concept for preserving biodiversity holds true for other taxa as well, including reptiles, insects (including moths and butterflies), and mammals.

The large sedge meadows and associated small pools provide important breeding habitat for sedge wren (*Cistothorus platensis*), bobolink (*Dolichonyx oryzivorus*), American bittern (*Botaurus lentiginosus*), Le Conte's sparrow (*Ammodramus leconteii*), Nelson's sparrow (*Ammodramus nelsoni*), sandhill crane (*Grus canadensis*), northern harrier (*Circus cyaneus*), short-eared owl (*Asio flammeus*), and blue-winged teal (*Anas discors*). The GLGPG provides the best management opportunity in the state for Nelson's sparrow and yellow rail (*Coturnicops noveboracensis*) along with a core area for conservation of significant populations of rare marsh birds specifically the LeConte's sparrow and American bittern. Golden-winged warblers (*Vermivora chrysoptera*) are common in lowland shrubs within sedge meadows. Wisconsin holds a very large responsibility for managing for populations of the golden-winged warbler as a large percentage of the species global range occurs within the state. These areas are also used as a summer habitat area for the globally rare whooping crane (*Grus americana*). These areas also provide important breeding habitat for amphibians.

Flowages, containing open water, emergent vegetation, and standing dead trees, are important resources for yellow-headed blackbird (*Xanthocephalus xanthocephalus*), black tern (*Chlidonias niger*), least bittern (*Ixobrychus exilis*), red-necked grebe (*Podiceps grisegena*), trumpeter swan (*Cygnus buccinator*), and heron species. A flowage within the GLGPG has consistent records of breeding red-necked grebes, representing one of only a handful of known breeding locations for this State Endangered species. These areas are also used by birds for feeding, loafing, and roosting. Flowages can support habitat for American bullfrog (*Lithobates catesbeianus*) and mink frog (*Lithobates septentrionalis*). Wild rice (*Zizania aquatica*) within these flowages provide an important resource in the spring and fall for migrating birds, including most waterfowl species, rails, coots, and blackbirds (WDNR and NRPC 2000).

Lowlands shrubs, generally found on the margins of open wetlands or as the dominant cover in a wetland, as at Danbury Wildlife Area, provide breeding habitat for many species, including willow flycatchers (*Empidonax traillii*), golden-winged warblers, veery (*Catharus fuscescens*), and sedge wren. Buehler et al (2007) identified protecting and maintaining lowland shrubs as a conservation priority for the north-

central region of North America for golden-winged warbler populations and would benefit numerous other bird species of concern.

Sphagnum moss and tamarack dominated areas provide habitat for a diversity of sparrows including swamp sparrow (*Melospiza georgiana*), song sparrow (*Melospiza melodia*), savannah sparrow (*Passerculus sandwichensis*), and Lincoln's sparrow (*Melospiza lincolni*), as well as sedge wren, northern harrier, and veery.

Lowland forests provide habitat for many breeding birds, including veery, American redstart (*Setophaga ruticilla*), common yellowthroat (*Geothlypis trichas*), ovenbird (*Seiurus aurocapillus*), and black-and-white warbler (*Mniotilta varia*), chestnut-sided warbler (*Dendroica pensylvanica*), rose-breasted grosbeak (*Pheucticus ludovicianus*), song sparrow, and yellow-bellied sapsucker (*Sphyrapicus varius*).

Prairie and Barrens

The GLGPG offers exceptional opportunities for managing prairie and barrens habitat. The GLGPG was once located at the western edge of the largest expanse of barrens in the state corresponding to the current location of the Northwest Sands Ecological Landscape. Since Euro-American settlement, this area, especially the barrens, have undergone significant changes (Radeloff et al. 1999). Prior to settlement, many of the historical barrens had scattered trees present and occurred in a continuum from the most open (Sand Prairie) stands to areas with the highest tree cover (Northern Dry Forest) with other combinations in-between, including barrens and woodland communities. Threats to barrens throughout the state include fire suppression, conversion to plantation, pest species, and development (Shively and Temple 1994).

The barrens habitats at the GLGPG provide a substantial proportion of the remaining large barrens habitat patches in northwestern Wisconsin (WDNR In Prep.). These remnants of the globally rare barrens natural communities are critical to the long term survival of many species, including the Special Concern northern prairie skink (*Plestiodon septentrionalis*), eastern hog-nosed snake (*Heterodon platirhinos*) and gophersnake (*Pituophis catenifer*) (bullsnake), as well as the State Threatened Blanding's turtle (*Emydoidea blandingii*). It is likely that this gophersnake metapopulation is the best remaining in the entire state, and the Blanding's turtle and northern prairie skink metapopulations are probably among the top five remaining in the state. Other rare species relying on these areas are sharp-tailed grouse, upland sandpiper (*Bartramia longicauda*), brown thrasher (*Toxostoma rufum*), vesper sparrow (*Pooecetes gramineus*), silky prairie-clover (*Dalea villosa*), and dwarf milkweed (*Asclepias ovalifolia*). The sharp-tailed grouse habitat provided on the GLGPG is crucial to the survival of the species in Wisconsin (WDNR and NRPC 2000). A record of the Special Concern Franklin's ground squirrel (*Spermophilus franklinii*) was verified via photographs in 2010. This species is quickly disappearing from much of its former range in Wisconsin and locations of known occurrences will be critical to management aimed at preserving this small mammal on the landscape. The gray wolf (*Canis lupus*) is common throughout the GLGPG with three territories overlapping within the project area.

The prairies and barrens of the GLGPG represent one of the most important opportunities in the state for protecting butterfly and moth diversity. Due to the rarity of these plant communities many of the representative butterfly and moth species are also quite rare. Some of these rare butterflies and moths are limited to specific larval host plant species. Identifying and managing for these host plants and facilitating this ecological relationship between plants and animals is critical to conserving these rare species. Within the GLGPG, there are eleven rare barrens obligate butterfly and moth species known to occur, with two of these species state or federally Endangered and the remainder either special concern or SGCN.

Species also likely use microhabitats within the barrens such as sand dunes that provide loose sand for reptile nesting areas. In addition, the shrubby ecotone between barrens and wetlands supports rare plants. Coarse woody debris is also an important component of vegetation structure within barrens. These areas provide cover, foraging habitat, and perch sites for many bird species (Mossman et al. 1991); act as a substrate for fungi; provide cover for invertebrates and small vertebrates; and are a nutrient reservoir (Niemuth and Boyce 1998).

Management to promote open brush prairies and oak barrens is being done on properties within the GLGPG. Crex Meadows Wildlife Area has an extensive history of management, including prescribed burning for brush prairie and barrens since 1947. Opportunities to manage at a landscape level are high because of the large size of the properties and the proximity to other public lands, including Governor Knowles State Forest and Burnett County Forests. Managing large tracts of land for barrens, including using large clear-cuts in areas managed for timber production, can help to mimic the natural disturbance patterns that are important to many barrens dependent species (Radeloff et al. 2000). Niemuth and Boyce (1998) concluded, however, that there are differences in resulting vegetation structure among clear-cutting, short-cycle prescribed burning, and crown fires. The resulting differences in vegetation structure can impact availability and quality of wildlife habitat. Management should seek to use landscape-level management to promote temporal variation in disturbance. As Vogl (1964) observed, “brush prairie savanna undoubtedly reverted back and forth from brush to forest and forest to brush again, depending on the absence or presence of fire.”

