



Rapid Ecological Assessment for Amnicon Falls and Pattison State Parks Planning Group

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

Properties included in this report are:

Amnicon Falls State Park
Big Manitou Falls and Gorge State Natural Area
Pattison State Park

Wisconsin's Natural Heritage Inventory Program
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Cover Photo: Little Manitou Falls at Pattison State Park. Photo by: Richard Staffen

Table of Contents

| | |
|---|-----------|
| Acknowledgments | 2 |
| Table of Contents..... | 3 |
| List of Figures..... | 4 |
| List of Tables..... | 4 |
| Appendices..... | 4 |
| Executive Summary | 7 |
| Introduction | 8 |
| Purpose and Objectives..... | 8 |
| Overview of Methods | 8 |
| Background on Past Efforts | 11 |
| Special Management Designations | 11 |
| Regional Ecological Context | 12 |
| Regional Biodiversity Needs and Opportunities..... | 12 |
| Rare Species of the Superior Coastal Plain and Northwest Lowlands Ecological Landscapes | 13 |
| Description of the Study Area | 15 |
| Location and Size..... | 15 |
| Ecoregions | 15 |
| Physical Environment | 17 |
| Vegetation..... | 18 |
| Rare Species and High Quality Natural Communities of the Amnicon Falls and Pattison State Parks Planning Group | 23 |
| Management Considerations and Opportunities for Biodiversity Conservation ... | 25 |
| Landscape Level Priorities..... | 25 |
| Community Level Priorities..... | 26 |
| High Conservation Value Forests | 27 |
| Ecological Priorities for SGCN | 27 |
| Priority Conservation Actions..... | 27 |
| Wisconsin’s Statewide Forest Strategy..... | 28 |
| Natural Community Management Opportunities..... | 29 |
| Invasive Plants | 29 |
| Primary Sites: Site-specific Opportunities for Biodiversity Conservation | 31 |
| Future Needs | 33 |
| Glossary | 34 |
| Species List | 36 |

| | |
|-----------------------------------|-----------|
| Reference List | 37 |
| Additional Resources | 40 |

List of Figures

| | |
|--|----|
| Figure 1: Location of Properties within the Amnicon Falls and Pattison State Parks Planning Group..... | 10 |
| Figure 2: Ecological Landscapes of Wisconsin and the study area..... | 12 |
| Figure 3: Landtype Associations for the area comprising the Amnicon Falls and Pattison State Parks Planning Group..... | 16 |
| Figure 4: Vegetation for the study area prior to Euro-American settlement. Data are from Finley (1976)..... | 19 |
| Figure 5: Landcover for Amnicon Falls and Pattison State Parks from the Wisconsin DNR Wiscland GIS coverage (WDNR 1993)..... | 22 |
| Figure 6: Primary Sites of the Amnicon Falls and Pattison State Parks Planning Group..... | 32 |

List of Tables

| | |
|--|----|
| Table 1. Major Natural Communities Management Opportunities in the Superior Coastal Plain Ecological Landscape..... | 13 |
| Table 2. Major Natural Communities Management Opportunities in the Northwest Lowlands Ecological Landscape..... | 13 |
| Table 3. Listing Status for rare species in the Superior Coastal Plain Ecological Landscape as of November 2009..... | 14 |
| Table 4. Listing Status for rare species in the Northwest Lowlands Ecological Landscape as of November 2009..... | 14 |
| Table 5. Documented rare species and high-quality natural communities for the Amnicon Falls and Pattison State Parks Planning Group..... | 23 |
| Table 6. Invasive Plants of Amnicon Falls State Park..... | 29 |

Appendices

- A. Natural Heritage Inventory Methods Overview and Working List Explanation
- B. Map of Conservation Opportunity Areas for the Superior Coastal Plain Ecological Landscape

C. Descriptions for Rare Species and High Quality Natural Communities Documented on the Amnicon Falls and Pattison State Parks Planning Group

D. Amnicon Falls and Pattison State Parks Planning Group Species of Greatest Conservation Need

E. Primary Sites within the Amnicon Falls and Pattison State Parks Planning Group

Amnicon and Pattison State Parks At a Glance

Exceptional Characteristics of the Study Area

- **Rare Animals and Plants.** The diverse habitats of Amnicon Falls and Pattison State Parks (AFPSP) support numerous rare species. Thirteen rare animal species are known from the AFPSP, including one Federally Endangered mammal, two State Threatened herptiles, and ten Special Concern species. Twelve rare plants are known from the project area including two State Threatened species.
- **Older Forests / Old Growth Forests.** Older forests can support high densities of certain forest herbs, as well as certain unique assemblages of birds and other animals that are rare in the state. Some structural attributes associated with old growth forests exist in the Northern Mesic Forest at Pattison State Park. Examples of these older forests are not well represented within the Superior Coastal Plain Ecological Landscape.
- **Boreal Forest.** This natural community, always geographically restricted in the state, is currently rare with limited suitable locations in Wisconsin. The Superior Glacial Plain Ecological Landscape was the only area in the state to historically support sizable tracts of Boreal Forest (WDNR 2006a). Small, moderate-quality examples still exist on the AFPSP, but a sizable acreage of lower-quality stands with restoration potential is also present.
- **Amnicon / Black Rivers and Tributaries.** The free-flowing stretches of the Amnicon and Black Rivers and Copper Creek provide important habitat for many rare animal species, and management of lands adjacent to the river will have important effects on water quality. Many of the areas along the river slopes contain maturing forests, as well as steep cliffs that harbor rare plant assemblages.

Site Specific Opportunities for Biodiversity Conservation

Four ecologically important sites were identified on the AFPSP. These “Primary Sites” were delineated because they generally encompass the best examples of 1) representative and rare 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.

- **Copper Creek Gorge.** This Primary Site encompasses a scenic gorge where waterfalls are abundant along Copper Creek and good-quality Dry Cliff communities supporting rare plants. The surrounding forest offers major opportunities to enhance a Boreal Forest in the most appropriate ecological landscape for this community in the state.
- **Pattison Mesic Forest.** This site represents a large block of older-aged, rich, mesic forest connected to the Northwest Lowlands Ecological Landscape, where forest cover types are the dominant natural communities. Connecting and expanding these unfragmented forests would benefit numerous uncommon plants and animals. Promoting mature forests and their associated structural complexity would be an important consideration for this site considering older hardwood forest stands are uncommon in this area.
- **Amnicon River and Dry-mesic Forest.** The Amnicon River reflects the value of Outstanding Resource Water where it flows through Amnicon Falls State Park. The narrow block of older upland Northern Dry-mesic Forest protects this water resource and supports numerous rare plants and animals. There are also small inclusions of open wetlands within the site that provide important habitat for amphibians within the park.
- **Big Manitou Falls and Gorge SNA.** This primary site protects rare cliff communities, numerous rare species, ecologically significant forest types, and unique geological features.

Introduction

Purpose and Objectives

This report is intended to be used as a source of information for developing a new master plan for the Amnicon Falls and Pattison State Parks Planning Group (AFPSP; Figure 1). The regional ecological context for the AFPSP 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:

- Amnicon Falls State Park
- Big Manitou Falls and Gorge State Natural Area (SNA)
- Pattison State Park

The primary objectives of this project were to collect biological inventory information relevant to the development of a master plan for the AFPSP 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 AFPSP 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. This report provides much of the same information as in “Biotic Inventory” reports, although, the inventory was limited to a “rapid ecological assessment.” There will, undoubtedly, be gaps in our knowledge of the biota of this property, especially for certain taxon 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 Web site (*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.

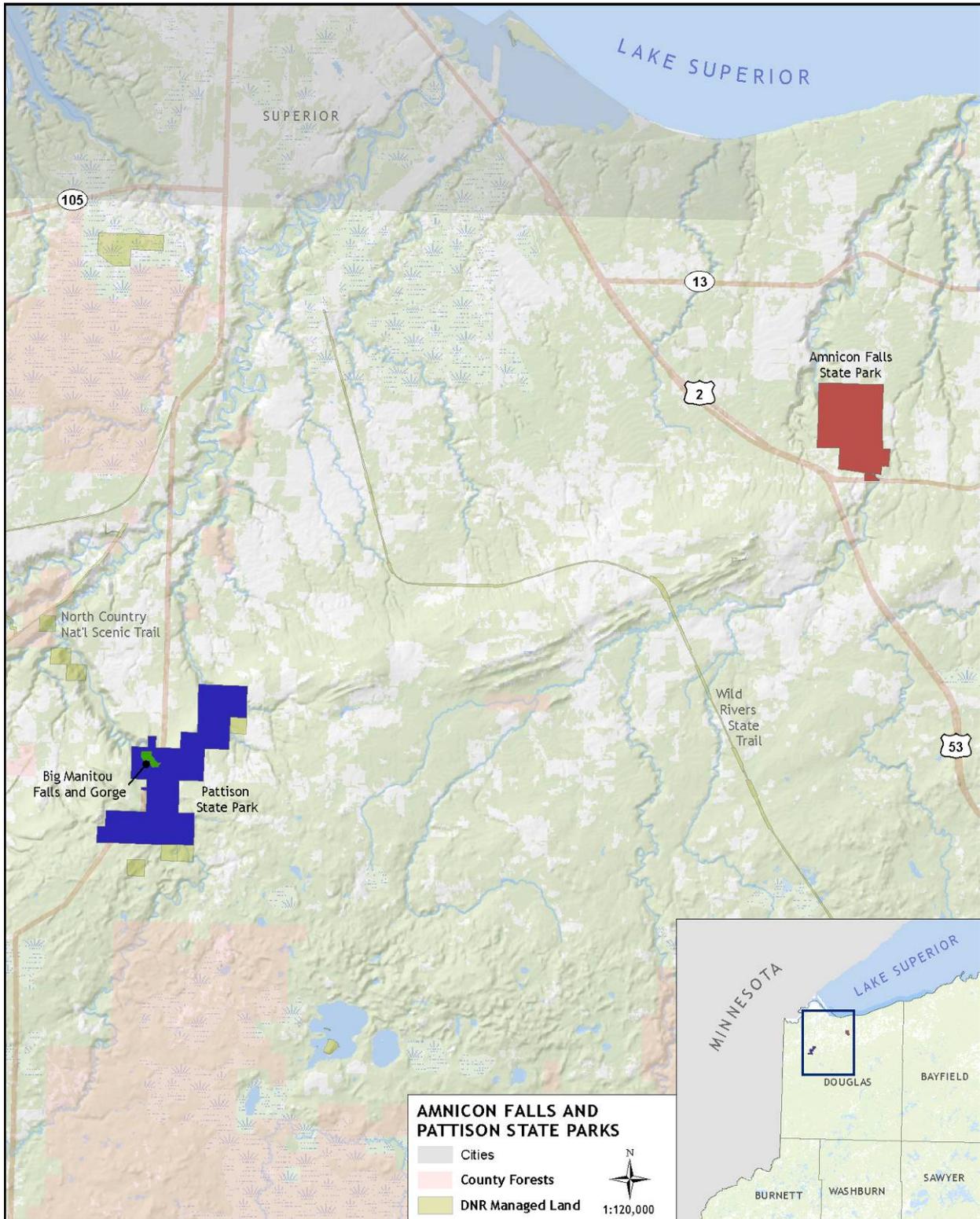
Existing NHI data are often the starting point for conducting a biotic inventory to support master planning. Prior to this project, NHI data for the AFPSP were limited to: 1) the Statewide Natural Area Inventory, a county-by-county effort conducted by WDNR's Bureau of Research and Endangered Resources between 1969 and 1984 that focused on natural communities but include some surveys for rare plants and animals, 2) WDNR's eagle and osprey aerial surveys, 3) Flora of Amnicon Falls State Park (Hlina et al. 2008), and 4) other taxa-specific surveys.

The most recent taxa-specific field surveys for the study area were conducted during 2009. Surveys were limited in scope and focused on documenting high-quality natural communities, rare plants, breeding birds, and rare herptiles. The collective results from all of these surveys were used, along with other information, to identify ecologically important areas (Primary Sites) at Amnicon Falls and Pattison State Parks.

Survey locations were identified 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 Amnicon Falls and Pattison State Parks, key inventory considerations included the identification of remaining high-quality Boreal Forest, along with older growth stands of mixed coniferous - hardwood forest, rare forest bird communities, representative rare fauna associated with aquatic features found at the state parks, and the location of additional habitats that had the potential to support rare species. Private lands surrounding the state parks were not surveyed.

Scientific names for all species mentioned in the text are included in a list on page 36.

Figure 1: Location of Properties within the Amnicon Falls and Pattison State Parks Planning Group



Background on Past Efforts

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

The **Land Legacy Report** (WDNR 2006a) was designed to identify Wisconsin's most important conservation and recreation needs for the next 50 years. The report identifies the Black River and Manitou Fall within Pattison State Park as a high-quality river system protecting a number of rare species and an important tributary to the Necedah River. Wisconsin is at the southern limit of the range of the Boreal Forest, and the river and state park marks the separation between the Boreal Forest habitat to the north and northern mesic and aspen forests to the south.

The **Nature Conservancy (TNC): Superior Mixed Forest Ecoregional Plan** (TNC 2002) identified a portfolio of terrestrial and aquatic "Conservation Areas" representing viable natural community types, globally rare native species, and other selected features. The AFPSP comprises a portion of a terrestrial TNC Conservation Area called the Necedah Peatlands Conservation Area, an 187,314-acre site that includes Pattison State Park, the Black River, and Douglas County forest. The Black River is also a TNC Great Lakes Ecoregion Aquatic Sites Conservation Area.

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 AFPSP are:

- Big Manitou Falls and Gorge State Natural Area

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

Outstanding and Exceptional Resource Waters (ORW and ERW) are officially designated (NR 102.11) waters that provide outstanding recreational opportunities, support valuable fish and wildlife habitat, have good water quality, are not significantly impacted by human activities, and, thereby recognized as being the highest quality waters in the state. Outstanding Resource Waters typically do not have any point sources discharging pollutants directly to the water (for instance, no industrial sources or municipal sewage treatment plants) and no increases of pollutant levels are allowed. If a waterbody has existing point sources at the time of designation, it is more likely to be designated as an ERW. Of Wisconsin's 15,000 lakes and impoundments, 103 are designated as ORW—fewer than 1%. The Amnicon River, which flows through Amnicon Falls State Park, is a designated Outstanding Resource Water and Copper Creek Tributary within Pattison State Park is a designated Exceptional Resource Water.

Regional Ecological Context

This section is largely reproduced from the Ecological Landscapes of Wisconsin Handbook (WDNR In Prep. a). This handbook was developed by the WDNR Ecosystem Management Planning Team (EMPT) and 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 WDNR has mapped the state into areas of similar ecological potential and geography called Ecological Landscapes. The Ecological Landscapes are based on aggregations of smaller ecoregional units (Subsections) from a national system of delineated ecoregions known as the National Hierarchical Framework of Ecological Units (NHFEU) (Cleland et al. 1997). These ecoregional classification systems delineate landscapes of similar ecological pattern and potential for use by resource administrators, planners, and managers.

Amnicon Falls and Pattison State Parks are primarily located in the *Superior Coastal Plain* Ecological Landscape with the very southern portion of Pattison State Park located in the *Northwest Lowlands* Ecological Landscape (Figure 2). The Superior Coastal Plain is Wisconsin's northernmost Ecological Landscape, bordered on the north by southwestern Lake Superior and strongly influencing the local climate, resulting in cooler summers, warmer winters, and greater precipitation compared to more inland locations (WDNR In Prep. a). The major landform in this Ecological Landscape is a nearly level plain of lacustrine clays that slopes northward toward Lake Superior (WDNR In Prep. a). Historically this Ecological Landscape was almost entirely forested with a mixture of white pine (*Pinus strobus*), white spruce (*Picea glauca*), balsam fir (*Abies balsamea*), paper birch (*Betula papyrifera*), balsam poplar (*Populus balsamifera*), trembling aspen (*Populus tremuloides*), and northern white-cedar (*Thuja occidentalis*) (WDNR In Prep. a). The present clay plain forest has been fragmented by agricultural use, and today approximately one-third of this landscape is non-forested. Aspen and birch forests occupy about 40% of the total land area, having increased in prominence over the boreal conifers (WDNR In Prep. a). The Northwest Lowlands Ecological Landscape was historically almost entirely forested with upland forest vegetation composed mostly of paper birch, balsam fir, sugar maple (*Acer saccharum*), aspen (*Populus* spp.), and white spruce (WDNR In Prep. a). The lowlands supported extensive wet forest of black spruce (*Picea mariana*) and tamarack (*Larix laricina*), and some cedar and black ash swamps (WDNR In Prep. a). The present-day forests remain extensive and relatively unbroken, occupying about 76% of the landscape (WDNR In Prep. a).

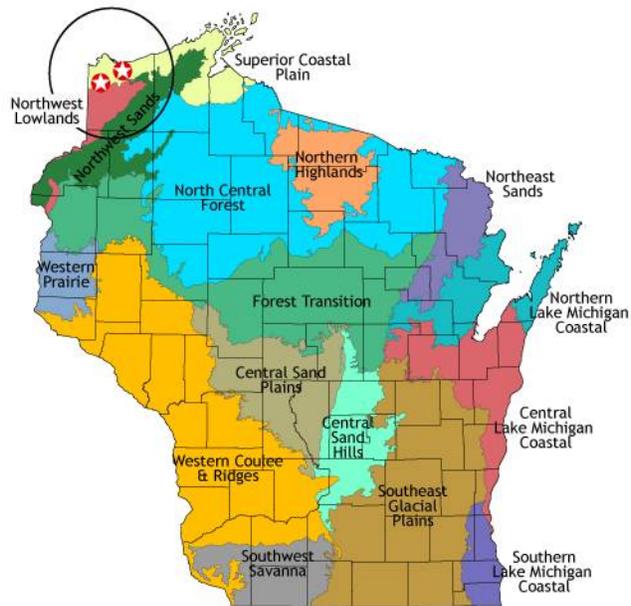


Figure 2: Ecological Landscapes of Wisconsin and the study area

Regional Biodiversity Needs and Opportunities

Opportunities for sustaining natural communities in the Superior Coastal Plain and Northwest Lowlands Ecological Landscapes 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 historically occurred in a given landscape and 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. These are the most appropriate community types that could be considered for conservation/management activities within the Superior Coastal Plain and Northwest Lowlands Ecological Landscapes.

There are management opportunities for 30 natural communities in the Superior Coastal Plain 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 14 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 does occur 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 Superior Coastal Plain Ecological Landscape (EMPT 2007; WDNR 2006b)

| | | | |
|-------------------|----------------------------|--------------------|-------------------|
| Boreal Forest | Emergent Marsh | Great Lakes Dune | Open Bog |
| Coldwater streams | Emergent Marsh - Wild Rice | Interdunal Wetland | Shore Fen |
| Coolwater streams | Great Lakes Barrens | Lake Superior | Submergent Marsh |
| Dry Cliff | Great Lakes Beach | Moist Cliff | Warmwater streams |

There are management opportunities for 13 natural communities in the Northwest Lowlands Ecological Landscape. Of these, four are considered “major” opportunities (Table 2) and an additional nine natural communities are considered “important” in this landscape.

Table 2. Major Natural Communities Management Opportunities in the Northwest Lowlands Ecological Landscape (EMPT 2007; WDNR 2006b)

| | | | |
|-----------------------|---------------------|----------|------------------|
| Northern Sedge Meadow | Northern Wet Forest | Open Bog | Warmwater rivers |
|-----------------------|---------------------|----------|------------------|

Rare Species of the Superior Coastal Plain and Northwest Lowlands Ecological Landscapes

Numerous rare species are known from the Superior Coastal Plain and Northwest Lowlands Ecological Landscapes. “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.” Tables 3 and 4 list the number of species known to occur in the Superior Coastal Plain and Northwest Lowlands Ecological Landscapes based on information stored in the NHI database as of November 2009 (WDNR In Prep. a).

Table 3. Listing Status for rare species in the Superior Coastal Plain Ecological Landscape as of December 2009 (WDNR In Prep. a)

| Listing Status | Birds | Fishes | Herptiles | Invertebrate s | Mammal s | Plant s | Total Fauna | Total Flora | Total Rare |
|-----------------------|--------------|---------------|------------------|---------------------------|---------------------|--------------------|------------------------|------------------------|-----------------------|
| WI Endangered | 4 | 0 | 0 | 0 | 1 | 10 | 5 | 10 | 15 |
| WI Threatened | 3 | 0 | 2 | 0 | 0 | 18 | 5 | 18 | 23 |
| WI Special Concern | 21 | 2 | 2 | 25 | 2 | 53 | 52 | 53 | 105 |
| U.S. Endangered | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 2 |
| U.S. Threatened | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| U.S. Candidate | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table 4. Listing Status for rare species in the Northwest Lowlands Ecological Landscape as of November 2009 (WDNR In Prep. a)

| Listing Status | Birds | Fishes | Herptiles | Invertebrate s | Mammal s | Plant s | Total Faun a | Total Flor a | Total Rare |
|-----------------------|--------------|---------------|------------------|---------------------------|---------------------|--------------------|-----------------------------|-----------------------------|-----------------------|
| WI Endangered | 0 | 0 | 0 | 4 | 1 | 3 | 5 | 3 | 8 |
| WI Threatened | 4 | 4 | 2 | 2 | 0 | 6 | 12 | 6 | 18 |
| WI Special Concern | 11 | 2 | 2 | 31 | 1 | 15 | 47 | 15 | 62 |
| U.S. Endangered | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 0 | 2 |
| U.S. Threatened | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| U.S. Candidate | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |

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 43 vertebrate SGCN significantly associated with the Superior Coastal Plain Ecological Landscape and 26 vertebrate SGCN significantly associated with the Northwest Lowlands Ecological Landscape (See Appendix D). 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 study area, comprising about 2,278 acres, is located in northern Douglas County (Figure 1). Located within the Superior Coastal Plain and Northwest Lowlands Ecological Landscapes, the two state parks are located just south and southeast of the city of Superior. Pattison State Park is located along State Highway 35 and Amnicon Falls State Park is located along United States Highway 2; they are approximately 9.5 miles apart. Both parks are significantly associated with regionally important river systems, the Amnicon and Black Rivers, both of which eventually flow into nearby Lake Superior.

Properties included in the AFPSP are:

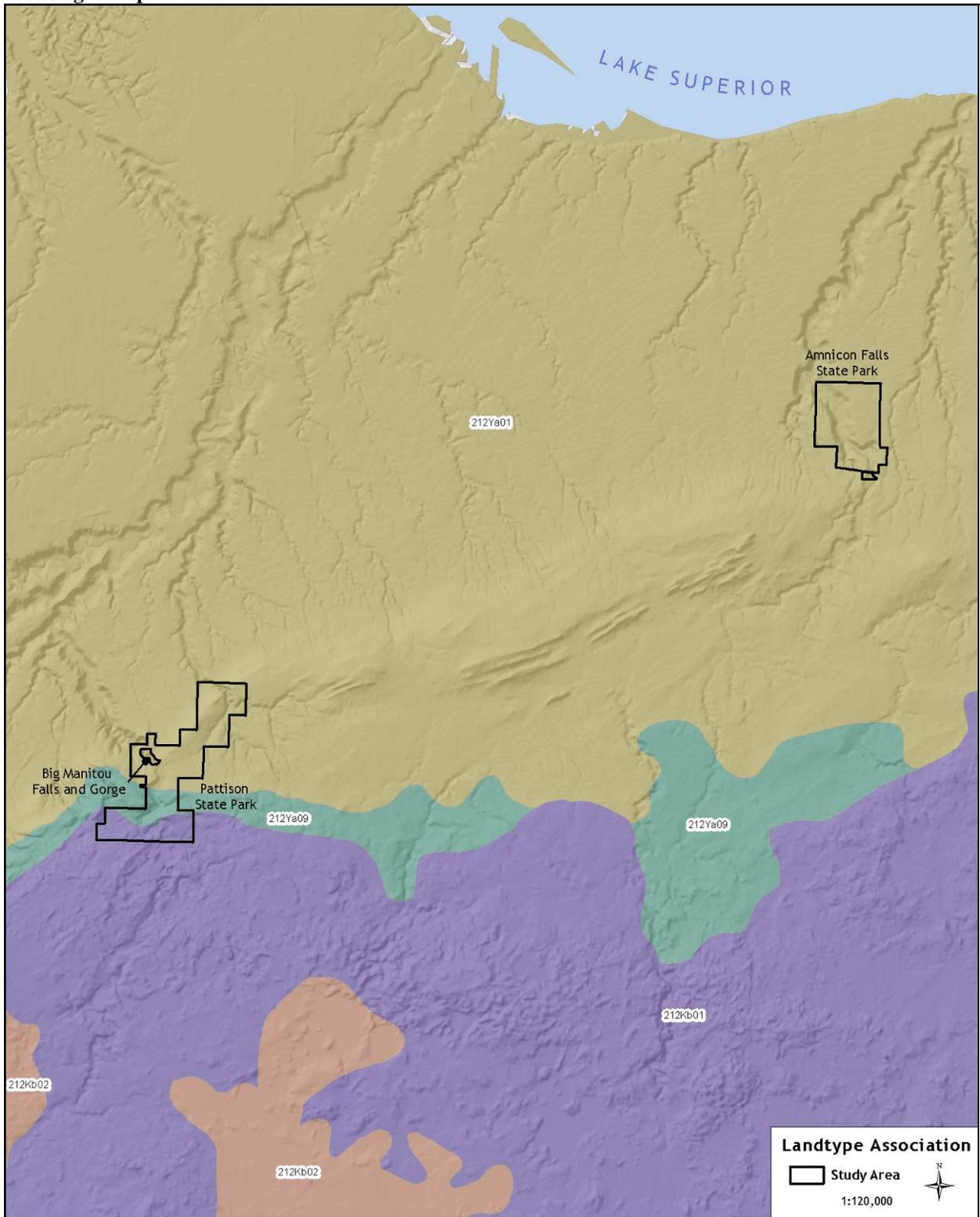
- **Amnicon Falls State Park** (832 acres) is located in north-central Douglas County, about 13 miles southeast of the City of Superior, along the Amnicon River which drains into Lake Superior.
- **Pattison State Park** (1,446 acres), including Big Manitou Falls and Gorge SNA, is located in northwest Douglas County, about 14 miles south of the City of Superior, along the Black River, a tributary to the Nemadji River which drains into Lake Superior.

Ecoregions

From the National Hierarchical Framework of Ecological Units (NHFEU), the units most relevant to this study are two Subsections: the Superior/Ashland Clay Plain (212Ya) and the Mille Lacs Uplands (212Kb) and three Landtype Associations (LTA; Figure 3). The following Landtype Associations are within the study area:

- Douglas Lake-Modified Till Plain (212Ya01). The characteristic landform pattern is undulating modified lacustrine moraine with deep v-shaped ravines. Soils are predominantly somewhat poorly drained clay over calcareous clay till or loamy lacustrine. This LTA comprises 75% of the study area.
- Pattison Moraines (212Kb01). The characteristic landform pattern is rolling collapsed moraine. Soils are predominantly well drained sandy loam over acid loamy sand till. This LTA comprises 15% of the study area.
- Carlton Plains (212Ya09). The characteristic landform pattern is undulating outwash plains and lake plains with old beaches and dunes common. Soils are predominantly excessively drained sand over outwash or loamy lacustrine. This LTA comprises 10% of the study area.

Figure 2: Landtype Associations for the area comprising the Amnicon Falls and Pattison State Parks Planning Group



Physical Environment

Geology and Geography

The AFPSP reveals much about the geologic history of this area, including earthquakes, lava flows, and glaciers. The AFPSP lies along the Douglas Fault, a southwest-to-northeast trending fault line that is mostly concealed by Glacial Lake Duluth sediments. About 900 million years ago, this fault raised Precambrian volcanic basalts against the younger Precambrian sandstone, resulting in the escarpment that overlooks the Lake Superior lowlands to the north (Dott and Attig 2004).

This area was glaciated most recently by the Superior Lobe and the Chippewa Sublobe between about 11,500 and 9,500 yrs before present; these lobes were the last advances of the Laurentide Ice Sheet into Wisconsin at the end of the last glaciation. Glacial Lake Duluth, of which the sandy beach deposits between Little Manitou Falls and Interfalls Lake at Pattison State Park mark the southeastern shoreline, deposited sediments that modified the surface of the entire area (Dott and Attig 2004). Rivers and streams in this area, including the Amnicon and Black Rivers, cut through the red clayey till and glacial lake sediments to reveal the basaltic bedrock below.

Within Amnicon Falls State Park, the Amnicon River has three waterfalls; the upper two flow over resistant basalts and the lower one flows over sandstone (Dott and Attig 2004). The steeply inclined Douglas Fault is visible as a zone of shattered rock as it crosses the river just below the Upper Falls and adjacent to Snake Pit Falls.

Within Pattison State Park the Black River has eroded through clayey Glacial Lake Duluth sediment to reveal the bedrock and created Big and Little Manitou Falls (Dott and Attig 2004). The Douglas Fault travels through Pattison State Park, although it is concealed by deposits from Glacial Lake Duluth.

Soils

(An excerpt from the Ecological Landscapes of Wisconsin Handbook [WDNR In Prep. a])

The soils of the AFPSP are characterized as “red clay” soils that are made up of reddish-brown, clayey glacial till, and lake-deposited clay and silt. The clay is derived from deep lake-bottom deposits in the Superior Basin, and gets its color from the reddish Precambrian sandstones. It is also slightly calcareous, possibly due to inputs of glacial materials from Minnesota transported via meltwater sediments through the St. Louis River valley. These materials are thought to have been derived from limestone and dolomite in Manitoba and transported to Minnesota by the St. Louis Lobe of the glacier. The soils are moderately well drained and clayey, with a clay loam surface, very slow permeability, and very high available water capacity. Soil drainage classes range from well-drained to somewhat poorly drained. Surface textures are generally clay to silt loam; permeability ranges from very slow to moderately slow, and available water capacity ranges from moderate to very high.

The fine textures and slow permeability of these soils give them many of the functional characteristics of wetland soils, even when they occur on uplands. Water moves out of them very slowly, and surface ponding from runoff can be common in basins and lower-lying areas. Vegetation communities on these soils typically contain species characteristic of wetlands, including northern white-cedar, black ash (*Fraxinus nigra*), and speckled alder (*Alnus incana*).

Hydrology

Both of the AFPSP properties are within the Lake Superior Basin. The AFPSP is primarily drained by two large river systems, the Amnicon and Black Rivers with Copper Creek and a few unnamed tributaries also present. Interfalls Lake is present on the AFPSP and was formed by a dam on the Black River at Pattison State Park. There are no other named or unnamed lakes on either of the properties.

The Amnicon River, which flows through Amnicon Falls State Park, is a lightly-stained, warmwater drainage stream originating at the outlet of Amnicon Lake and flows in a northeasterly direction on its way to Lake Superior (Sather and Johannes 1972). The Amnicon River has a large watershed located mainly on Lake Superior red clay soils resulting in varying base flows with periods of high volume, during snowmelt and heavy precipitation (Sather and Johannes 1972). Scenic Amnicon Falls is the major attraction of Amnicon Falls State Park. The stream channel is heavily eroded below the falls with boulders, gravel, sand, and clay the predominant bottom types (Sather and Johannes 1972).