Migratory Birds

The diversity of habitats on the GLGPG, from large wetlands and flowages to brush prairie, oak barrens, and pine and oak forests offers important resources for numerous bird groups. Large numbers of individuals from many species accumulate here during migration because these areas offer food, water, and shelter, the most important resources to migrating birds.

Large emergent wetlands and associated open water areas offer migratory birds such as waterfowl, shorebirds, songbirds, and waterbirds like herons diverse habitats during the migratory seasons. Important features include emergent aquatic plants such as hard and soft-stem bulrush (*Schoenoplectus acutus* and *S. tabernaemontani*), cat-tails (*Typha* sp.), smartweed (*Polygonum* spp.), and arrowheads (*Sagittaria* sp.); open water areas that team with amphibians, fish, and aquatic invertebrates; and mudflats with abundant invertebrates and insect larvae. This plant and animal life provide important foraging opportunities during spring and fall migration for waterfowl, herons, bitterns, geese, cranes, and shorebirds. This area has become especially important to sandhill cranes, with more than 10,000 staging here during the fall migration. Other species that gather in large numbers are Canada geese (*Branta canadensis*), tundra swans (*Cygnus columbianus*), and trumpeter swans. Migratory raptors use these open areas to hunt waterfowl. These areas are also important staging areas for waterfowl that later disperse to breeding areas.

In addition, lowland shrubs present in these wetlands offer migrating songbirds protection from severe weather and predators, and feeding during a critical time in their life cycle. Lowland shrubs offer perches for capturing emerging aquatic insects in spring and food in the form of fruiting shrubs in fall, which are high in energy and are used by migrants to build fat reserves necessary for sustaining long migratory flights.

The GLGPG is also important to numerous wintering birds from the arctic and boreal regions including golden eagle (*Aquila chrysaetos*), short-eared owl, rough-legged hawk (*Buteo lagopus*), northern hawk owl (*Surnia ulula*), northern shrike (*Lanius excubitor*), snow bunting (*Plectrophenax nivalis*), and common redpoll (*Carduelis flammea*) (eBird 2010 & Collins 2010). These are birds that hunt in open

grasslands and wetlands and move south to seek out more abundant prey and better conditions that will allow them to survive during a vulnerable period in their lives. Other important wintering birds include lapland longspurs (*Calcarius lapponicus*), horned larks (*Eremophila alpestris*), and snow buntings.

Threats to migratory birds include habitat destruction and habitat alteration (Duncan 2002). Habitat alteration includes the simplification of forest structure or the alteration of forest composition, including non-native invasive species that may change the kinds, quantity, and quality of food resources (Duncan 2002). Many wetlands in the surrounding landscape of the GLGPG, especially within the Northwest Lowlands Ecological Landscape, have been ditched or filled for agriculture or developed, threatening the availability of habitat for migrating birds. These areas are currently targeted for wetland restoration.

Ecological Priorities for SGCN

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 Species of Greatest Conservation Need. Appendix E highlights the Ecological Priorities for vertebrate SGCN on the GLGPG. Note that these Ecological Priorities include all of the natural communities that we have determined to provide the best opportunities for management on the GLGPG from an ecological/biodiversity perspective.

Natural Community Management Opportunities

The Wisconsin Wildlife Action Plan (WAP) (WDNR 2006b) identifies 21 natural communities for which there are “Major” or “Important” opportunities for protection, restoration, or management in the Northwest Sands Ecological Landscape. Fifteen of these natural communities are present on the GLGPG:

- Alder Thicket
- Emergent Marsh
- Emergent Marsh - Wild Rice
- Ephemeral Pond
- Impoundments/Reservoirs
- Inland lakes
- Northern Dry Forest
- Northern Dry-mesic Forest
- Northern Hardwood Swamp
- Northern Sedge Meadow
- Northern Wet Forest
- Northern Wet-mesic Forest
- Oak Barrens
- Pine Barrens
- Shrub-carr
- Submergent Marsh
- Surrogate Grasslands

Invasive Plants

Non-native invasive species thrive in newly disturbed areas because they establish quickly, tolerate a wide range of conditions, are easily dispersed, and are no longer limited by the diseases, predators, and competitors that kept their populations in check in their native range. As a result, invasive plants can kill and outcompete native plants by monopolizing light, water, and nutrients and altering soil chemistry and mycorrhizal relationships. In situations where invasive plants become dominant, they may even alter ecological processes by limiting the ability to use prescribed fire and modifying hydrology. In addition to the threats on native communities and native species diversity, invasive species negatively impact forestry (by reducing tree regeneration, growth and longevity), recreation (by degrading fish and wildlife habitat and limiting access), agriculture, and human health (noxious weeds and non-native pathogens).

Invasive plant species, although well-established in some areas of the GLGPG, are generally restricted to trails, roadsides, and low quality habitats. Many of the high-quality areas and areas managed for wildlife habitat are not heavily infested. Invasive plant species that are widespread on the GLGPG and have the greatest impact to native species diversity, rare species habitats, or high-quality natural communities are

spotted knapweed (*Centaurea biebersteinii*), reed canary grass, common reed grass, Canada thistle (*Cirsium arvense*), purple loosestrife (*Lythrum salicaria*), leafy spurge, and narrow-leaved cat-tail (*Typha angustifolia*).

Primary Sites: Site-specific Opportunities for Biodiversity Conservation

Five ecologically important sites were identified on the GLGPG. 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.

Descriptions for each 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 the GLGPG by Primary Site.

Glacial Lake Grantsburg Planning Group Primary Sites

- GLGPG01. Crex Meadows Wildlife Area
- GLGPG02. Amsterdam Sloughs Sedge Meadow
- GLGPG03. Blomberg Lake and Woods
- GLGPG04. Fish Lake Northern Dry-mesic Forest
- GLGPG05. Fish Lake Meadows, Prairies, and Forests

Future Needs

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

- Continued invasive species monitoring and control is needed. State wildlife areas and many other public lands throughout Wisconsin are facing major management problems because of serious infestations of highly invasive species. Some of these species are easily dispersed by humans and vehicles; others are spread by birds, mammals, insects, water, or wind. In order to protect the important biodiversity values of the GLGPG, a comprehensive invasive species monitoring and control plan will be needed for detecting and rapidly responding to new invasive threats. Citizens, such as trail users or hunters, could be encouraged to report new sightings of invasive plants and animals and, perhaps, cooperate with property managers in control efforts.
- Quantitative vegetation data should be collected from the barrens, prairies, and wetlands in this region. Establishing baseline vegetation plots or transects will help to better understand these unique and diverse natural communities, help to determine how best to maintain these transitional natural communities, and better classify the brush-prairie phase of Oak Barrens.
- Establishing snake and skink monitoring programs is recommended for the GLGPG, especially for gophersnakes, eastern hog-nosed snakes, and skinks.
- Conducting surveys for the Special Concern four-toed salamander (*Hemidactylium scutatum*) is recommended for the GLGPG to determine presence or absence. This species is expected to be especially sensitive to climate change.
- Locations and likely habitats should be identified for conducting additional rare plant and animal surveys during appropriate seasons. This should include additional vertebrate and invertebrate animal taxon groups.
- Research is needed on the response of the butterfly and moth community to current management practices.