The Black River flows through Pattison State Park before emptying into the Nemadji River south of the city of Superior. The Black River flows over a relatively flat plain of lake clays and glacial stream deposits resulting in darkly stained swamp water before flowing over the Superior escarpment at Pattison State Park (Sather and Johannes 1972). The results of this river-escarpment convergence are evidenced by the spectacular Big Manitou Falls, the highest waterfall in Wisconsin (165 feet), and Little Manitou Falls, both found within the park. The Black River is a class 3 trout stream above Interfalls Lake with gravel and boulders predominant along these areas, and sand, silt, and clay the dominant stream bottom types below Big Manitou Falls.

A medium hard water drainage stream, Copper Creek flows generally north off the Superior escarpment into the Nemadji River. A portion of the creek, classified as a Class 2 trout stream, and several other unnamed tributaries, flow through the northernmost portion of Pattison State Park. Boulder is the predominant stream bottom type with sand, gravel, and clay also present (Sather and Johannes 1972). A scenic waterfall and deep gorge are present in the park where Copper Creek tumbles over the Superior escarpment (Sather and Johannes 1972).

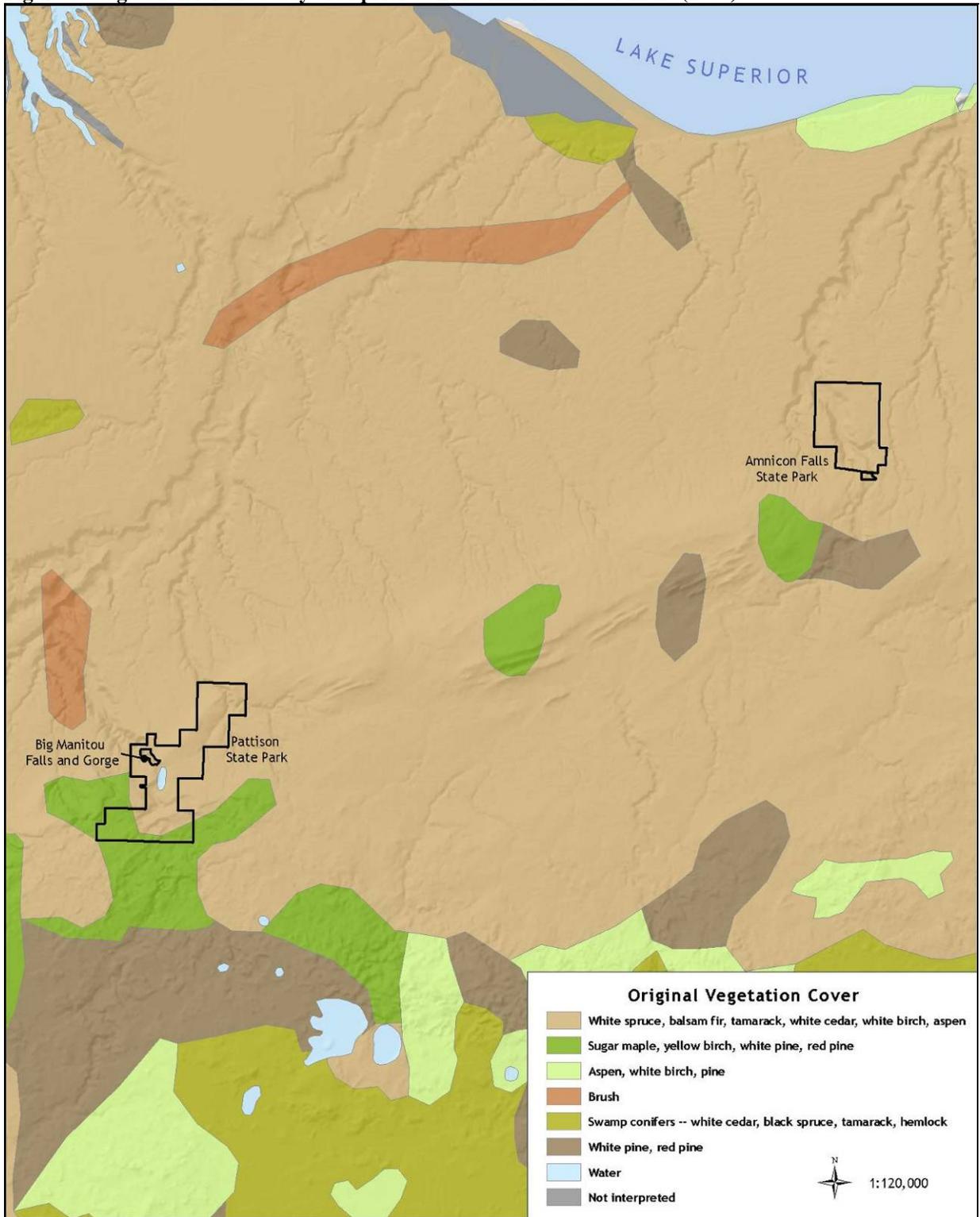
Vegetation

Historical Vegetation

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. a). Public Land Surveys for the area comprising the AFPSPG were conducted between 1851 and 1860.

Finley's (1976) Pre-settlement Vegetation map (Figure 4) identifies the study area as being dominated by Boreal Forests of white spruce, balsam fir, tamarack, northern white-cedar, paper birch, and aspen. In the very southern part of Pattison State Park, a mesic forest of sugar maple, yellow birch (*Betula alleghaniensis*), white pine, and red pine (*Pinus resinosa*) was identified.

Figure 3: Vegetation for the study area prior to Euro-American settlement (1976).



Current Vegetation

The AFPSP properties are embedded primarily within the Lake Superior clay plain, an area now largely aspen dominated deciduous forest, with scattered areas of conifers including Boreal Forest, and some agricultural land and high density development near the city of Superior (Figure 5). Currently, Amnicon Falls State Park is largely comprised of early successional, upland forest predominantly of trembling aspen with balsam fir. There are remnants of upland conifer forest still present, but they are restricted to along the Amnicon River. Small wetlands of Northern Sedge Meadow and Hardwood Swamp add to the overall diversity of the property. Pattison State Park has good-quality Northern Mesic Forest on the uplands at the south end of the park. Ephemeral Ponds are scattered throughout the mesic forest with Alder Thickets, wet conifer forests, and Hardwood Swamps present in shallow, wet depressions primarily in the southern half of the park. There are restoration opportunities for Boreal Forest remaining in patches near Big Manitou Falls and Gorge State Natural Area, and along Copper Creek in the northernmost reaches of the park. Current vegetation for all properties is described by natural community type.

Boreal Forest

Recovering stands of Boreal Forest exist in the northern portion of **Pattison State Park** with better quality examples found on narrow ridgetops and highly-erodible clay slopes along Copper Creek. Farther away from the slopes along Copper Creek the forest becomes younger and more heavily dominated by trembling aspen. Restoration potential exists in the park to enhance the Boreal Forest natural community. There are smaller inclusions of Boreal Forest along the Black River near Big and Little Manitou Falls. Forested Seeps are scattered throughout and elements of Boreal Forest intergrade into Hardwood Swamp and Northern Mesic Forest in the southeast portion of **Pattison State Park**. These areas add to the overall diversity of the forest and are known to harbor rare plants and animals. Characteristic canopy species include white spruce, balsam fir, northern white-cedar, white and red pine, paper birch, and trembling aspen. Representative understory herbs include large-leaved aster (*Aster macrophyllus*), American spikenard (*Aralia racemosa*), northern bluebells (*Mertensia paniculata*), northern sweet-colt's-foot (*Petasites frigidus*), rusty cliff fern (*Woodsia ilvensis*), and thimbleberry (*Rubus parviflorus*).

Northern Mesic Forest

Further south in **Pattison State Park** the landscape begins to change to rolling moraines with well-drained sandy loam soils. Here, the plant community changes to mature, good-quality Northern Mesic Forest. It has a closed canopy dominated by timber-sized sugar maple with red oak (*Quercus rubra*), basswood (*Tilia americana*), red maple (*Acer rubrum*), trembling aspen (in pockets), yellow birch (medium to large diameter), paper birch (some old and large), and scattered very large diameter (22 inches and above diameter breast height [dbh]) white pine. There are areas with inclusions of red pine, white spruce, balsam fir, northern white-cedar and black ash. Canopy trees are uneven-aged and include a good distribution of large diameter (14-16 inches and above dbh) trees. Coarse woody debris is well-developed, and moderate to good pit-and-mound topography is present. The subcanopy is variably dense with low to moderate coverage of primarily sugar maple. The tall shrub and sapling layer has low coverage of balsam fir, lesser amounts of sugar maple, eastern hop-hornbeam (*Ostrya virginiana*), and beaked hazelnut (*Corylus cornuta*). The rich ground flora is variable and patchily distributed with some very rich pockets and others tending towards dry-mesic. Spring ephemerals include wild leek (*Allium tricoccum*), bloodroot (*Sanguinaria canadensis*), Carolina spring-beauty (*Claytonia caroliniana*), Dutchman's-breeches (*Dicentra cucullaria*), and blue cohosh (*Caulophyllum thalictroides*). Cut-leaved toothwort (*Cardamine concatenata*) and a few others were more scattered. The most common herbs in general were Pennsylvania sedge (*Carex pensylvanica*), various *Aralia* species, and large-leaved aster (*Aster macrophyllus*). Ephemeral ponds are present throughout the forest.

Ephemeral Pond

There are numerous examples of Ephemeral Ponds scattered throughout the mesic forest areas of **Pattison State Park**, adding greatly to the biological diversity of these areas. Little vegetation data was collected in the ponds, but the presence of a moist, closed canopy forest with downed woody debris was noted in and around the ponds, which are important structural components necessary for many amphibians. Collecting additional vegetation and invertebrate data from these ponds has been identified as a future need for the project area.

Dry Cliff

Two examples of Dry Cliff communities are located at **Pattison State Park**. The steep cliffs rising above Copper Creek have characteristic sandstone bedrock eroded down to the underlying basalt in places, while igneous cliffs are found within the Big Manitou Falls and Gorge SNA. Moisture conditions vary depending upon the aspect, with south- and west-facing cliffs being very dry. Characteristic Dry Cliff species are present here, including many ferns, like common polypody (*Polypodium virginianum*), rusty woodsia (*Woodsia ilvensis*), narrow beech fern (*Phegopteris connectilis*), bladder fern (*Cystopteris fragilis*), spinulose wood fern (*Dryopteris carthusiana*), common lady fern (*Athyrium filix-femina*), and some rare fern species. Other dry cliff species observed include columbine (*Aquilegia canadensis*), harebell (*Campanula rotundifolia*), pale corydalis (*Corydalis sempervirens*), and bush-honeysuckle (*Diervilla lonicera*).

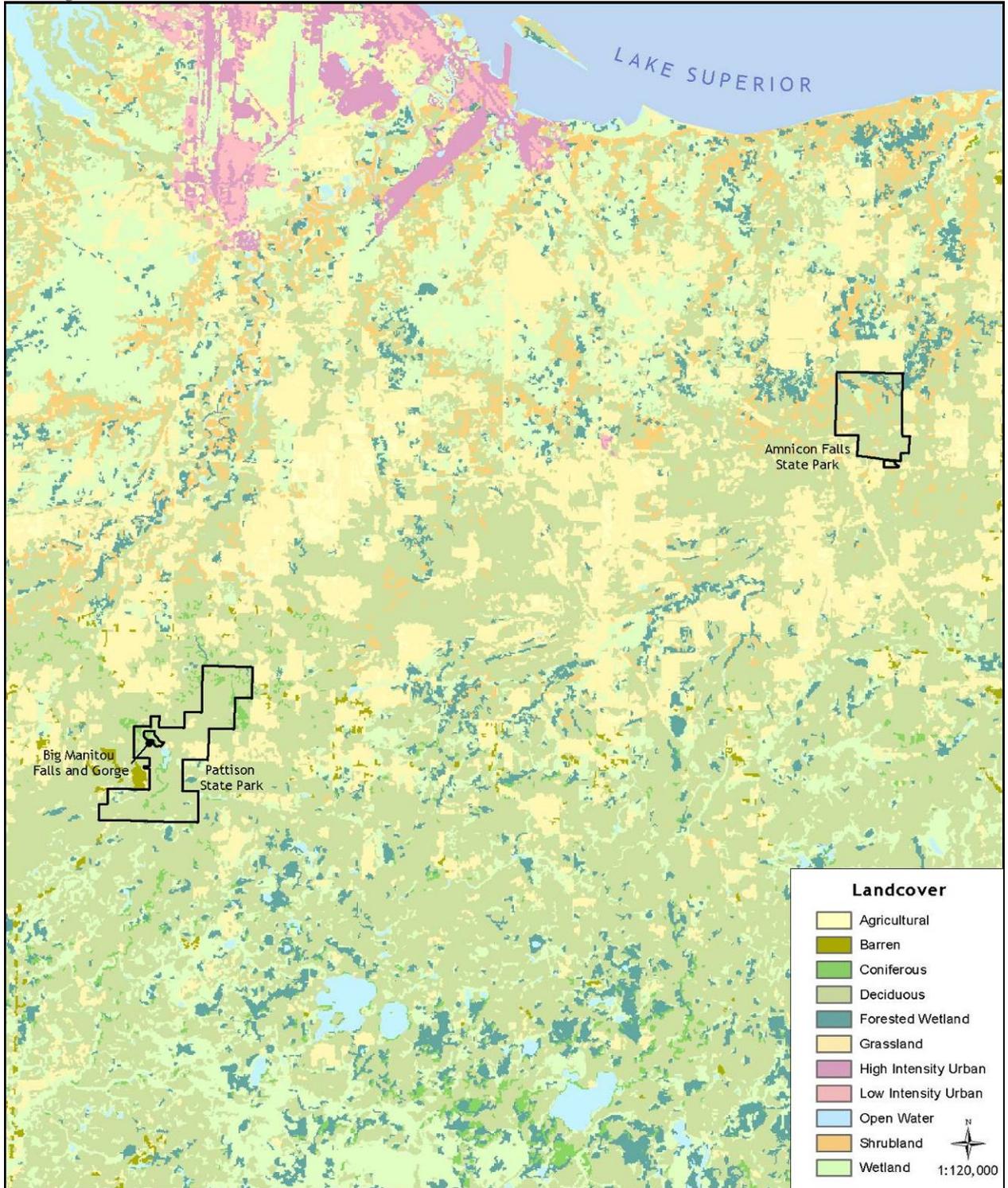
Additional Natural Communities

Also within the AFPSP are small areas of Northern Dry-mesic Forest, Hardwood Swamp, and Alder Thicket. Small, moderate- to low-quality examples of Northern Sedge Meadow are present in some of the ravines associated with tributaries to the Amnicon River. These areas appear to have been formerly flooded by beavers, as numerous standing snags are present. The vegetation of these meadows is dominated by reed canary grass (*Phalaris arundinacea*) and Canada blue-joint grass (*Calamagrostis canadensis*). These meadows are important amphibian breeding areas because they are fishless, and numerous species of adult frogs were captured or observed here during spring sampling. A small meadow is also present at **Pattison State Park** that is associated with Spring Brook.

Small areas of Hardwood Swamp are present at both **Amnicon Falls** and **Pattison State Parks**. Seeps are common throughout these Hardwood Swamps and have been known to host a number of rare plant species. A larger, perched Hardwood Swamp is present just east of Interfalls Lake at **Pattison State Park**. The canopy is dominated by black ash with lesser amounts of green ash (*Fraxinus pennsylvanica*) and some widely scattered northern white-cedar and black spruce. The herbaceous layer includes marsh marigold (*Caltha palustris*), yellow jewelweed (*Impatiens pallida*), slender sedge (*Carex leptalea*), greater bladder sedge (*Carex intumescens*), fragrant bedstraw (*Galium triflorum*), sensitive fern (*Onoclea sensibilis*), and swamp thistle (*Cirsium muticum*). A small, semi-open wetland area in the southwest portion of **Pattison State Park** near Little Manitou Falls includes a mosaic of Alder Thicket, Northern Sedge Meadow, Hardwood Swamp, and Northern Wet Forest. The area was likely a more open Northern Sedge Meadow at one time but has seen an encroachment of shrubs and trees including alder, tamarack, black ash, and white spruce. The tall shrub layer is dominated by alder, red-osier dogwood (*Cornus stolonifera*), and balsam willow (*Salix pyrifolia*). The herbaceous layer includes Canada blue-joint grass, tussock sedge (*Carex stricta*), common lake sedge (*Carex lacustris*), cinnamon fern (*Osmunda cinnamomea*), and reed canary grass.