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.

ecological priority – the natural communities (habitats) in each Ecological Landscape that are most important to the Species of Greatest Conservation Need, as identified in the Wisconsin Wildlife Action Plan (WDNR 2006b). Three sources of data were used to derive this information: 1) the probability that a species will occur in a given landscape, 2) the degree to which a species is associated with a particular natural community, and 3) the degree to which there are opportunities for sustaining a given natural community in any given Ecological Landscape. See dnr.wi.gov/org/land/er/wwap/explore/tool for more information.

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 (modified from <http://whiteoak.natureserve.org/eodraft/index.htm>)

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 2006b).

Tension Zone – a narrow region extending from northwest to southeast across Wisconsin. The tension zone separates the mixed conifer-hardwood forests of the north from the prairie/savanna/hardwood forests of the south. Many native plant and animal species occupy ranges roughly delineated by the tension zone.

Species List

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

Common Name	Scientific Name
Animals	
American bittern	<i>Botaurus lentiginosus</i>
American bullfrog	<i>Lithobates catesbeianus</i>
American redstart	<i>Setophaga ruticilla</i>
black tern	<i>Chlidonias niger</i>
black-and-white warbler	<i>Mniotilta varia</i>
Blanding's turtle	<i>Emydoidea blandingii</i>
blue-winged teal	<i>Anas discors</i>
bobolink	<i>Dolichonyx oryzivorus</i>
brown thrasher	<i>Toxostoma rufum</i>
Canada geese	<i>Branta canadensis</i>
chestnut-sided warbler	<i>Dendroica pensylvanica</i>
common redpoll	<i>Carduelis flammea</i>
common yellowthroat	<i>Geothlypis trichas</i>
eastern hog-nosed snake	<i>Heterodon platirhinos</i>
four-toed salamander	<i>Hemidactylum scutatum</i>
Franklin's ground squirrel	<i>Spermophilus franklinii</i>
golden eagle	<i>Aquila chrysaetos</i>
Golden-winged warbler	<i>Vermivora chrysoptera</i>
gophersnake/bullsnake	<i>Pituophis catenifer</i>
gray wolf	<i>Canis lupus</i>
horned larks	<i>Eremophila alpestris</i>
karner blue butterfly	<i>Lycaeides melissa samuelis</i>
lapland longspurs	<i>Calcarius lapponicus</i>
Le Conte's sparrow	<i>Ammodramus leconteii</i>
least bittern	<i>Ixobrychus exilis</i>
Lincoln's sparrow	<i>Melospiza lincolni</i>
mink frog	<i>Lithobates septentrionalis</i>
Nelson's sparrow	<i>Ammodramus nelsoni</i>
northern harrier	<i>Circus cyaneus</i>
northern hawk owl	<i>Surnia ulula</i>
northern prairie skink	<i>Plestiodon septentrionalis</i>
northern shrike	<i>Lanius excubitor</i>
ovenbird	<i>Seiurus aurocapillus</i>
red-necked grebe	<i>Podiceps grisegena</i>
rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>
rough-legged hawk	<i>Buteo lagopus</i>
sandhill crane	<i>Grus canadensis</i>
savannah sparrow	<i>Passerculus sandwichensis</i>
sedge wren	<i>Cistothorus platensis</i>
sharp-tailed grouse	<i>Tympanuchus phasianellus</i>
short-eared owl	<i>Asio flammeus</i>
snow bunting	<i>Plectrophenax nivalis</i>

Common Name	Scientific Name
Animals	
song sparrow	<i>Melospiza melodia</i>
swamp sparrow	<i>Melospiza georgiana</i>
trumpeter swan	<i>Cygnus buccinator</i>
tundra swan	<i>Cygnus columbianus</i>
upland sandpiper	<i>Bartramia longicauda</i>
veery	<i>Catharus fuscescens</i>
vesper sparrow	<i>Pooecetes gramineus</i>
whooping crane	<i>Grus americana</i>
willow flycatcher	<i>Empidonax traillii</i>
yellow rail	<i>Coturnicops noveboracensis</i>
yellow-bellied sapsucker	<i>Sphyrapicus varius</i>
yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>
Plants	
American hazelnut	<i>Corylus americana</i>
American starflower	<i>Trientalis borealis</i>
American white water-lily	<i>Nymphaea odorata</i>
arrowheads	<i>Sagittaria sp</i>
balsam fir	<i>Abies balsamea</i>
basswood	<i>Tilia americana</i>
big blue-stem	<i>Andropogon gerardii</i>
bigtooth aspen	<i>Populus grandidentata</i>
bird's-foot violet	<i>Viola pedata</i>
black ash	<i>Fraxinus nigra</i>
black chokeberry	<i>Aronia melanocarpa</i>
black snakeroot	<i>Sanicula marilandica</i>
black spruce	<i>Picea mariana</i>
blueberry / cranberry	<i>Vaccinium sp</i>
blue-joint grass	<i>Calamagrostis canadensis</i>
bog birch	<i>Betula pumila</i>
bottlebrush grass	<i>Elymus hystrix</i>
bracken fern	<i>Pteridium aquilinum</i>
broad-leaf enchanter's-nightshade	<i>Circaea lutetiana</i>
bunchberry	<i>Cornus canadensis</i>
bur oak	<i>Quercus macrocarpa</i>
Canada thistle	<i>Cirsium arvense</i>
cat-tail	<i>Typha sp</i>
cinnamon fern	<i>Osmunda cinnamomea</i>
common lake sedge	<i>Carex lacustris</i>
common reed grass	<i>Phragmites australis</i>
common yellow lake sedge	<i>Carex utriculata</i>
creeping sedge	<i>Carex chordorrhiza</i>
dogwood	<i>Cornus sp</i>
dwarf milkweed	<i>Asclepias ovalifolia</i>
early low blueberry	<i>Vaccinium angustifolium</i>
false heather	<i>Hudsonia tomentosa</i>
fen star sedge	<i>Carex sterilis</i>