A moderate- to good-quality, older-aged Northern Dry-mesic Forest is present within **Amnicon Falls State Park** on the river banks near high use areas around the campground and falls areas. The canopy is dominated by large diameter white and red pine. Several rare plant species are located along the Amnicon River within this pine-dominated forest (Hlina et.al. 2008).

Figure 4: Landcover for Amnicon Falls and Pattison State Parks from the Wisconsin DNR Wisland GIS coverage (WDNR 1993).



Rare Species and High Quality Natural Communities of the Amnicon Falls and Pattison State Parks Planning Group

Numerous rare species and high-quality examples of native communities have been documented within the AFPSP (Table 5). Table 5 shows the rare species and high-quality natural communities currently known from the AFPSP. See Appendix C for summary descriptions for the species and natural communities that occur on the AFPSP.

Table 5. Documented rare species and high-quality natural communities for the Amnicon Falls and Pattison State Parks Planning Group. Years listed in Planning Group column indicate the most recent documented observation. More than one element occurrence of a particular species or natural community may be at each property. For an explanation of state and global ranks, as well as state status, see Appendix A. **Note: Listing status is based on the NHI Working List published April 2009.**

| Common Name | Scientific Name | AFPSP Planning Group | State Rank | Global Rank | State Status | Federal Status | SGCN | Tracked by NHI |
|-------------------------|------------------------------|----------------------|------------|-------------|--------------|----------------|------|----------------|
| Animal | | | | | | | | |
| American Woodcock | <i>Scolopax minor</i> | 2009 | S4B | G5 | SC/M | | Yes | No |
| Blanding's Turtle | <i>Emydoidea blandingii</i> | 1987 | S3 | G4 | THR | | Yes | Yes |
| Canada Warbler | <i>Wilsonia canadensis</i> | 2009 | S3B | G5 | SC/M | | Yes | Yes |
| Gray Wolf | <i>Canis lupus</i> | 2008 | S2 | G4 | SC/P | END | Yes | Yes |
| Least Flycatcher | <i>Empidonax minimus</i> | 2009 | S4B | G5 | SC/M | | Yes | No |
| Merlin | <i>Falco columbarius</i> | 2009 | S3B,S2N | G5 | SC/M | | No | No |
| Mystery Vertigo | <i>Vertigo paradoxa</i> | 1997 | S1 | G4G5Q | SC/N | | Yes | Yes |
| Nashville Warbler | <i>Vermivora ruficapilla</i> | 2009 | S4? | G5 | SC/M | | No | No |
| Northern Goshawk | <i>Accipiter gentilis</i> | 2009 | S2B,S2N | G5 | SC/M | | Yes | Yes |
| Northern Ringneck Snake | <i>Diadophis punctatus</i> | 1996 | S3? | G5T5 | SC/H | | No | Yes |
| Veery | <i>Catharus fuscescens</i> | 2009 | S4B | G5 | SC/M | | Yes | No |
| Wood Thrush | <i>Hylocichla mustelina</i> | 2009 | S4B | G5 | SC/M | | Yes | No |
| Wood Turtle | <i>Glyptemys insculpta</i> | 2008 | S2 | G4 | THR | | Yes | Yes |

Table 5. Documented rare species and high-quality natural communities for the Amnicon Falls and Pattison State Parks Planning Group. Years listed in Planning Group column indicate the most recent documented observation. More than one element occurrence of a particular species or natural community may be at each property. For an explanation of state and global ranks, as well as state status, see Appendix A. **Note: Listing status is based on the NHI Working List published April 2009.**

| Common Name | Scientific Name | APPSP Planning Group | State Rank | Global Rank | State Status | Federal Status | SGCN | Tracked by NHI |
|--------------------------------|--|----------------------|------------|-------------|--------------|----------------|------|----------------|
| Yellow-bellied Flycatcher | <i>Empidonax flaviventris</i> | 2009 | S4B | G5 | SC/M | | No | No |
| Plants | | | | | | | | |
| Arrow-leaved Sweet-coltsfoot | <i>Petasites sagittatus</i> | 2008 | S3 | G5 | THR | | NA | Yes |
| Canadian Yew | <i>Taxus canadensis</i> | 2009 | S4 | G5 | SC | | NA | No |
| Fragrant Fern | <i>Dryopteris fragrans</i> var. <i>reotiuscula</i> | 2006 | S3 | G5T3T5 | SC | | NA | Yes |
| Georgia Bulrush | <i>Scirpus georgianus</i> | 2006 | SH | G5 | SC | | NA | Yes |
| Large-leaved Avens | <i>Geum macrophyllum</i> var. <i>macrophyllum</i> | 2006 | S1 | G5T5 | SC | | NA | Yes |
| Large Roundleaf Orchid | <i>Platanthera orbiculata</i> | 2009 | S3 | G5 | SC | | NA | Yes |
| Laurentian Bladder Fern | <i>Cystopteris laurentiana</i> | 2009 | S2 | G3 | SC | | NA | Yes |
| Northern Yellow Lady's-slipper | <i>Cypripedium parviflorum</i> var. <i>makasin</i> | 2008 | S3 | G5T4Q | SC | | NA | No |
| Oregon Woodsia (Tetraploid) | <i>Woodsia oregano</i> ssp. <i>cathcartiana</i> | 1985 | S1 | G5T5 | SC | | NA | Yes |
| Purple Clematis | <i>Clematis occidentalis</i> | 2007 | S3 | G5 | SC | | NA | Yes |
| Ram's-head Lady's-slipper | <i>Cypripedium arietinum</i> | 2010 | S2 | G3 | THR | | NA | Yes |
| Vasey's Rush | <i>Juncus vaseyi</i> | 2008 | S3 | G5? | SC | | NA | Yes |
| Natural Community | | | | | | | | |
| Dry Cliff | | 2009 | S4 | G4G5 | NA | | NA | Yes |
| Ephemeral Pond | | 2009 | SU | GNRQ | NA | | NA | Yes |
| Northern Mesic Forest | | 2009 | S4 | G4 | NA | | NA | Yes |

Management Considerations and Opportunities for Biodiversity Conservation

Landscape Level Priorities

Forest Patch Size and Ecological Connections

Forest fragmentation and the overall loss of forests have been identified as a major threat to northern forests in the Lake States (Hawbaker et al. 2006, Radeloff et al. 2005). As many forested areas in the state become parcelized and developed, the AFPSP and vast forests of Douglas and Bayfield County Forests, Brule River State Forest, and Chequamegon – Nicolet National Forest collectively represent an important opportunity to maintain an intact forested landscape, serving critical functions on a statewide and regional level.

The AFPSP presents opportunities to maintain or re-establish connectivity between ecologically significant sites (as identified in this inventory) and adjacent forested tracts within this landscape. It is important to recognize forest patterns and processes, as well as the context of ecologically important areas and how forest stands function within the regional landscape. For example, the AFPSP contains a rich mosaic of forested uplands, wetlands, and streams and rivers in a mostly remote, forested context. These areas offer opportunities to connect with other more remote wetlands and forested features to the south and west of the AFPSP and to provide habitat for a diverse group of species. This part of the state has been shown to provide an important travel corridor via roadless areas, riverine corridors, and other contiguous wilderness areas for immigration of several mammal species from Minnesota into Wisconsin including the gray wolf (*Canis lupus*) and American marten (*Martes americana*) (WDNR in Prep. b, Wydeven et al. 2009). Opportunities to enhance these connections through protecting and expanding both forested uplands and wetlands on a landscape scale could be beneficial.

Older Forests / Old-growth Forests

The WDNR has identified a need to conserve, protect, and manage old-growth forests (WDNR 2006b, WDNR 2004, WDNR 1995). Older forests (e.g., those with trees older than 120 years) are rare in the state, especially upland forests with a range of tree diameter sizes (especially very large), large diameter coarse woody debris, abundant large dead snags and cavity trees, and pit-and-mound micro-topography (WDNR 2005). Old-growth forests can support high densities of certain forest herbs, as well as certain unique assemblages of birds and other animals that are rare in the state. The State Endangered American marten is known from Douglas County. This species requires older forest features including high levels of canopy closure, good amounts of downed woody debris, forests with greater structural diversity, and high numbers of snags and cavities (WDNR in Prep. b).

Currently, much of the Superior Coastal Plain Ecological Landscape surrounding the AFPSP is represented by young and medium-aged stands; these stands are often dominated by early successional species such as aspen within a mosaic of small patches of older forests. In contrast, larger areas of older, less disturbed Northern Mesic and Boreal Forests are not well-represented in this landscape. The AFPSP offers opportunities to manage for tracts of older forests within a context of outstanding aquatic features, relatively undisturbed forested wetlands, and vast public landholdings to the south. Within Pattison State Park, older aged stands (>90 yrs old) of oak, white birch, and northern hardwoods exist (WDNR 2011). Allowing these areas to continue to mature would provide important habitat for species dependant on older forests. Old-growth forest management is one important facet of providing the diverse range of habitats needed for sustainable forest management (WDNR 2006c).

Community Level Priorities

Boreal Forest

Before Euro-American settlement, white pine, white spruce, and paper birch were the dominant trees on uplands in the Superior Glacial Plain Ecological Landscape, and this was the only area in the state to support sizable tracts of Boreal Forest (WDNR 2006a). Small but moderate-quality examples of this rare community type were found on the AFPSP, but substantial acreages of diminished quality Boreal Forest are present throughout. Boreal Forests were historically logged and have been converted largely to trembling aspen with balsam poplar and balsam fir also present in the canopy and subcanopy. They are lacking much of the conifer component formerly present in Boreal Forests that included a large percentage of white pine, white spruce, and northern white-cedar. Opportunities exist to restore these forests closer to historical conditions. Possible techniques include a combination of cutting, girdling, and basal bark treatments of aspen, and planting of conifer species. Examples of Boreal Forest restoration projects, at various stages of completion, exist within the Brule River State Forest and Pokegama – Carnegie State Natural Area. The focus of these projects is to reduce the dominance of the existing aspen (*Populus* spp.) and to reintroduce and/or enhance existing conifer species within these areas. Challenges exist with controlling aspen, deer herbivory on seedlings, planting on wet clay soils, use of herbicides, and costs associated with these restoration efforts. In addition, climate change models show boreal conifer tree species moving northward and out of Wisconsin (WICCI 2011). However, the close proximity of the planning group to Lake Superior and the moderating effects of the lake coupled with the loss of high-quality Boreal Forest communities and the numerous animal SGCN that utilize this habitat, make these opportunities worth consideration during the master planning process.

Northern Mesic Forest

Northern Mesic Forests in the Superior Glacial Plain Ecological Landscape are an important plant community, but rich, good-quality, older forest successional stages are now rare throughout the Superior Clay Plain (WDNR 2006b). Pattison State Park has an excellent example of an older stand of Northern Mesic Forest with a rich groundlayer and diverse canopy trees including some large diameter white pines. Historically, sugar maple was either a dominant or co-dominant canopy species in these forests along with conifers, particularly white pine. However, conifer species are greatly reduced in today's mesic forests, resulting in ecological simplification. Managing simplification by limiting the dominance of sugar maple and increasing the conifer component and hardwoods such as yellow birch and white ash (*Fraxinus americana*) would enhance the heterogeneity of the site. Historically, the Superior Coastal Plain was almost entirely forested, but today the clay plain forest has been fragmented by agricultural use and currently one-third of this landscape is non-forested. Limiting fragmentation and connecting larger blocks of this and other forest types to forest lands to the south of the AFPSP would benefit numerous animal species including wide-roaming mammals and forest interior birds.

Ephemeral Ponds

Ephemeral Ponds are an important component of the biodiversity of the AFPSP. Ephemeral Ponds are abundant in Northern Mesic Forests and are key breeding areas for invertebrates and amphibians, support foraging birds and mammals, and may provide habitat for unusual assemblages of vascular and non-vascular plants (WDNR 2005). Ephemeral Ponds provide high quality habitat for numerous species where they are embedded within forested habitats, especially if efforts are made to minimize or prevent negative impacts to hydrology by limiting road, ditch, or dike construction. The timing of management activities around Ephemeral Ponds can be critical. By recognizing Ephemeral Pond communities and their associated species distributions throughout the forest, proactive steps can be done in the development of forest management plans that will help amphibians, without hindering other management activities.

Amnicon and Black Rivers and Tributaries

The free-flowing stretches of the Amnicon and Black Rivers and Copper Creek provide important habitat for many rare animal species (e.g., the State Threatened wood turtle [*Glyptemys insculpta*]), and management of lands adjacent to the river will have important effects on water quality. The largely aquatic wood turtle tends to nests communally in terrestrial, sandy soils and is often associated with trails and roads when natural open, sandy areas are lacking. Protecting turtle nest locations would be aided by limiting disturbance, including trying to minimize recreational activities in the vicinity of these nests. For all riparian species, including the wood turtle, it is vital to limit road-building near rivers and streams and to maintain riparian forest habitat, as wood turtles spend summer months foraging in adjacent upland forests. Many of the areas along the river slopes contain maturing forests, as well as steep cliffs that harbor rare plant assemblages. A river buffer that accounts for steepness of slope, soil type, vegetative cover, and the habitat needs of sensitive species would be most effective for protecting species associated with the river.

High Conservation Value Forests

The Wisconsin DNR manages 1.5 million acres that are certified by the Forest Stewardship Council (FSC) and the Sustainable Forest Initiative (SFI). Forest certification requires forests to be managed using specified criteria for ecological, social, and economic sustainability. Principle 9 of the *Draft 7 FSC-US Forest Management Standard* concerns the maintenance of High Conservation Value Forests (HCVF). High Conservation Value Forests are defined as possessing one or more of the following:

- Contain globally, regionally, or nationally significant concentrations of biodiversity values, including rare, threatened, or endangered species and their habitats.
- Globally, regionally, or nationally significant large landscape level forests, contained within, or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance.
- Are in or contain rare, threatened, or endangered ecosystems.
- Provide basic services of nature in critical situations (e.g., watershed protection, erosion control).
- Are fundamental to meeting basic needs of local communities (e.g., subsistence, health).
- Are critical to local communities' traditional cultural identity (areas of cultural, ecological, economic, or religious significance identified in cooperation with such local communities).

Based on the current draft criteria for defining HCVFs (Forest Stewardship Council 2009) the best opportunities for HCVF on the AFPSP are the Primary Sites, as well as high quality natural communities and rare species habitat areas that are outside of the Primary Sites.

Ecological Priorities for SGCN

The Wisconsin Wildlife Action Plan (WAP; WDNR 2006b) 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 D highlights the Ecological Priorities for vertebrate SGCN on the AFPSP. Note that these Ecological Priorities include all of the natural communities that have been determined to provide the best opportunities for management on the AFPSP from an ecological biodiversity perspective.

Priority Conservation Actions

The Wildlife Action Plan developed Priority Conservation Actions that make effective use of limited resources and address multiple species with each action. Implementing these actions and avoiding

activities that may preclude successful implementation of these actions in the future would greatly benefit the SGCN on the AFPSP.