Common Name	Scientific Name
few-seeded sedge	<i>Carex oligosperma</i>
Plants	
hairy sweet cicely	<i>Osmorhiza claytonii</i>
hard-stem bulrush	<i>Schoenoplectus acutus</i>
hemlock	<i>Tsuga canadensis</i>
Hill's oak	<i>Quercus ellipsoidalis</i>
hop-hornbeam	<i>Ostrya virginiana</i>
jack pine	<i>Pinus banksiana</i>
June grass	<i>Koeleria macrantha</i>
Labrador-tea	<i>Ledum groenlandicum</i>
large-leaved pondweed	<i>Potamogeton amplifolius</i>
large-leaved shin-leaf	<i>Pyrola elliptica</i>
leafy spurge	<i>Euphorbia esula</i>
leather-leaf	<i>Chamaedaphne calyculata</i>
little blue-stem	<i>Schizachyrium scoparium</i>
maidenhair fern	<i>Adiantum pedatum</i>
marsh fern	<i>Thelypteris palustris</i>
marsh marigold	<i>Caltha palustris</i>
narrow-leaved cat-tail	<i>Typha angustifolia</i>
New Jersey tea	<i>Ceanothus americanus</i>
northern white-cedar	<i>Thuja occidentalis</i>
partridgeberry	<i>Mitchella repens</i>
Pennsylvania sedge	<i>Carex pennsylvanica</i>
pod-grass	<i>Scheuchzeria palustris</i>
prairie goldenrod	<i>Solidago ptarmicoides</i>
prairie onion	<i>Allium stellatum</i>
prairie tickseed	<i>Coreopsis palmata</i>
prairie willow	<i>Salix humilis</i>
purple loosestrife	<i>Lythrum salicaria</i>
red maple	<i>Acer rubrum</i>
red oak	<i>Quercus rubra</i>
red pine	<i>Pinus resinosa</i>
reed canary grass	<i>Phalaris arundinacea</i>
rough blazing-star	<i>Liatris aspera</i>
round-headed bush-clover	<i>Lespedeza capitata</i>
round-lobed hepatica	<i>Anemone americana</i>
royal fern	<i>Osmunda regalis</i>
sand cherry	<i>Prunus pumila</i>
scrub oak	<i>Quercus spp</i>
sedges	<i>Carex sp</i>
showy goldenrod	<i>Solidago speciosa</i>
slender willow	<i>Salix petiolaris</i>
smartweed	<i>Polygonum sp</i>
soft-stem bulrush	<i>Schoenoplectus tabernaemontani</i>
speckled alder	<i>Alnus incana</i>
spotted Joe-Pye-weed	<i>Eupatorium maculatum</i>
spotted knapweed	<i>Centaurea biebersteinii</i>

Common Name	Scientific Name
steeplesh	<i>Spiraea tomentosa</i>
sugar maple	<i>Acer saccharum</i>
Plants	
swamp loosestrife	<i>Lysimachia thyrsiflora</i>
swamp milkweed	<i>Asclepias incarnata</i>
sweet-fern	<i>Comptonia peregrina</i>
tall cotton-grass	<i>Eriophorum viridi-carinatum</i>
tamarack	<i>Larix laricina</i>
tawny cotton-grass	<i>Eriophorum virginicum</i>
three-fruited sedge	<i>Carex trisperma</i>
three-leaved gold-thread	<i>Coptis trifolia</i>
three-way sedge	<i>Dulichium arundinaceum</i>
trembling aspen	<i>Populus tremuloides</i>
tussock sedge	<i>Carex stricta</i>
western sunflower	<i>Helianthus occidentalis</i>
whip nutrush	<i>Scleria triglomerata</i>
white birch	<i>Betula papyrifera</i>
white oak	<i>Quercus alba</i>
white pine	<i>Pinus strobus</i>
wild lupine	<i>Lupinus perennis</i>
wild rice	<i>Zizania aquatica</i>
willows	<i>Salix spp</i>
wintergreen	<i>Gaultheria procumbens</i>
wood anemone	<i>Anemone quinquefolia</i>
wood-betony	<i>Pedicularis canadensis</i>
woolly-fruit sedge	<i>Carex lasiocarpa</i>
yellow water-lily	<i>Nuphar advena</i>

Reference List

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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 Endangered Resources' 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 Endangered Resources' main source of information for species and communities. dnr.wi.gov/org/land/er/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/org/land/er/wlist/

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/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/org/land/er/wwap/
- explore Wildlife Action Plan data: dnr.wi.gov/org/land/er/wwap/explore/
- Wildlife Action Plan Implementation: dnr.wi.gov/org/land/er/wwap/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/org/es/science/publications/rs915_95.htm

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/forestry/assessment/strategy/overview.htm

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/forestry/assessment/strategy/assess.htm

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

Summary Descriptions for Rare Species and High Quality Natural Communities Documented on the Glacial Lake Grantsburg Planning Group

The following paragraphs give brief summary descriptions for some of the rare species and high quality natural communities documented on the Glacial Lake Grantsburg Planning Group and mapped in the NHI Database. More information can be found on the Endangered Resources Web site (www.dnr.wi.gov/org/land/er/) for several of these species and natural communities.

Rare Animals

A Tiger Beetle

A Tiger Beetle (*Cicindela patruela patruela*), a State Special Concern beetle, has been found in Semi open pine/oak barrens, jack and red pine stands with open areas on sandy soil, sandy firelanes or trails. Understory usually dominated by Vaccinium, bracken fern, and with a ground cover of moss patches. Optimal identification period is in the spring/fall with diminished numbers in mid summer.

American Bullfrog

American Bullfrog (*Rana catesbeiana*), a State Special Concern frog, may be found throughout Wisconsin in any permanent body of water - lakes, ponds, rivers, and creeks, although they have a very patchy distribution. In Wisconsin, bullfrogs appear to favor oligotrophic to mesotrophic waters, often breeding where dense submergent vegetation filters out the majority of the suspended solids. Adult bullfrogs overwinter in water to avoid freezing. Bullfrogs are active from April through mid-October. They breed from mid-May through late July or later. Larvae overwinter before transforming the following year or, or in rare situations, in their second full year.

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. The breeding season extends from February through August. Favored wintering and roosting habitat includes wooded valleys near open water and major rivers from December through March.

Black Tern

Black Tern (*Chlidonias niger*), a bird listed as Special Concern, prefers large shallow marshes with abundant vegetation adjacent to open water. Nesting occurs from May through the end of July.

Blanding's Turtle

Blanding's turtles (*Emydoidea blandingii*) are listed as a Threatened species in Wisconsin. They utilize a wide variety of aquatic habitats including deep and shallow marshes, shallow bays of lakes and impoundments where areas of dense emergent and submergent vegetation exists, sluggish streams, oxbows and other backwaters of rivers, drainage ditches (usually where wetlands have been drained), and sedge meadows and wet meadows adjacent to these habitats. This species is semi-terrestrial and individuals may spend a good deal of time on land. They often move between a variety of wetland types during the active season, which can extend from early March to mid-October. They overwinter in

standing water that is typically more than 3 feet in deep and with a deep organic substrate but will also use both warm and cold-water streams and rivers where they can avoid freezing. Blanding's generally breed in spring, late summer or fall. Nesting occurs from about mid-May through June depending on spring temperatures. They strongly prefer to nest in sandy soils and may travel well over a mile to find suitable soils. This species appear to display nest site fidelity, returning to its natal site and then nesting in a similar location annually. Hatching occurs from early August through early September but hatchlings can successfully overwinter in the nest, emerging the following late April or May. This species takes 17 to 20 years or more to reach maturity.

Dusted Skipper

Dusted skipper (*Atrytonopsis hianna*), a State Special Concern butterfly, has been found in dry, open sandy areas, dry prairie, pine barrens. Its host plants are Big bluestem (*Andropogon gerardii*) and little bluestem (*Schizachryium scoparius*). This species is univoltine with adults in flight from late May to early June in Wisconsin when few other skippers are present. Fully grown caterpillars hibernate and pupate in a sealed case 1-3 inches above the ground at the base of the host plant.

Franklin's Ground Squirrel

Franklin's Ground Squirrel (*Spermophilus franklinii*), a mammal listed as Special Concern, this semi-colonial species prefers brushy and partly wooded areas, dense grassy, shrubby marshland, as well as, prairie edges, rather than open prairie. Mating occurs from the late April to mid-May and young are born between late May to mid-June.

Gophersnake

Bullsnake (*Pituophis catenifer*), a species of Special Concern and a Protected Wild Animal, prefer sand prairies, bluff prairies, oak savannas and pine and oak barrens. Overwintering can occur in sand prairies, where they often den singly by using mammal burrows or other structures to get below the frost line or they may den communally using deep rock fissures on southerly exposed bluff prairies. This species is active from late March through early October, breeds mid-April through May and lays its eggs in sand cavities they create or under large flat rocks in late June to early July. The eggs hatch in late August to early September.

Gorgone Checker Spot

Gorgone checker spot (*Chlosyne gorgone*), a State Special Concern butterfly, is found in barrens, dry fields and prairies, sandy ridges, glades in woodlands, and open pine forests. This species has two flight periods, one from late May through June and again in early August to early September.

Gray Wolf

Gray wolf (*Canis lupus*), also referred to as timber wolf, is currently listed as Federally Endangered and as State Special Concern. Wolves are also on the State list of Protected Wild Animals. Gray wolves are social animals, living in a family group, or pack. Pack sizes in Wisconsin average 2-6 individuals, with a few packs as large as 10-12 animals. A territory represents the geographic extent that a particular wolf pack will utilize in search of food and shelter. A wolf pack's territory may cover 20-80 square miles.

Greater Prairie-chicken

Greater Prairie chicken (*Tympanuchus cupido*), a bird listed as Threatened in Wisconsin, prefers mixed grasslands and managed grasslands including wheatgrass, switchgrass, timothy, bromegrass, hoary alyssum, yarrow, blue vervain, daisy fleabane and goldenrods. Breeding occurs from April through August.

Henry's Elfin

Henry's elfin (*Callophrys henrici*), a State status taxagroup, has been found in pine barrens and oak savanna, occasionally in boggy areas.. Adults are usually present from mid May to early June, sometimes emerging earlier in abnormally advanced seasons.

Karner Blue

Karner blue (*Lycaeides melissa samuelis*), butterfly listed as Federally Endangered and Special Concern in Wisconsin, has been found in pine barrens and oak savanna in close association with its larval hostplant lupine (*Lupinus perennis*). In Wisconsin, also found along utility and road right-of-ways, abandoned agricultural fields, and managed forests. This butterfly has two flight periods: adults are present from late May through late June and again from late July through late August.

Lake Darner

Lake darner (*Aeshna eremita*), a State Special Concern dragonfly, has been found in bog or marsh-bordered ponds and lakes. The flight period extends from late July through early October.

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. Breeding occurs from mid May to mid July.

Leonard's Skipper

Leonard's Skipper (*Hesperia leonardus leonardus*), State Special Concern butterfly, has been found in pine barrens, oak savanna, and dry prairies. Its host plants are little bluestem (*Schizachyrium scoparium*), blue grama (*Bouteloua gracilis*), and panic grass (*Panicum* spp.). This is a univoltine species with adults in flight from early August to early September. Caterpillars hibernate soon after hatching and overwinter.

Long-eared Owl

Long-eared Owl (*Asio otus*), a bird listed as Special Concern, prefers conifer plantations and deciduous forests. Its breeding season extends from late March through late May.

Mink Frog

Mink frogs (*Rana septentrionalis*), a species of special concern, prefer rivers and lakes with bog shoreline habitats. They are a shoreline-dependent species but also forage on and around floating mats of vegetation away from the shoreline in the littoral zone. They may sometimes be found in permanent waters where no bog characteristics exist, although they are usually associated with tannin-stained waters. Mink frogs overwinter in water to avoid freezing. They are active from April through October and breed from June through July. Larvae overwinter before transforming the following summer.

Mottled Dusky Wing

Mottled dusky wing (*Erynnis martialis*), a State Special Concern butterfly. This skipper is found in scrub forest, pine/oak barrens and oak savanna. It is a bivoltine species, the spring flight occurs from mid May to mid-June and the summer flight from mid July to mid August. Larvae feed only on members of the plant genus *Ceanothus*.

Osprey

Osprey (*Pandion haliaetus*) prefer 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. The breeding season extends from late April through August.

Phlox Moth

Phlox Moth (*Schinia indiana*), a State Endangered lepidopteran, are about 0.6 inches long as adults and can often co-occur with Karner Blue Butterflies. Flox Flower Moths appear pink and their forewings are pink as adults are pink to reddish with triangular violet median areas and slender violet margins. The hind wings, which are rarely visible, are black with yellowish fringe. The wingspan is about 1.3 inches (33mm). Larvae are unlikely to be found but the head is dark or orange and the body is green suffused with reddish-brown and marked with light lateral stripes. This species is most often found on the brightest or "freshest" blossoms of its host plant, the downy phlox which occurs in pine/oak barrens and scrub oak habitat as well as prairies and roadsides on sandy soils. The downy flox requires open, sunny sites with some shade and doesn't appear to colonize new openings very quickly. The critical period of the downy flox's growth from the end of April through July coincides with adult emergence and larval development. It is therefore critical to time spring burns or mowing so that it doesn't disrupt the flowering of the downy flox, which is needed by the moths. Management is best conducted after mid-July once the moths have become pupae.

Pygmy Shrew

Pygmy Shrew (*Sorex hoyi*), a state Special Concern mammal. This species is found in among debris and heavy vegetation in woods, clearings, and meadows, particularly those grown to high grass. Avoiding swampy or excessively wet areas, though can be found in cold sphagnum or tamarack bogs.

Red-necked Grebe

Red-necked Grebe (*Podiceps grisegena*), a bird listed as Endangered in Wisconsin, prefers seasonally or permanently flooded wetlands with extensive beds of aquatic plants and large beds of softstem bulrush in open country. Nesting habitat includes wetlands with patches of open water and stands of bulrush (*Scirpus validus*, *S. acutus*) or similar emergents.