Priority Conservation Actions identified in the Wisconsin Wildlife Action Plan (WDNR 2006b) for the Superior Coast Plain Ecological Landscape that apply to the AFPSP include:

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

Wisconsin’s Statewide Forest Strategy

Wisconsin’s Statewide Forest Assessment (WDNR 2010a) was based on Wisconsin’s Forest Sustainability Framework (“Wisconsin Forest Sustainability Framework”) and was designed to assess the current state of Wisconsin’s public and private forests and analyze the sustainability of our forested ecosystems. Wisconsin’s Statewide Forest Strategy (WDNR 2010b) contains a collection of strategies and actions designed to address the management and landscape priorities identified in the Statewide Forest Assessment. The strategies are broad guides intended to focus the actions of the forestry community.

All three of these documents include topics related to biological diversity in Wisconsin’s forests, and provide information useful for department master planning and management activities. The following strategies, organized using their number in the Statewide Forest Strategy document, are particularly pertinent to the AFPSP planning efforts in regard to opportunities to maintain or enhance biological diversity (WDNR 2010b). These strategies may not be applicable to areas of the AFPSP.

| Strategy Number | Strategy |
|-----------------|--|
| 1 | Encourage planting to enhance, protect, and connect larger tracts of forested land in appropriate locations consistent with ecological landscapes. |
| 5 | Pursue the conservation and protection of large, unfragmented blocks of forest lands |
| 6 | Strengthen collaborative and large scale planning at the town, county, state and federal levels |
| 7 | Increase the functional size of forest blocks by encouraging coordination of management of clusters of forest ownerships |
| 11 | Encourage the management of under-represented forest communities |
| 12 | Improve all forested communities with a landscape management approach that considers the representation of all successional stages |
| 13 | Increase forest structure and diversity |
| 14 | Encourage the use of disturbance mechanisms to maintain diverse forest communities |
| 15 | Maintain the appropriate forest types for the ecological landscape while protecting |

| | |
|----|---|
| | forest health and function |
| 22 | Strive to prevent infestations of invasive species before they arrive |
| 23 | Work to detect new (invasive species) infestations early and respond rapidly to minimize impacts to forests |
| 24 | Control and management of existing (invasive species) infestations. |
| 25 | Rehabilitate, restore, or adapt native forest habitats and ecosystems |
| 29 | Attempt to improve the defenses of the forest and increase the resilience of natural systems to future climate change impacts |

Natural Community Management Opportunities

The Wisconsin Wildlife Action Plan (WDNR 2006b) identifies 28 natural communities for which there are “Major” or “Important” opportunities for protection, restoration, or management in the Superior Coastal Plain Ecological Landscape. Nine of these natural communities are present on the AFPSP:

- Alder Thicket
- Boreal Forest
- Dry Cliff
- Hardwood Swamp
- Northern Dry-mesic Forest
- Northern Mesic Forest
- Northern Sedge Meadow
- Northern Wet Forest
- Warmwater Rivers

Invasive Plants

A number of invasive plants are present in and around Amnicon Falls and Pattison State Parks. Non-native invasive plants establish quickly, tolerate a wide range of conditions, are easily dispersed, and are free of the diseases, predators, and competitors that kept their populations in check in their native range. They can out-compete and even kill native plants. In situations where non-native invasive plants become dominant, they may alter ecological processes by limiting one’s ability to use prescribed fire, by modifying hydrology, and by limiting tree regeneration and ultimately forest composition. 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 (plants that cause skin rashes or blisters).

At Amnicon Falls State Park, non-native invasive plants were concentrated along the pipeline corridor, along the riverbed and its banks (of particular note, Canada thistle [*Cirsium arvense*] and common tansy [*Tanacetum vulgare*]), and in the northern third of the park that was once farmed (especially common buckthorn [*Rhamnus cathartica*]). The Northern Sedge Meadow is dominated in part by reed canary grass with a small patch of purple loosestrife (*Lythrum salicaria*) also present. Other non-native invasive plants occur adjacent to County Highway U along the eastern park boundary and include crown vetch (*Coronilla varia*) and bird’s-foot trefoil (*Lotus corniculata*).

Table 6. Invasive Plants of Amnicon Falls State Park

| Scientific Name | Common Name |
|------------------------------|------------------------|
| <i>Berberis thunbergii</i> | Japanese barberry |
| <i>Cirsium arvense</i> | Canada thistle |
| <i>Coronilla varia</i> | crown-vetch |
| <i>Galeopsis tetrahit</i> | hemp-nettle |
| <i>Lotus corniculata</i> | bird's-foot trefoil |
| <i>Lythrum salicaria</i> | purple loosestrife |
| <i>Phalaris arundinacea</i> | reed canary grass |
| <i>Rhamnus cathartica</i> | common buckthorn |
| <i>Salix x rubens</i> | hybrid crack willow |
| <i>Sorbus aucuparia</i> | Eurasian mountain-ash |
| <i>Tanacetum vulgare</i> | common tansy |
| <i>Typha angustifolia</i> | narrow-leaved cat-tail |
| <i>Valeriana officinalis</i> | garden valerian |

At Pattison State Park, few invasive plants were noted in the uplands, other than occasional bush honeysuckle (*Lonicera x bella*) in the forest and garden valerian (*Valeriana officinalis*) on the Dry Cliffs in the relatively undisturbed Copper Creek area. Reed canary grass is common along the Black River and in associated wetlands and common buckthorn, black locust (*Robinia pseudoaccacia*), and Siberian peashrub (*Caragana arborescens*) are being removed from the Big Manitou Falls area. Garlic mustard (*Alliaria petiolata*) and other legally “Prohibited Invasive Species” under NR40 have the potential to be found in or near the AFPSP, and if located, they should be reported and controlled.

The high recreational usage of state parks significantly contributes to the potential for introduction and spread of invasive species. Campgrounds, trails and other high-use areas are typical entry points for invasive species that are introduced by visitors’ footwear, clothing, vehicle tires, boats, and recreational equipment. Once established, these non-native invasives may continue to spread along natural corridors (e.g., waterways) and along recreational corridors (e.g, trails). When resources for complete control of widespread non-native invasives are lacking, containment (i.e., limiting further spread) should be considered as an alternative action. Early detection and rapid control of new and/or small infestations, however, should be considered for high prioritization in an invasive species management strategy (Boos et al. 2010). Best Management Practices for Preventing the Spread of Invasive Species by Outdoor Recreation Activities in Wisconsin Forests have been developed by the Wisconsin Council on Forestry and are available at: <http://council.wisconsinforestry.org/invasives/recreation.php>

Exotic Earthworms

The invasion of forests by European earthworms of the families Amyntas, Acanthodrilidae, Lumbricidae, and Megascloedidae is a concern throughout Wisconsin. While native earthworms were absent from this landscape after the last glaciation, exotic earthworms have been introduced since Euro-American settlement, primarily as discarded fishing bait (Hendrix and Bohlen 2002, Hale et al. 2005). Exotic earthworms can have dramatic impacts on forest floor properties by greatly reducing organic matter (Hale et al. 2005), microbial biomass (Groffman et al. 2004), nutrient availability (Bohlen et al. 2004, Suarez et al. 2004), and fine-root biomass (Groffman et al. 2004). These physical changes in the forest floor reduce densities of tree seedlings and rare herbs (Gundale 2002) and can favor invasive plants (Kourtev et al. 1999) and reduce habitats for animals. In a study of 51 Northern Wisconsin forest stands, Wiegmann (2006) found that shifts in understory plant community composition due to exotic earthworms were more severe in stands with high white-tailed deer densities.

Primary Sites: Site-specific Opportunities for Biodiversity Conservation

Three ecologically important sites were identified on the AFPSP. 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 E. 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.

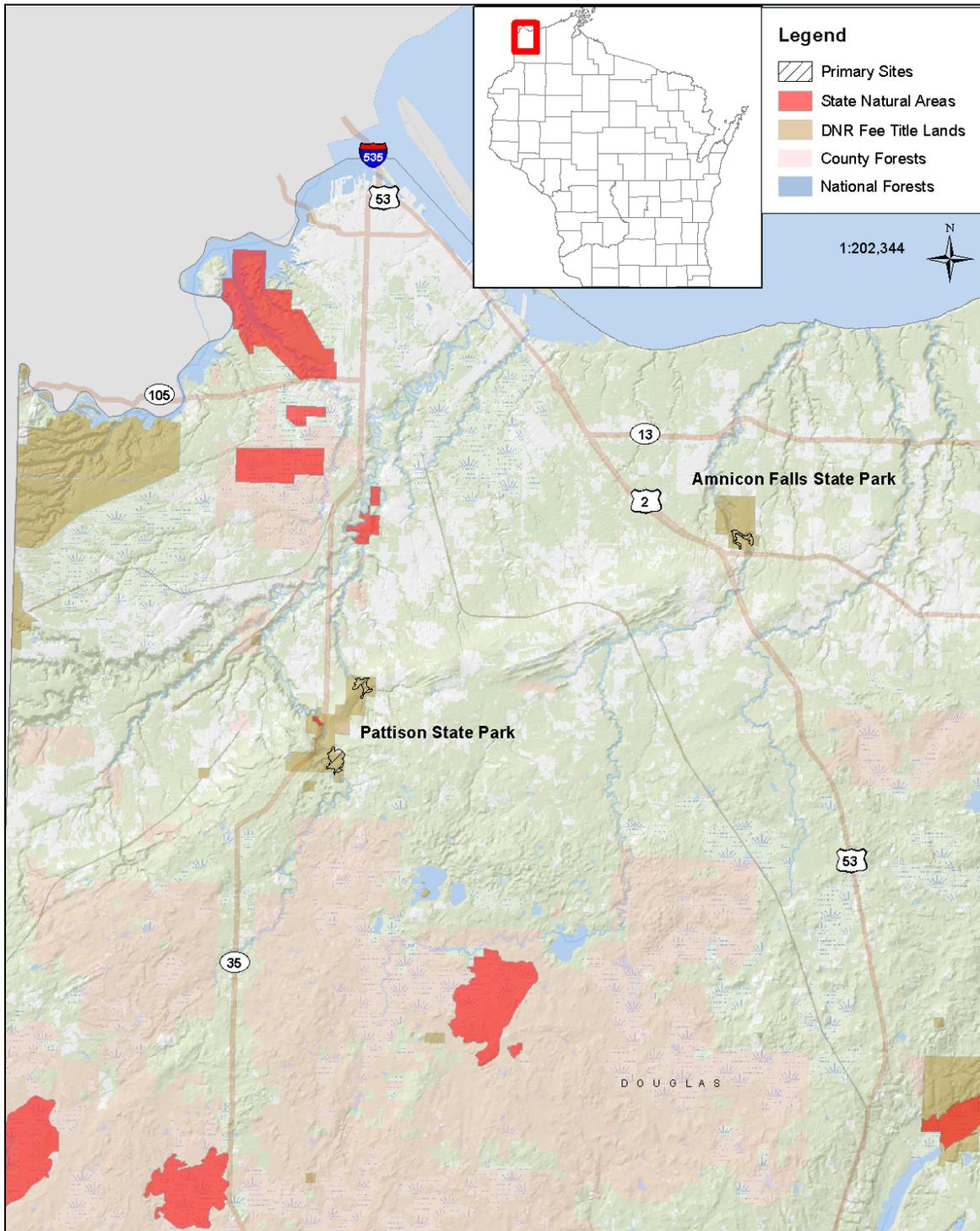
Amnicon and Pattison State Park Planning Group Primary Sites

- AFPSP01 Copper Creek Gorge
- AFPSP02 Pattison Mesic Forest
- AFPSP03 Amnicon River and Dry-mesic Forest
- AFPSP04 Big Manitou Falls and Gorge State Natural Area



Amnicon River at Amnicon Falls State Park (Photo by Brian M. Collins)

Figure 5: Primary Sites of the Amnicon Falls and Pattison State Parks Planning Group



Future Needs

This project was designed to provide a rapid assessment of the biodiversity values for the AFPSP. 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 AFPSP.

- Invasive species monitoring and control – establishing an invasives early detection and monitoring protocol will be critical for the AFPSP. State parks and many other public lands throughout Wisconsin are facing major management problems because of serious infestations of highly invasive species such as emerald ash borer (*Agrilus planipennis*), garlic mustard, spotted knapweed (*Centaurea biebersteinii*), reed canary grass, European buckthorns (*Rhamnus* spp.), and Eurasian honeysuckles (*Lonicera* spp.). 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 AFPSP, a comprehensive 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. The North Woods Cooperative Weed Management Area covers Douglas County and could be a good source for volunteers to conduct early detection and/or control efforts.
- Additional plant and natural community data should be collected from the Alder Thicket/Hardwood Swamp/Northern Sedge Meadow area at Pattison State Park.
- In Wisconsin, there has been a need to better understand the link between forest management and the management of Ephemeral Ponds. Collecting additional vegetative, herptile, and invertebrate data from Ephemeral Ponds within Pattison State Park could add to the knowledge base of the physical and biotic parameters for Ephemeral Ponds and their surrounding habitat matrix, and the wildlife species they support. This additional data could be used to inform adaptive management strategies for forests and other activities around ephemeral wetlands in northern Wisconsin.
- Additional inventory and monitoring is needed to locate and protect wood turtle nesting sites near the Black and Amnicon Rivers and their tributaries.
- Additional mammal inventory efforts are needed within the AFPSP focusing primarily on American marten, small mammals, and bats.
- Perform systematic surveys for aquatic invertebrates within the Amnicon and Black Rivers and tributaries within the AFPSP.



Wood Turtle (Photo by Brian M. Collins)

Glossary

adaptive management - a formal, structured approach to dealing with uncertainty in natural resource management, using the experience of management as an ongoing and continually improving process.

basalt – the dark, dense igneous rock of a lava flow or minor intrusion, composed essentially of labradorite and pyroxene and often displaying a columnar structure.

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>)

escarpment - a long, precipitous, clifflike ridge of land, rock, or the like, commonly formed by faulting or fracturing of the earth's crust.

Forest Certification – a market-based, non-regulatory forest conservation tool designed to recognize and promote environmentally-responsible forestry and sustainability of forest resources. The certification process involves an evaluation of management planning and forestry practices by a third-party according to an agreed-upon set of standards (from <http://www.pinchot.org/project/59>). See <http://dnr.wi.gov/forestry/certification/> regarding certification of WDNR managed lands.

igneous – produced under conditions involving intense heat, as rocks of volcanic origin or rocks crystallized from molten magma.

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.

moraine – landforms composed of unsorted materials deposited by glaciers. They can cover broad geographic areas of millions of acres. Topography can vary from nearly level “till” plains to rough end moraine landscapes composed of steep dry ridges interspersed with deep kettle holes. These glacial “kettles” are frequent locations for lakes and wetlands.

National Hierarchical Framework of Ecological Units (NHFEU) – a land unit classification system developed by the U.S. Forest Service and many collaborators. As described by Avers et al (1994): “The NHFEU can provide a basis for assessing resource conditions at multiple scales. Broadly defined ecological units can be used for general planning assessments of resource capability. Intermediate scale units can be used to identify areas with similar disturbance regimes. Narrowly defined land units can be used to assess specific site conditions including: distributions of terrestrial and aquatic biota; forest growth, succession, and health; and various physical conditions.”

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).

Subsection – This is a level in the NHFEU that is intermediate in scale. Subsections are characterized by distinctive glacial landforms (e.g., outwash or moraine), soils, and broadly, by vegetation. The 16 Ecological Landscapes developed by the WDNR are largely based on NHFEU Subsections (see *Ecological Landscape*).