Red-shouldered Hawk

Red-shouldered Hawk (*Buteo lineatus*), a bird listed as Threatened in Wisconsin. This species prefers larger stands of medium-aged to mature lowland deciduous forests, dry-mesic and mesic forest with small wetland pockets. Breeding occurs from mid-March through early August.

Sharp-tailed Grouse

Sharp-tailed (*Tympanuchus phasianellus*), a Special Concern bird in Wisconsin, requires a mosaic of dense grass and shrubs with rich forb and insect foods during nesting and brood-rearing and a bare open area for lekking. During winter often relies on riparian areas and other sites that support deciduous trees and shrub for feeding, roosting, and escape cover; also utilizes non-native cultivated grains and hedgerow species.

Trumpeter Swan

Trumpeter Swan *Cygnus buccinator*, is a special concern bird in Wisconsin. Adults have all white plumage, a black bill with a narrow, salmon-red stripe along the base of lower bill, and a wingspan of nearly 8 feet. Most Trumpeters weigh 21-30 pounds, although large males may exceed 35 pounds. Individuals can live to 20-30 years of age. Juvenile Trumpeters are sooty gray with black-tipped, pink bills. They do not become all white with a black bill until about a year old. Trumpeters are often confused with other white waterfowl, especially Tundra Swans (*Cygnus columbianus*). Trumpeter Swans are migratory birds that arrive in their breeding grounds soon after ice melt in early spring and leave for their northern wintering grounds shortly before freeze. Trumpeter pair bonds mate for life and normally choose their 6-150 acre nesting territory near where the female (pen) was hatched. If a pair uses the same nesting location two summers in a row, they form an almost unbreakable attachment to the site. The pairs begin

building their 6-ft diameter nests in mid-April on top of muskrat or beaver lodges or on mounds of emergent vegetation. The hen lays her clutch of 5-9 off-white eggs between late April and early May. She incubates the 4 ½ inch by 3 inch eggs for about 33-34 days while the male (cob) defends the nest. The cygnets hatch in June and fledge at about 14 weeks of age. They spend the rest of the summer preparing for migration with their parents to ice-free streams and ponds. Ideal habitat for Trumpeters include shallow wetlands 1-3 feet deep in isolated areas away from human disturbance with a diverse mix of emergent vegetation and open water that support a rich variety of submergent plants.

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 breeding season extends from early May through late September.

Yellow Rail

Yellow Rail *Coturnicops noveboracensis*, a State Threatened bird, is a rare migrant as well as a rare summer resident in both the north and east of Wisconsin. Yellow Rails are approximately the size of a sparrow, about 6-7 inches long. They have short bills and are a deep tawny-yellow in color with dark stripes crossed by white bars. In flight, the yellow rail is the only rail with a white patch on the trailing edge of each wing. These birds lay their 8-10 pinkish eggs from late May through mid-June in nests that are woven cups of dead grass placed above the water on tussocks. Parents incubate the eggs for approximately 17 days and the following fledgling period is about 35 days long. Yellow Rail habitat is primarily extensive meadows of "wiregrass" sedge and sometimes bluejoint, with little or no shrub encroachment. Preservation of large unfragmented bottomland forests will benefit this neotropical migrant.

Rare Plants

Adder's-tongue

Adder's-tongue (*Ophioglossum pusillum*), a State Special Concern plant, is found in meadows and woods or, rarely, on sandy beaches. The optimal identification period for this species is late June through early September.

Dwarf Milkweed

Dwarf Milkweed (*Asclepias ovalifolia*), a State Threatened plant, is found in periodically brushed areas, rights-of-way. Blooming occurs early June through early July; fruiting occurs late June through late August. The optimal identification period for this species is throughout June.

Prickly Hornwort

Prickly Hornwort (*Ceratophyllum echinatum*), a State Special Concern plant, is found in soft-water lakes, ponds, and reservoirs. Blooming occurs throughout July; fruiting occurs early August through late September. The optimal identification period for this species is early August through late September.

Silky Prairie-clover

Silky Prairie-clover (*Dalea villosa* var. *villosa*), a State Special Concern plant, is found on dry sandy river terraces and hillside prairies (often being invaded by red cedar) near the St. Croix and Mississippi Rivers. Blooming occurs late July through early September; fruiting occurs throughout September. The optimal identification period for this species is early August through late September.

Sparse-flowered Sedge

Sparse-flowered Sedge (*Carex tenuiflora*), a State Special Concern plant, is found in open- to closed canopy cold, wet, coniferous forests, usually on neutral to calcareous substrates. Blooming occurs late May through early June; fruiting occurs late June through late July. The optimal identification period for this species is early June through late July.

Whip Nutrush

Whip Nutrush (*Scleria triglomerata*), a State Special Concern plant, is found on the sunny margins between jack pine/Hill's oak barrens and wet acid ditches with coastal plain species. Blooming occurs late June through late July; fruiting occurs early July through late August. The optimal identification period for this species is late June through late August.

Natural Communities

Alder Thicket

The alder thicket is a minerotrophic wetland community dominated by tall shrubs, especially speckled alder. Shrub associates may include red-osier dogwood, nannyberry, cranberry viburnum, wild currants, and willows. Among the characteristic herbaceous species are Canada bluejoint grass, orange jewelweed, asters, boneset, rough bedstraw, marsh fern, arrow-leaved tearthumb, and sensitive fern. This community type is sometimes a seral stage between northern sedge meadow and northern conifer swamp or northern hardwood swamp, but occurrences can be stable and persist at given locations for long periods of time. This type is common and widespread in northern and central Wisconsin, but also occurs at isolated locales in the southern part of the state. Alder thicket often occurs as a relatively stable community along streams and around lakes, but can occupy large areas formerly covered by conifer swamps that were logged during the Cutover and/or where water tables were raised. Stands of alder that originated following logging and/or wildfire will usually revert to forest, although on heavy, poorly drained soils, forest re-growth can be problematic owing to "swamping" effects. Groundwater seepage is an important attribute of alder thickets. Seepage areas are often indicated by the presence of skunk-cabbage, marsh-marigold, swamp saxifrage, American golden saxifrage, and marsh pennywort.

Northern Dry Forest

This forest community occurs on nutrient-poor sites with excessively drained sandy or rocky soils. The primary historic disturbance regime was catastrophic fire at intervals of ten to one hundred years. Dominant trees of mature stands include jack and red pines and/or Hill's oak. Large acreages of this forest type were cut and burned during the catastrophic logging of the late 19th and early 20th century. Much of this land was then colonized by white birch and/or quaking aspen, or converted to pine plantations starting in the 1920s. Today's forests have a greatly reduced component of pines, and a greater extent of aspen, red maple, and oaks as compared to historic conditions. Common understory shrubs are hazelnuts, early blueberry, and brambles (*Rubus* spp.); common herbs include bracken fern, starflower, barren-strawberry, cow-wheat, trailing arbutus, and members of the shinleaf family (*Chimaphila umbellata*, *Pyrola* spp.). Vast acreages of cutover land were also planted to pine, or naturally succeeded to densely stocked "dry" forests.