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 marten | <i>Martes americana</i> |
| Wood turtle | <i>Glyptemys insculpta</i> |
| Plants | |
| Alder | <i>Alnus spp.</i> |
| Aspen | <i>Populus spp.</i> |
| Balsam fir | <i>Abies balsamea</i> |
| Black ash | <i>Fraxinus nigra</i> |
| Black spruce | <i>Picea mariana</i> |
| Canada blue-joint grass | <i>Calamagrostis canadensis</i> |
| Common buckthorn | <i>Rhamnus cathartica</i> |
| Garlic mustard | <i>Alliaria petiolata</i> |
| Northern white-cedar | <i>Thuja occidentalis</i> |
| Paper birch | <i>Betula papyrifera</i> |
| Red pine | <i>Pinus resinosa</i> |
| Reed canary grass | <i>Phalaris arundinacea</i> |
| Sugar maple | <i>Acer saccharum</i> |
| Tamarack | <i>Larix laricina</i> |
| Trembling aspen | <i>Populus tremuloides</i> |
| White pine | <i>Pinus strobus</i> |
| White spruce | <i>Picea glauca</i> |
| Yellow birch | <i>Betula alleghaniensis</i> |

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Additional Resources

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

1. Bureau of 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

Wisconsin Natural Heritage Inventory 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.

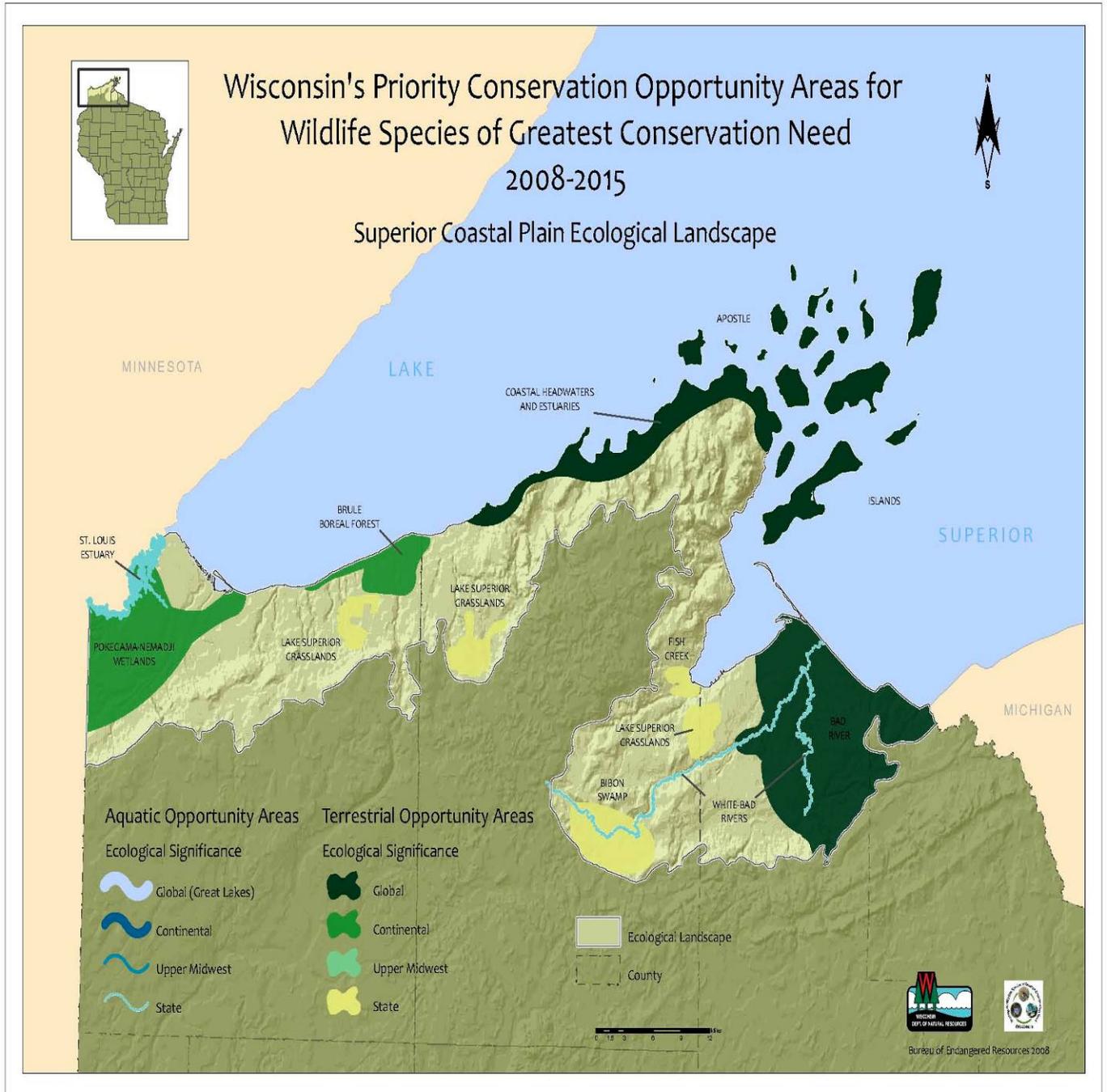
SU = Possibly in peril in the state, but their status is uncertain. More information is needed.

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).

Appendix B



Appendix C

Summary Descriptions for Rare Species and High Quality Natural Communities Documented on the Amnicon Falls and Pattison State Parks Planning Group

The following paragraphs give brief summary descriptions for some of the rare species and high quality natural communities documented on the Amnicon Falls and Pattison State Parks 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

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 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 appears 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.

Canada Warbler

Canada Warblers (*Wilsonia canadensis*) are typically most abundant in moist, mixed coniferous-deciduous forests with a well-developed understory. In Wisconsin they occur in spruce, hemlock, and balsam fir forest types in the northern counties. Important components of breeding habitat include conifers and often creeks and streams. The Canada Warbler nests in dense vegetation, often in areas with mosses, ferns, and decaying stumps or logs. The breeding season occurs from early June to early July.

Gray Wolf

Gray wolf (*Canis lupis*), also referred to as timber wolf, is the largest wild member of the dog family. Males average about 10% larger in size than females. In addition, gray wolves have a massive head and neck important in killing prey, which results in larger fore feet than hind feet. Body weight, height, and foot prints are important distinguishing characteristics when comparing gray wolves to other wild and domestic canids (shown in detail at <http://dnr.wi.gov/org/land/er/mammals/wolf/identification.htm>). 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 8-10 animals. A wolf pack's territory may cover 20-120 square miles.

Mystery Vertigo

Mystery Vertigo, (*Vertigo paradoxa*), a terrestrial snail listed as Special Concern, has a shell approximately 1.75mm long and 1 mm wide (Nekola, 1999). It has been found in leaf litter in upland woods.

Northern Goshawk

Northern Goshawks (*Accipiter gentilis*) prefer mature deciduous, coniferous, or mixed forest types found in the northern 2/3 of Wisconsin. Territories are also known to occur in pine plantations in lower percentages, especially in the central part of the state. A mature, closed canopy forest with large diameter trees for nesting and foraging is predominately selected for by breeding pairs. Territorial adults are known to be very aggressive to humans entering within a half-mile or more of an active nest during most stages of the breeding season which extends from mid-March through mid-July. Nests are generally placed just below the canopy in the upper portion of the nest tree and one to five alternate nests are common within a nest stand.

Northern Ring-necked Snake

Northern ring-necked snakes (*Diadophis punctatus edwardsii*), a species of Special Concern, prefer moist to moderately dry deciduous forests. They also are found in openings within the woods or near woods edges, but almost always are under cover such as rocks, downed woody debris or artificial materials. Within the forest, this species may also be found between the bark and core wood of tree stumps or within rotting logs. No specific overwintering habitat has been described in Wisconsin, although they likely use rotted out root channels and other structures that offer a moist, no-freeze environment. They are active from mid-April through early October, breed late April through early June and lay their eggs between late-June and early July. Eggs may be laid communally by two or more females. Hatching occurs in August or early September.

Wood Turtle

Wood turtles (*Glyptemys insculpta*), a Threatened species in Wisconsin, prefer clean rivers and streams with moderate to fast flows and adjacent riparian wetlands and upland deciduous forests. This species often forages in open wet meadows or in shrub-carr habitats dominated by speckled alder. They overwinter in streams and rivers in deep holes or undercut banks where there is enough water flow to prevent freezing. This semi-terrestrial species tends to stay within about 300 meters of rivers and streams but exceptions certainly occur, especially within the Driftless Area of southwestern and western Wisconsin. This species becomes active in spring as soon as the ice is gone and air temperatures reach around 50 degrees in March or April. They can remain active into mid-October but have been seen breeding under the ice. Wood turtles can breed at any time of year, but primarily during the spring or fall. Nesting usually begins in late May in northern WI and early June in southern WI and continues through June. This species nests in sand or gravel, usually very close to the water, although it is known to nest along sand and gravel roads or in abandoned gravel pits some distance from water. Hatching occurs in 55-75 days (August) depending on air temperatures.

Rare Plants

Arrow-leaved Sweet-coltsfoot

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

Fragrant Fern

Fragrant fern (*Dryopteris fragrans* var. *remotiuscula*), a State Special Concern plant, is found on moist (but not wet) shaded rock cliffs, usually on basalt and, rarely, on sandstone. This species can be identified year-round.

Georgia Bulrush

Georgia bulrush (*Scirpus georgianus*), a State Special Concern plant, is found in moist acid sandy meadows. Rangewide, it has been found in moist meadows (including sedge meadows), shallow marshes, edges of wet forests, and ditches. Blooming occurs late May through late June; fruiting occurs late June through early August. The optimal identification period for this species is late June early August.

Large-leaved Avens

Large-leaved avens (*Geum macrophyllum* var. *macrophyllum*), a State Special Concern plant, is found in moist woods, thickets, and rocky ledges and openings, sometimes weedy. Blooming occurs early May through mid-August; fruiting occurs early June through mid-September. The optimal identification period for this species is early June through mid-August.

Large Roundleaf Orchid

Large roundleaf orchid (*Platanthera orbiculata*), a State Special Concern plant, is found in moist hardwood or mixed conifer-hardwood forests. 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 early August.

Laurentian Bladder Fern

Laurentian bladder fern (*Cystopteris laurentiana*), a State Special Concern plant, is found in moist, mostly wooded slopes and ledges in circumneutral soil. The optimal identification period for this species is late June through early September.

Northern Yellow Lady's-slipper

Northern yellow lady's-slipper (*Cypripedium parviflorum* var. *makasin*), a State Special Concern plant, is found in fens, calcareous swales, and rich springy forest edges. Blooming occurs late May through late June; fruiting occurs late June through late July. The optimal identification period for this species is late May through early July.

Oregon Woodsia (Tetraploid)

Oregon woodsia (*Woodsia oregana* ssp. *cathcartiana*), a State Special Concern plant, is found on dry or moist, shaded (occasionally exposed) basaltic, sandstone, or less commonly dolomite cliffs. The optimal identification period for this species is late May through late September.

Purple Clematis

Purple clematis (*Clematis occidentalis*), a State Special Concern plant, is found in cool forests (usually mixed conifer-hardwoods), often on cliffs and ravines with igneous rock (basalt, quartzite). Blooming occurs late May through late June; fruiting occurs early July through late August. The optimal identification period for this species is early June through late August.

Ram's-head Lady's-slipper

Ram's-head lady's-slipper (*Cypripedium arietinum*), a State Threatened plant, is found on basic substrates in various habitats, but it is most characteristic of conifer swamps. Blooming occurs late May through early June; fruiting occurs late June through late July. The optimal identification period for this species is late May through early June.

Vasey's Rush

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

Natural Communities

Dry Cliff

These dry vertical bedrock exposures occur on many different rock types, which may influence species composition. Scattered pines, oaks, or shrubs often occur. However, the most characteristic plants are often the ferns, common polypody (*Polypodium vulgare*) and rusty woodsia (*Woodsia ilvensis*), along with herbs such as columbine (*Aquilegia canadensis*), harebell (*Campanula rotundifolia*), pale corydalis (*Corydalis sempervirens*), juneberry (*Amelanchier* spp.), bush-honeysuckle (*Diervilla lonicera*), and rock spikemoss (*Selaginella rupestris*).

Ephemeral Pond

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

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, on loamy soils of glacial till plains and moraines deposited by the Wisconsin glaciation. Sugar maple (*Acer saccharum*) is dominant or co-dominant in most stands. Historically, eastern hemlock (*Tsuga canadensis*) 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 (*Fagus grandifolia*) can be a co-dominant with sugar maple in the counties near Lake Michigan. Other important tree species were yellow birch (*Betula allegheniensis*), basswood (*Tilia americana*), and white ash (*Fraxinus americana*). The groundlayer varies from sparse and species poor (especially in hemlock stands) with woodferns, blue-bead lily (*Clintonia borealis*), club-mosses (*Lycopodium* spp.), and Canada mayflower (*Maianthemum canadense*), 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 (*Populus tremuloides* and *P. grandidentata*), white birch (*Betula papyrifera*), and red maple (*Acer rubrum*) 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.

Appendix D

Amnicon Falls and Pattison State Parks 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 Amnicon Falls and Pattison State Parks Planning Group (AFPSP) in the Superior Coastal Plain Ecological Landscape. Only SGCN with a high or moderate probability of occurring in the Superior Coastal Plain 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 AFPSP.

| | Major | | Important | | | | | | |
|--|---------------|-----------|---------------|---------------------------|----------------|-----------------------|-----------------------|---------------------|------------------|
| | Boreal Forest | Dry Cliff | Alder Thicket | Northern Dry-mesic Forest | Hardwood Swamp | Northern Mesic Forest | Northern Sedge Meadow | Northern Wet Forest | Warmwater rivers |
| Species that are Significantly Associated with the Superior Coastal Plain Landscape | | | | | | | | | |
| American Bittern | | | L | | | | S | | |
| American Golden Plover | | | | | | | L | | |
| American Woodcock | L | | S | L | M | M | L | L | |
| Bald Eagle | | | | | | | | | S |
| Black Tern | | | | | | | M | | |
| Black-billed Cuckoo | L | | S | L | L | M | L | L | |
| Black-throated Blue Warbler | L | | | M | | S | | | |
| Blue-winged Teal | | | | | | | M | | L |
| Bobolink | | | | | | | S | | |
| Boreal Chorus Frog | | | | | | | S | | |
| Canada Warbler | S | | M | M | S | M | | M | |
| Dunlin | | | | | | | | | M |
| Four-toed Salamander | M | | S | | M | S | M | M | |
| Golden-winged Warbler | L | | S | M | M | M | | M | |
| Gray Wolf | S | | S | S | M | S | L | S | |
| Lake Sturgeon | | | | | | | | | S |
| Le Conte's Sparrow | | | | | | | S | | |
| Least Flycatcher | M | | | M | M | S | | | |
| Lesser Scaup | | | | | | | | | M |
| Mink Frog | L | | M | | L | L | S | L | S |

| | | | | | | | | |
|--------------------------|---|---|---|---|---|---|---|---|
| Mudpuppy | | | | | | | | S |
| Northern Flying Squirrel | S | | | S | M | S | | S |
| Northern Harrier | | | L | | | | S | |
| Peregrine Falcon | | S | | | | | | |
| Trumpeter Swan | | | | | | | L | L |
| Upland Sandpiper | | | | | | | L | |
| Veery | S | | S | M | S | M | | M |
| Water Shrew | S | | M | | S | M | L | S |
| Wood Thrush | | | | L | L | M | | L |
| Wood Turtle | | | S | | M | S | M | M |
| Woodland Jumping Mouse | M | | L | L | M | S | L | M |

Species that are Moderately Associated with the Superior Coastal Plain Landscape

| | | | | | | | | |
|-------------------------|---|--|---|---|---|---|---|---|
| American Marten | S | | | S | L | S | | L |
| Black-backed Woodpecker | M | | | L | | L | | S |
| Canvasback | | | | | | | | S |
| Eastern Red Bat | M | | M | M | M | M | M | M |
| Hoary Bat | M | | M | M | M | M | M | M |
| Moose | S | | S | L | S | M | M | M |
| Northern Long-eared Bat | L | | M | M | M | M | M | L |
| Olive-sided Flycatcher | M | | L | L | | | | S |
| Pickerel Frog | | | M | | | M | S | M |
| Red Crossbill | L | | | S | | L | | L |
| Rusty Blackbird | | | M | | | | | |
| Sharp-tailed Grouse | | | | | | | M | |
| Silver-haired Bat | M | | M | M | M | M | M | M |
| Solitary Sandpiper | | | L | | | | L | |
| Yellow Rail | | | | | | | S | |

APPENDIX E

Primary Inventory Sites within the Amnicon Falls and Pattison State Parks Planning Group¹

Three ecologically important sites were identified on the Amnicon Falls and Pattison State Parks Planning Group (AFPSP). These “Primary Sites” were delineated because they generally encompass the best examples of 1) rare and representative natural communities, 2) documented occurrences of rare species populations, and/or 3) opportunities for ecological restoration or connections. These sites warrant high protection and/or restoration consideration during the development of the property master plan. This report is meant to be considered along with other information when identifying opportunities for various management designations during the master planning process.

Information provided in the summary paragraphs includes location information, a site map, a brief summary of the natural features present, the site’s ecological significance, and management considerations.

| Primary Sites | page |
|--|------|
| AFPSP01. Copper Creek Gorge | 56 |
| AFPSP02. Pattison Mesic Forest | 59 |
| AFPSP03. Amnicon River and Dry-mesic Forest..... | 61 |
| AFPSP04. Big Manitou Falls and Gorge SNA..... | 65 |
| Species List | 68 |
| References..... | 68 |

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

AFPSP01. Copper Creek Gorge

| | |
|---------------------------|---|
| Property: | Pattison State Park |
| County: | Douglas |
| Landtype Association: | 212Ya01. Douglas Lake – Modified Till Plain |
| Approximate Size (acres): | 67 |

Description of Site

The site surrounds Copper Creek, a medium hard water stream with scenic waterfalls and deep gorge where the creek goes over the Superior escarpment. Within the gorge are Dry Cliffs on exposed sandstone bedrock with other areas eroded down to the underlying basalt. South and west-facing cliffs are very dry, whereas north and east-facing cliffs are somewhat more moist. Characteristic Dry Cliff vegetation is present and includes numerous fern species with columbine (*Aquilegia canadensis*), harebell (*Campanula rotundifolia*), and northern bush-honeysuckle (*Diervilla lonicera*). The surrounding area has northern white-cedar (*Thuja occidentalis*), balsam fir (*Abies balsamea*), and white spruce (*Picea glauca*) along the stream with red pine (*Pinus resinosa*) and Northern Dry-mesic Forest on top of and extending away from the bluffs. Moving from the bluffs the forest becomes dominated by trembling aspen (*Populus tremuloides*) and balsam fir that has replaced the cutover-era Boreal Forest.

Significance of Site

An excellent population of a rare fern is present within the gorge on the south-facing cliffs. Only twelve populations from five counties are known from the state for this conservative species with very few populations estimated as having good long-term viability. There is Boreal Forest restoration potential for the surrounding uplands and this site offers a major opportunity to protect this increasingly rare forest type within the state. The Wisconsin Wildlife Action Plan (WDNR 2006) notes protecting Boreal Forests, within an existing forested context, as a conservation action. Pattison State Park offers high conservation value throughout the property, due to the good forest context present here and to the south in the Northwest Lowlands Ecological Landscape where 76% of the present-day forests remain relatively unbroken (WDNR 2006). These forest connections and increased patch-sizes benefit many plants and animals requiring large tracts of forest.

For example, perhaps the best richness and diversity of birds on the AFPSP, particularly of wood warblers (magnolia, blackburnian, mourning, Nashville, and black-throated green), was noted during breeding bird surveys within this primary site. Copper Creek has been designated an Exceptional Resource Waterway.



**Blackburnian Warbler from Pattison State Park
(Photo by Brian M. Collins)**

Management Considerations

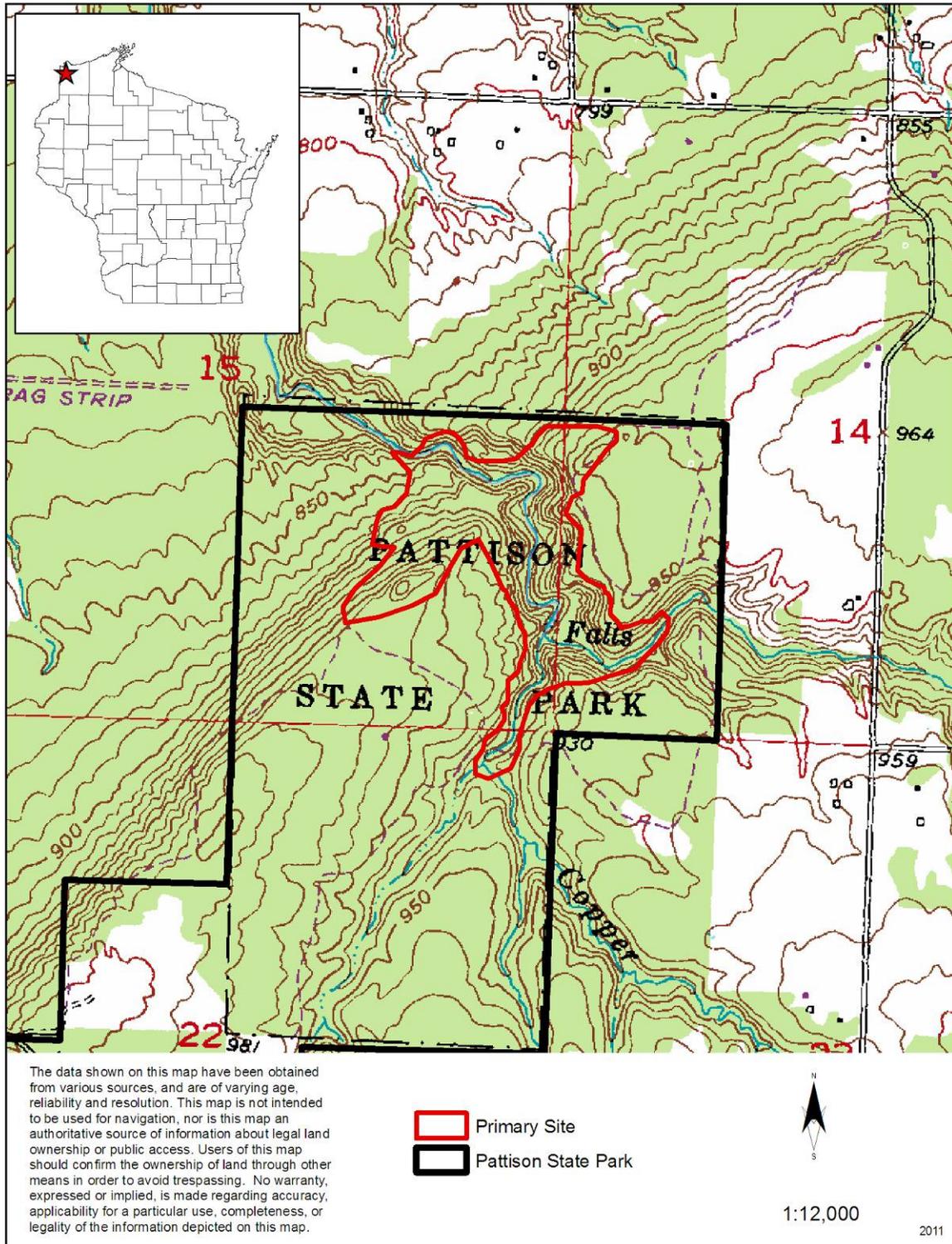
The site presents a good opportunity to restore Boreal Forest, largely restricted in the state to the Superior Coastal Plain Ecological Landscape, and greatly diminished from historical acreage due to past logging operations and conversion to agricultural lands. Restoration of Boreal Forests on the uplands of the site could focus on reducing the dominance of aspen in the forest and planting additional characteristic conifer species like white pine (*Pinus strobus*), white spruce (*Picea glauca*), and northern white-cedar.

Following examples of other Boreal Forest restoration projects occurring in this ecological landscape at the Brule River State Forest and Pokegama – Carnegie State Natural Area could provide baseline techniques to make this effort more successful. Copper Creek was designated as an Exceptional Resource Water and protecting the stream itself from runoff and degradation along with promoting a healthy forest are important steps in conserving this important resource. Protecting the gorge and sensitive cliff flora, including rare species, by limiting access and resulting trampling of the area, would be beneficial to the floristic value of the site.



Waterfall along Copper Creek (Photo by Richard Staffen)

Figure 7: Location of Copper Creek Gorge Primary Site



AFPSP02. Pattison Mesic Forest

| | |
|---------------------------|---|
| Property: | Pattison State Park |
| County: | Douglas |
| Landtype Associations: | 212Ya09. Carlton Plains 212Kb01. Pattison Moraines |
| Approximate Size (acres): | 126 |

Description of Site

A rich Northern Mesic Forest with a mature, uneven-aged, closed canopy (70-90%) of large diameter canopy trees with good size distribution is located along the Black River and extends north and east across the property. The canopy is a mix of characteristic hardwood and conifer tree species with coarse woody debris (CWD), well developed and moderate to good pit-and-mound topography present. There are pockets of wet coniferous forest embedded within the site near the Black River and a larger white cedar swamp at the north end that transitions to a Hardwood Swamp dominated by black ash (*Fraxinus nigra*) to the east. Ephemeral Ponds are scattered throughout the mesic forest. The rich ground flora is variable and patchily distributed with some very rich pockets of spring ephemerals.

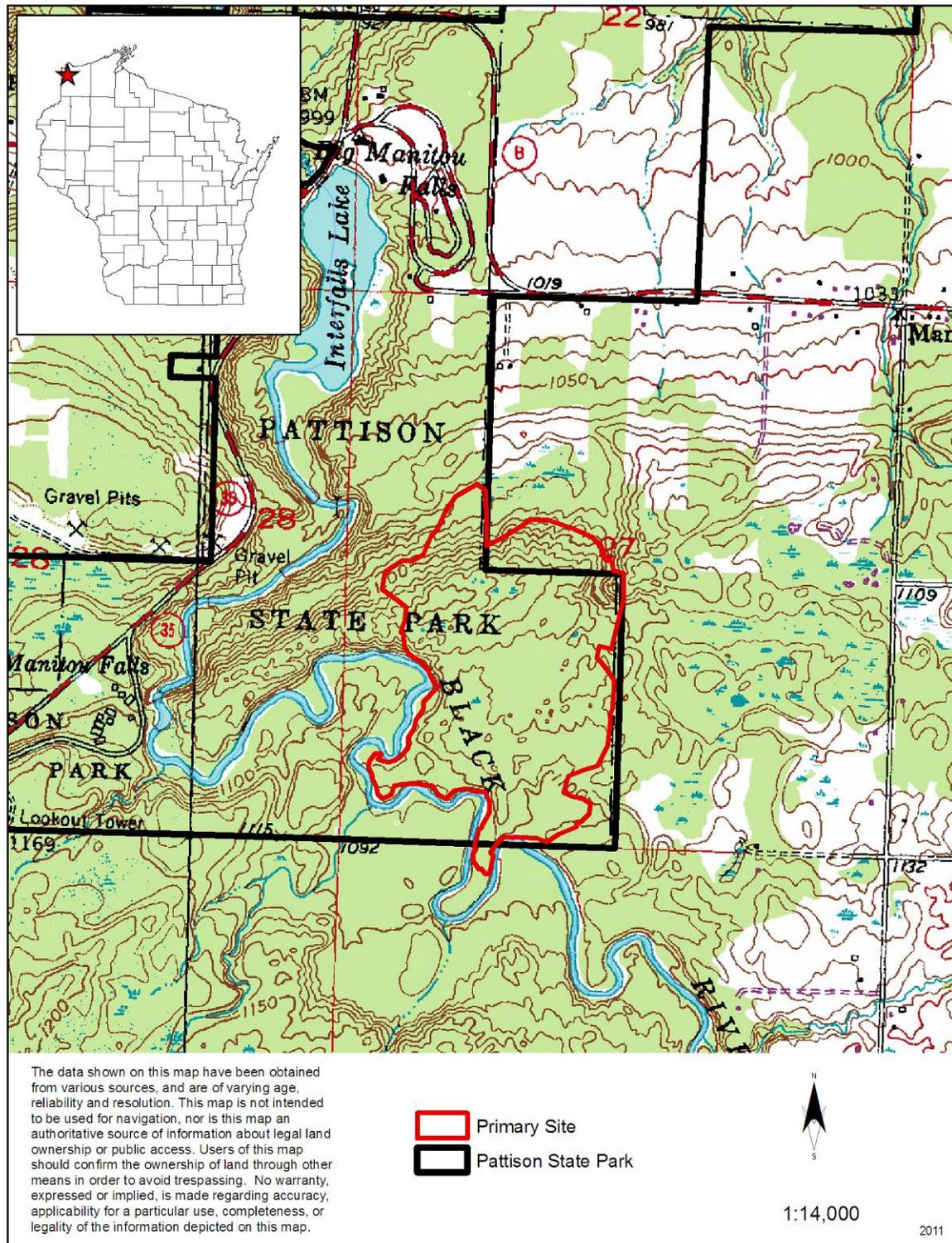
Significance of Site

Good-quality examples of older aged, rich Northern Mesic Forests are extremely rare in Douglas County and the clay plain landscape, thus protecting them is important and special designation could be warranted during the master plan process. Ephemeral Ponds are interspersed throughout the forest and are important breeding areas for many amphibians. Blue-spotted salamanders (*Ambystoma laterale*) were found in the Ephemeral Ponds and are indicator species of good-quality mature forests. Several rare birds are breeding within the site and require large blocks of unfragmented and older-aged forest stands.

Management Considerations

Early identification of Ephemeral Ponds and their associated species distributions throughout the forest would enable adaptive management to protect amphibians, without hindering other management or recreational activities. Additional opportunities exist to allow the mesic forest to mature and further develop old-growth characteristics and to connect these sites to the vast forests of the Northwest Lowlands Ecological Landscape to the south. There is additional Northern Mesic Forest west of the river that could be allowed to develop into older-aged forest with additional structural attributes. These conservation actions would help maintain the overall species diversity of the AFPSP by increasing habitat for area-sensitive forest birds, wide-ranging mammals and numerous rare plant species found in mature forests.