Northern Dry Forest community types most commonly occur on large, continuous glacial outwash or lake plain landforms. On these extensive xeric plains, historic fires were less likely to be halted by wetlands or mesic hills. Here, burns could be large and intense, creating ideal conditions for establishment of Northern Dry Forest.

Northern Dry-mesic Forest

In this forest community, mature stands are dominated by eastern white and red pines, sometimes mixed with northern red oak and red maple. Common understory shrubs are hazelnuts, blueberries, wintergreen, and partridge-berry. Among the dominant herbs are wild sarsaparilla, Canada mayflower, and cow-wheat.

Northern dry-mesic forests are typically found on irregular glacial topography (e.g., heads-of-outwash, tunnel channel deposits), or in areas with mixed glacial features (e.g., pitted outwash interspersed with remnant moraines). Soils are loamy sands or sands, and less commonly, sandy loams. Some occurrences are in areas where bedrock is close to the surface. Areas of northern dry-mesic forest that were historically dominated by red and white pines were considered the great "pineries" before the Cutover. Today, the extent of red and white pine stands is greatly decreased, while red maple, sugar maple, aspen, and oaks have increased. Historically, fire disturbance of low to moderate intensity and frequency was key to maintaining the northern dry-mesic forest type.

Northern Mesic Forest

Prior to Euro-American settlement, the northern mesic forest covered the largest acreage of any Wisconsin vegetation type. It is still very extensive, but made up of second-growth forests that developed following the Cutover. It forms the matrix for most of the other community types found in northern Wisconsin, and provides habitat for at least some portion of the life cycle of many species. It is found primarily north of the Tension Zone (Figure 2-2), on loamy soils of glacial till plains and moraines deposited by the Wisconsin glaciation. Sugar maple is dominant or co-dominant in most stands. Historically, eastern hemlock was the second most important species, sometimes occurring in nearly pure stands with eastern white pine; both of these conifer species are greatly reduced in today's forests. American beech can be a co-dominant with sugar maple in the counties near Lake Michigan. Other important tree species were yellow birch, basswood, and white ash. The groundlayer varies from sparse and species poor (especially in hemlock stands) with woodferns, blue-bead lily, club-mosses, and Canada mayflower, to lush and species-rich with fine spring ephemeral displays. Historically, Canada yew was an important shrub, but it is now absent from nearly all locations. Historic disturbance regimes were dominantly gap-phase windthrow; large windstorms occurred with long return periods. After old-growth stands were cut, trees such as quaking and bigtoothed aspens, white birch, and red maple became abundant and still are important in many second-growth northern mesic forests. Several distinct associations within this complex warrant recognition as communities, and draft abstracts of these are currently undergoing review.

Northern Sedge Meadow

This open wetland community is dominated by sedges and grasses and occurs primarily in northern Wisconsin. There are several common, fairly distinctive, subtypes: Tussock meadow, dominated by tussock sedge and Canada bluejoint grass; Broad-leaved sedge meadow, dominated by the robust sedges (*Carex lacustris* and/or *C. utriculata*); and Wire-leaved sedge meadow, dominated by woolly sedge and/or few-seeded sedge. Frequent associates include blue flag, marsh fern, marsh bellwort, manna grasses, panicked aster, Joe-Pye weed, and the bulrushes (*Schoenoplectus tabernaemontani* and *Scirpus cyperinus*). Sphagnum mosses are either absent or they occur in scattered, discontinuous patches. Sedge meadows occur on a variety of landforms and in several ecological settings that include depressions in outwash or ground moraine landforms in which there is groundwater movement and internal drainage, on the shores of some drainage lakes, and on the margins of streams and large rivers.

Oak Barrens

Black oak is often the dominant tree in this fire-adapted savanna community of xeric sites, but white oak, bur oak, northern pin oak, and occasionally red oak, may also be present. Common understory species include lead plant, black-eyed susan, round-headed bush-clover, goats rue, june grass, little bluestem,

flowering spurge, frostweed, false Solomon's-seal, spiderwort, and wild lupine. Some of the oak barrens remnants also contain patches of heath-like vegetation in addition to the prairie understory, with bracken fern, blueberries (*Vaccinium angustifolium* and *V. myrtilloides*), bearberry, and sweet fern locally common or even dominant. Distribution of this community is mostly in southwestern, central and west central Wisconsin.

The pine barrens and oak barrens communities described by Curtis (1959) share many similarities. In general, prairie species are better represented in the more oak-dominated barrens to the south, and pines and some of their characteristic associates are more prominent in the north. However, jack pine is an important component of some of Wisconsin's southernmost barrens occurrences (e.g., Gotham Jack Pines on the Wisconsin River in Richland County), and both red pine savanna and jack pine barrens were described in the Public Land Survey notes for Juneau County. Frequent fires can reduce the oaks to short, multi-stemmed "grubs", and result in the elimination of scattered large oaks that were formerly important in and characteristic of some areas.

Barrens communities occur on several landforms, especially outwash plains, lakeplains, and on the broad sandy terraces that flank some of the major rivers of southern Wisconsin. Soils are usually excessively well-drained sands, though thin-soiled, droughty sites over bedrock can also support this community. Similar communities include pine barrens, oak openings (drier sites), sand prairie, southern dry forest, Central Sands pine - oak forest, and bedrock glade.

Sand Barrens

Sand Barrens are herbaceous upland communities that develop on unstable or semi-stabilized alluvial sands along major rivers such as the Mississippi and Wisconsin. They are partly or perhaps wholly anthropogenic in origin, occurring on sites historically disturbed by plowing or very heavy grazing. Unvegetated "blow-outs" are characteristic features. Barrens, Dry Prairie and Sand Prairie species such as false-heather (*Hudsonia tomentosa*), bearberry (*Arctostaphylos uva-ursi*), sedges (*Cyperus filiculmis* and *C. schweinitzii*), sand cress (*Arabis lyrata*), three-awn grasses (*Aristida* spp.), rock spikemoss (*Selaginella rupestris*), and the earthstar fungi (*Geaster* spp.) are present in this community. Many exotics are present, and rare disturbance dependent species such as fameflower (*Talinum rugospermum*) occur in some stands.

Sand Prairie

Sand prairie is a dry native grassland community dominated by grasses such as little bluestem, J junegrass, panic grasses, and poverty-oat grass. Common herbaceous associates are sand cress, field sage-wort, western ragweed, several sedges (e.g., *Carex muhlenbergii*, *Cyperus filiculmis*, and *Cyperus schweinitzii*), flowering spurge, frostweed, round-headed bush-clover, western sunflower, false-heather, long-bearded hawkweed, stiff goldenrod, horsebalm, and spiderwort. Drought-adapted fungi, lichens, and mosses are significant components of sand prairie communities.