Figure 8: Location of Pattison Mesic Forest Primary Site

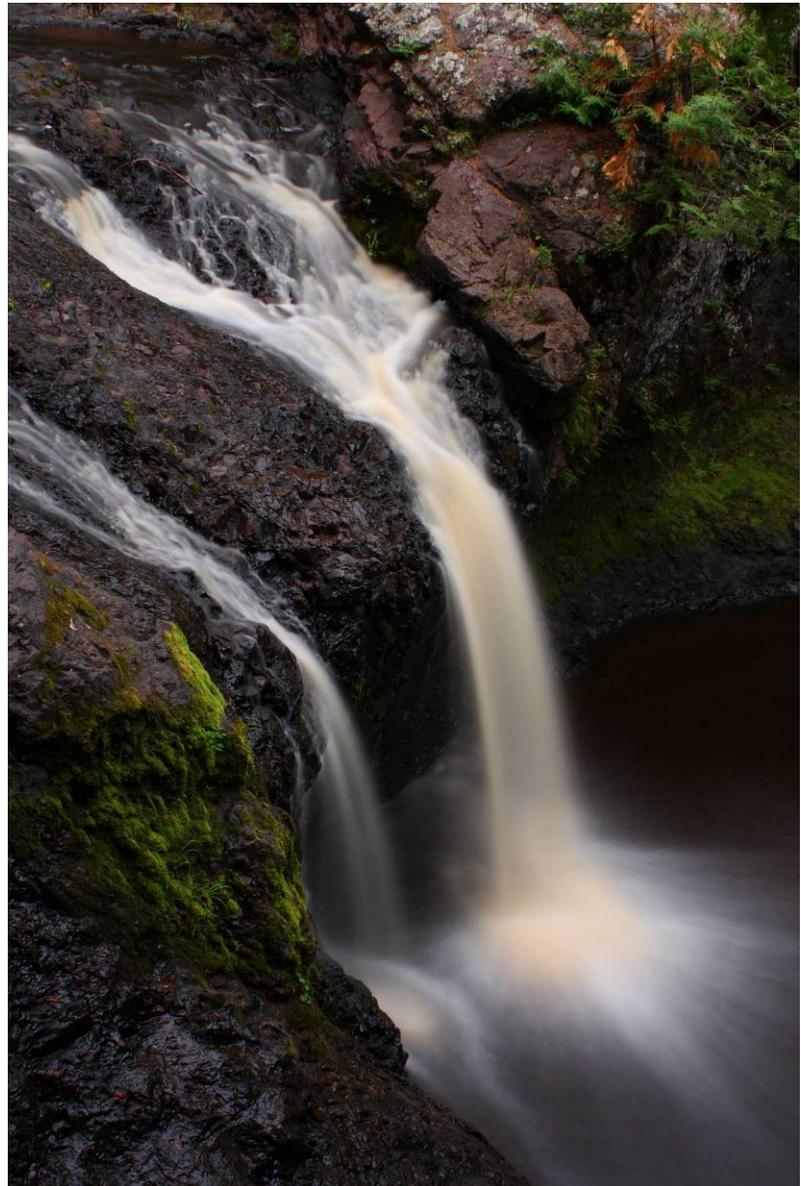


AFPSP03. Amnicon River and Dry-mesic Forest

Property: Amnicon Falls State Park
County: Douglas
Landtype Association: 212Ya01. Douglas Lake-Modified Till Plain
Approximate Size (acres): 58

Description of Site

This primary site includes a moderate- to good-quality, older-aged Northern Dry-mesic Forest along the Amnicon River with several dramatic waterfalls and cool, seepy cliff and wetland complex along a small tributary stream. The canopy of the Northern Dry-mesic Forest is dominated by large diameter white and red pine. The subcanopy and shrub layers are sparse with small amounts of beaked hazelnut (*Corylus cornuta*) and northern bush-honeysuckle. The groundlayer is also somewhat depauperate and includes pearly everlasting (*Anaphalis margaritacea*), wood anemone (*Anemone quiquefolia*), bracken fern (*Pteridium aquilinum*), and numerous rare species. There are small inclusions of Northern Sedge Meadow dominated by Canada blue-joint grass (*Calamagrostis canadensis*) and reed canary grass (*Phalaris arundinacea*) within the small ravines where a tributary stream flows to the Amnicon River. The activity center of the park is adjacent to the site with numerous trails, paved roads and parking lots, and the campground is found in close proximity. Beyond these developed areas, the majority of the surrounding uplands are formerly cut-over Boreal Forest, now dominated by trembling aspen with balsam fir.



Snakepit Falls at Amnicon Falls State Park (Photo by Brian M. Collins)

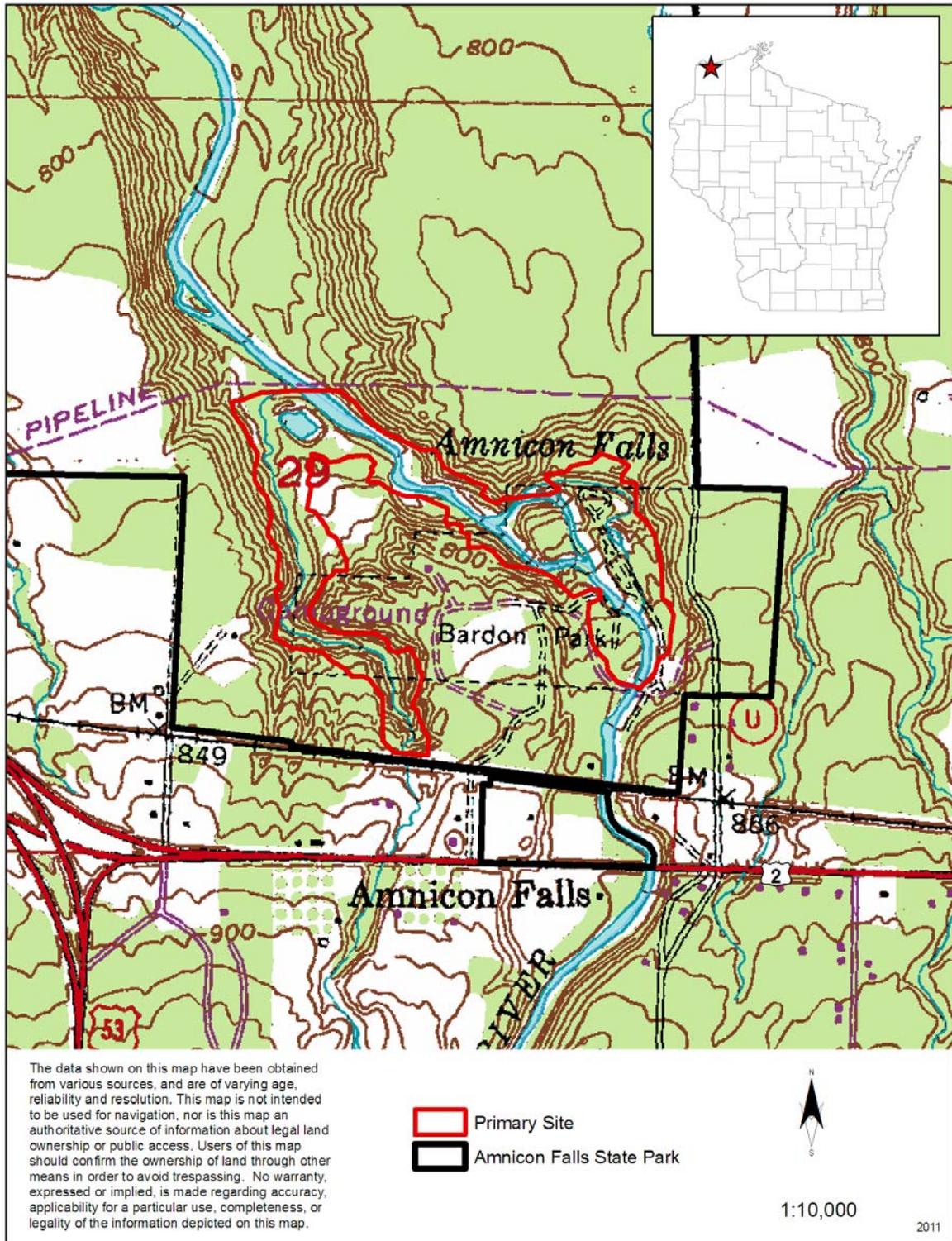
Significance of Site

Several rare plant species are located along the Amnicon River within this pine dominated forest (Hlina et.al. 2008). Many of the rare plants are associated with the cool moist cliffs and ledges along the Amnicon River including several fern species. Uncommon wood warblers are present in the upland forests of the site and rare animals are known from this stretch of the Amnicon River. Concentrated amphibian breeding areas were located here in wetlands carved out by an unnamed tributary to the Amnicon River. Wetlands are rare on the property and protecting these sites is important to amphibian conservation in the park. The Amnicon River is designated an Outstanding Resource Water and protecting and enhancing this resource would be beneficial to the many species that depend upon it.

Management Considerations

The Northern Sedge Meadow is dominated in part by reed canary grass; a small patch of purple loosestrife (*Lythrum salicaria*) was also found here. These species pose significant threats to wetlands. Control and monitoring of these non-native invasives should be a priority.

Figure 9: Location of Amnicon River and Dry-mesic Forest Primary Site



AFPSP04. Big Manitou Falls and Gorge State Natural Area

Property: Pattison State Park
County: Douglas
Landtype Associations: 212Kb01. Pattison Moraines
Approximate Size (acres): 60

Description of Site

Big Manitou Falls and Gorge contains a unique river gorge carved out of both sandstone and basalt and includes the 165' high roaring, cascading falls of the Black River. The primary site is pre-dominantly made up of good-quality Boreal Forest with Northern Mesic Forest elements and cliff communities within the gorge. The canopy is dominated by white spruce, red pine, white pine, northern white-cedar, paper birch (*Betula papyrifera*), and red oak (*Quercus rubra*). The shrub and sapling layer includes Canadian yew (*Taxus canadensis*), round-leaved dogwood (*Cornus rugosa*), balsam fir, mountain maple (*Acer spicatum*) and red maple (*Acer rubrum*). The groundlayer is dominated by ferns (common polypody [*Polypodium virginianum*], narrow beech fern [*Phegopteris connectilis*], common lady fern [*Athyrium filix-femina*]) along the cliffs and forest herbs including large-leaved aster (*Aster macrophyllus*), American spikenard (*Aralia racemosa*), columbine, and thimbleberry (*Rubus parviflorus*). Big Manitou Falls and Gorge is owned by the DNR and was designated a State Natural Area in 2003.



Canadian yew along the Black River within Big Manitou Falls and Gorge SNA (Photo by Ryan O'Connor)

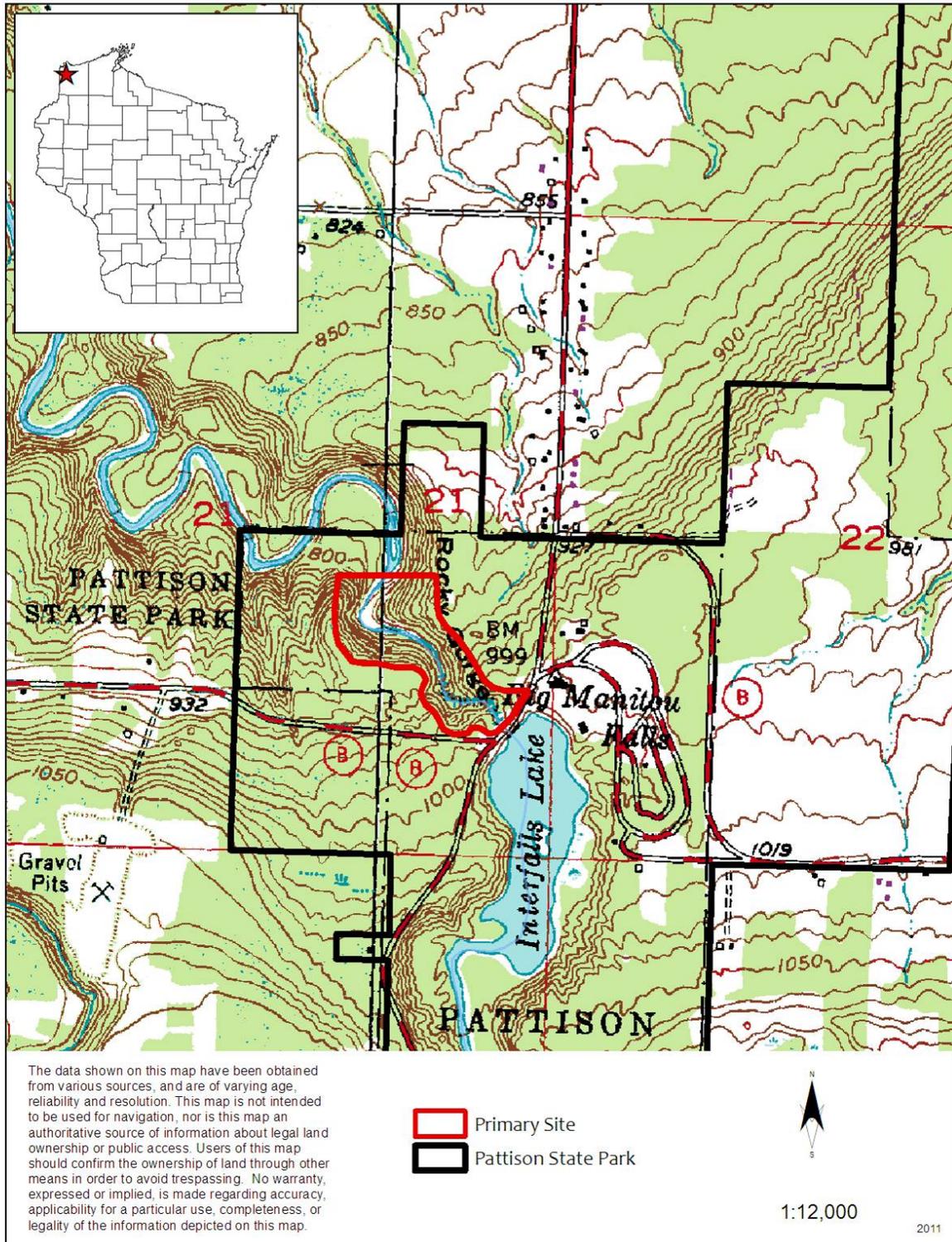
Significance of Site

The site protects Big Manitou Falls the highest waterfall in Wisconsin and the fourth highest waterfall east of the Rocky Mountains. Several rare plant and animal species have been found within the rocky gorge, including rare ferns and an uncommon land snail. One of the rare plants at the site is exceedingly rare in Wisconsin and is one of only three extant populations in the state. Good examples of Boreal Forest, like those found at the site, are increasingly rare within the state and identifying and protecting this forest type within an existing forested context, is a priority (WDNR 2006).

Management Considerations

Management of the site as a moist cliff reserve, a rare plant protection site, a significant geological site, and an ecological reference area would be appropriate. Natural processes should determine the structure of the moist cliff. This will protect the land snails and numerous rare fern species associated with these areas. Passive management of the site, allowing nature to determine the ecological characteristics of the state natural area, would benefit the intact Boreal Forest community present. Exceptions include control of invasive plants and animals, and maintenance of existing facilities. Control measures for white-tailed deer (*Odocoileus virginianus*) should be explored to protect the Canadian yew, a favorite browsing shrub of deer. Providing opportunities for research and education on moist cliffs, rare plants, and especially geological features at the site should be considered.

Figure 10: Big Manitou Falls and Gorge Primary Site



Species List

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

| Common Name | Scientific Name |
|------------------------------|-------------------------------|
| Animals | |
| Blackburnian Warbler | <i>Dendroica fusca</i> |
| Black-throated Green Warbler | <i>Dendroica virens</i> |
| Magnolia Warbler | <i>Dendroica magnolia</i> |
| Mourning Warbler | <i>Oporornis philadelphia</i> |
| Nashville Warbler | <i>Vermivora ruficapilla</i> |
| Plants | |
| Balsam Fir | <i>Abies balsamea</i> |
| Canadian Yew | <i>Taxus canadensis</i> |
| Columbine | <i>Aquilegia canadensis</i> |
| Northern bush-honeysuckle | <i>Diervilla lonicera</i> |
| Northern White-cedar | <i>Thuja occidentalis</i> |
| Red Pine | <i>Pinus resinosa</i> |
| Trembling Aspen | <i>Populus tremuloides</i> |
| White Pine | <i>Pinus strobus</i> |
| White Spruce | <i>Picea glauca</i> |

REFERENCES

- Casper, Gary, 2004. Amphibian and Reptile Inventory of the Peshtigo State Forest. Final report to the Bureau of Endangered Resources, Wisconsin Department of Natural Resources, Madison, WI.
- Hlina, Paul, D. S. Anderson, and D.W. Davidson. 2008. Flora of Amnicon Falls State Park, Douglas County, Wisconsin. Unpublished report for the Wisconsin Coastal Management Program.
- Wisconsin Department of Natural Resources. 2006b. Wisconsin Wildlife Action Plan. Available online: <http://dnr.wi.gov/org/land/er/wwap/plan/>.