At least some stands classified as sand prairie are oak or pine barrens remnants that now lack appreciable woody cover. Extensive stands may have occurred historically on broad sand terraces bordering the Mississippi, Wisconsin, Black, and Chippewa Rivers. Sand prairie may be more prevalent now in some areas than it was in historical times. Failed attempts to farm many of these prairies created blowouts, and may have even reactivated small dunes once the prairie sod was removed. We have included the 'sand barrens' community described by Curtis (1959) with this type.

Tamarack (poor) Swamp

These weakly to moderately minerotrophic conifer swamps are dominated by a broken to closed canopy of tamarack (*Larix laricina*) and a frequently dense understory of speckled alder (*Alnus incana*). The understory is more diverse than in Black Spruce Swamps and may include more nutrient-demanding species such as winterberry holly (*Ilex verticillata*) and black ash (*Fraxinus nigra*). The bryophytes

include many genera other than Sphagnum. Stands with spring seepage sometimes have marsh-marigold (*Caltha palustris*) and skunk-cabbage (*Symplocarpus foetidus*) as common understory inhabitants. These seepage stands have been separated out as a distinct type or subtype in some nearby states and provinces.

Appendix E

The Glacial Lake Grantsburg 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 Glacial Lake Grantsburg Planning Group (GLGPG) in the Northwest Sands Ecological Landscape. Only SGCN with a high or moderate probability of occurring in the Northwest Sands Ecological Landscape are shown. Communities shown here are limited to those identified as “Major” or “Important” management opportunities in the Wisconsin Wildlife Action Plan (WDNR 2006b). Letters indicate the degree to which each species is associated with a particular habitat type (S=significant association, M=moderate association, and L=low association). Animal-community combinations shown here that are assigned as either “S” or “M” are also Ecological Priorities, as defined by the Wisconsin Wildlife Action Plan (see dnr.wi.gov/org/land/er/WWAP/ for more information about these data). Shaded species have been documented for the GLGPG.

	Major										Important			Present			
	Emergent Marsh	Emergent Marsh - Wild Rice	Inland lakes	Northern Dry Forest	Northern Dry-mesic Forest	Northern Sedge Meadow	Northern Wet Forest	Oak Barrens	Pine Barrens	Submergent Marsh	Surrogate Grasslands	Alder Thicket	Impoundments/Reservoirs	Northern Hardwood Swamp	Northern Wet-mesic Forest	Ephemeral Pond	Shrub Carr
Species that are Significantly Associated with the Northwest Sands Landscape																	
American Bittern	S	L				S					L	L					L
American Woodcock				L	L	L	L	L	L		L	S		M	L	L	S
Bald Eagle		L	S							M		S					
Banded Killifish			M														
Black Tern	S	M	M			M				M		M					
Black-backed Woodpecker				M	L		S		L						L		
Black-billed Cuckoo				L	L	L	L	M	M			S		L			S
Blanding's Turtle	S	S	S			M		S	S	S		M	S			S	M
Blue-winged Teal	S	M	M			M				M	M		M			L	
Bobolink						S					S						
Boreal Chorus Frog	S		S			S		S	S				S			S	
Brown Thrasher				L				S	S		M						
Bullsnake								S	S								
Connecticut Warbler				S	L		M		M								
Field Sparrow								M	M		M						
Franklin's Ground Squirrel								S	S		M						
Golden-winged Warbler				M	M		M		L			S		M	L		S
Gray Wolf				M	S	L	S	M	M			S		M	S		M

	Major											Important			Present		
	Emergent Marsh	Emergent Marsh - Wild Rice	Inland lakes	Northern Dry Forest	Northern Dry-mesic Forest	Northern Sedge Meadow	Northern Wet Forest	Oak Barrens	Pine Barrens	Submergent Marsh	Surrogate Grasslands	Alder Thicket	Impoundments/Reservoirs	Northern Hardwood Swamp	Northern Wet-mesic Forest	Ephemeral Pond	Shrub Carr
Species that are Significantly Associated with the Northwest Sands Landscape																	
Greater Redhorse			M									M					
Le Conte's Sparrow						S				S							
Least Darter			M														
Least Flycatcher				M	M								M	L		L	
Lesser Scaup	L	M	M							S		M					
Nelson's Sharp-tailed Sparrow						S											
Northern Flying Squirrel				M	S		S		L				M	S			
Northern Harrier	L	L				S		M	M		S	L					L
Northern Prairie Skink				M	M			S	S								
Osprey		L	S							L		S					
Pugnose Shiner			M														
Red Crossbill				S	S		L		M								
Red-headed Woodpecker				L	L			M	L								
River Redhorse																	
Sharp-tailed Grouse						M		S	S		M						L
Short-billed Dowitcher	S									L		M					
Trumpeter Swan	S	S	M			L				S		M					
Upland Sandpiper						L		M	M		S						
Veery				L	M		M				S		S	L		S	
Vesper Sparrow								S	S		L						
Water Shrew			M			L	S					M	L	S	S		L
Whip-poor-will				M	M			M	M								
Wood Turtle						M	M	S	S	S		S		M	M	M	S
Yellow Rail						S											
Species that are Moderately Associated with the Northwest Sands Landscape																	
American Golden Plover	M					L					M		M				
Blue-winged Warbler				L				L									M
Canada Warbler				L	M		M					M		S	S		L
Canvasback	L	M	M							S		M					
Dunlin	M											M					
Eastern Meadowlark											S						
Four-toed Salamander	S					M	M					S		M	S	S	S
Gilt Darter																	
Grasshopper Sparrow								M	L		S						
Hudsonian Godwit	S									L			L				

Major											Important			Present		
Emergent Marsh	Emergent Marsh - Wild Rice	Inland lakes	Northern Dry Forest	Northern Dry-mesic Forest	Northern Sedge Meadow	Northern Wet Forest	Oak Barrens	Pine Barrens	Submergent Marsh	Surrogate Grasslands	Alder Thicket	Impoundments/Reservoirs	Northern Hardwood Swamp	Northern Wet-mesic Forest	Ephemeral Pond	Shrub Carr

Species that are Moderately Associated with the Northwest Sands Landscape																
Lake Sturgeon			S									S				
Marbled Godwit	S								L	M		L				
Mink Frog	S	M	S		S	L			S		M	S	L	L	M	M
Mudpuppy			S									S				
Northern Goshawk				L	M								L	L		
Olive-sided Flycatcher				L	L		S		L		L			M		L
Pickerel Frog	S		M		S	M			S		M	S		M	S	M
Red-necked Grebe	S	L							M							
Red-shouldered Hawk				L	M								L	L	S	
Rusty Blackbird	M										M				M	M
Solitary Sandpiper	S				L						L				S	L
Wilson's Phalarope	S				S				M							
Wood Thrush				L		L							L	L		
Woodland Jumping Mouse				L	L	L	M		L		L		M	M	M	L

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/org/land/er/wlist/>).

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).