



# **Biotic Inventory and Analysis of the Peshtigo River State Forest**

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A Baseline Inventory and Analysis of Natural Communities, Rare Plants and Animals, Aquatic Invertebrates, and Other Selected Features in Preparation for State Forest Master Planning

October 2006

**Natural Heritage Inventory Program**  
Bureau of Endangered Resources  
Department of Natural Resources  
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**Cover Photographs (clockwise from left):** dwarf milkweed (*Asclepias ovalifolia*), Eric Epstein; the Lake Lackawanna and Cedars Primary Site, Drew Feldkirchner; wood turtle (*Clemmys insculpta*), A.B. Sheldon.

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**Primary Authors:** Craig Anderson, Eric Epstein, Drew Feldkirchner, and William Smith

**October 2006**

**Wisconsin's Natural Heritage Inventory Program**  
Bureau of Endangered Resources  
Department of Natural Resources  
P.O. Box 7921, Madison, WI 53707



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- Craig Anderson – planning, botany, rare plants
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- Matt Brust – aquatic and terrestrial invertebrates
- Gary Casper – herpetology
- Andy Clark – botany, rare plants, community ecology
- Fred Clark – coarse filter, ecological overview
- Eric Epstein – planning, community ecology, birds
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- Janeen Laatsch – botany, data processing
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- Richard Staffen – zoology, data processing
- Jedd Ungrodt – coarse filter, ecological overview
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# Executive Summary

## Project Purpose and Objectives

This report presents the results of a multi-year project to inventory and analyze selected biotic resources of the Peshtigo River State Forest (PRSF) and the surrounding landscape. This project was undertaken by the Natural Heritage Inventory section of the Wisconsin Department of Natural Resources' (WDNR) Bureau of Endangered Resources, in cooperation with the Division of Forestry, to provide baseline information on the rare species, natural communities, and ecology of the study area relevant to the development of a new property Master Plan for the Peshtigo River State Forest and the conservation of biological diversity.

This inventory and analysis is one of a number of assessments identified as critical for developing a new state forest master plan. The information provided in this report consolidates background information useful for property master planning and is intended to be used in conjunction with other master planning assessments along with other sources of information to develop overall recommendations for the forest. It is our hope that this information will also be useful to a wider audience that includes managers, administrators, conservation groups, private landowners, and others who have an interest in conserving the biological diversity of this landscape.

The primary objectives of this project were:

- The identification and evaluation of natural biotic communities,
- The identification and evaluation of rare or otherwise significant plant and animal populations,
- The identification and evaluation of selected aquatic features and their associated biotic communities,
- The identification of sites appropriate for the restoration of lost or declining communities or important habitats,
- The identification of especially important protection, management, and restoration opportunities, focusing on both unique and representative natural features of these properties, as well as the surrounding landscape,
- The interpretation and transfer of the information gathered for use by the property master planning team, as well as managers, administrators, and others involved in the implementation of land use decisions on the Peshtigo River State Forest, as well as the surrounding landscape.

## Description of the Study Area

The study area is located in Marinette County, in an area characterized by sandy soils, igneous bedrock outcroppings, glacial topography, and extensive forests. The study area is centered on the Peshtigo River State Forest and Governor Thompson State Park (GTSP), but includes several free-flowing stretches of the Peshtigo River above the State Forest, nearby Marinette County lands adjacent to the river, and the Green Bay West Shores Wildlife Area near the mouth of the river.

## Exceptional Ecological Characteristics of the Study Area

Free-flowing stretches of the Peshtigo River support significant biodiversity, especially for aquatic macroinvertebrates. Key ecological features within state ownership include scattered outcroppings of igneous bedrock; small, remnant stands of the severely diminished and now globally rare Pine/Oak Barrens community; several floristically rich stands of Northern Wet-mesic Forest (white cedar swamps), and occurrences of older stands of Northern Dry-mesic Forest (white pine - red pine - red oak - red maple) on the steep slopes flanking the river. North and west of the state-owned lands is a significant area of mature Northern Mesic Forest, which features hemlock and American beech as major canopy components.

Ultimately, the Peshtigo River runs into Green Bay of Lake Michigan, where it forms an extensive delta composed of several thousand acres of Emergent Marsh, Sedge Meadow, Shrub-carr, interlaced with river channels and backwater

sloughs. Significant stands of Floodplain Forest and Northern Dry-mesic Forest border the lower river just above the open wetlands. Much of this area is within the Peshtigo Harbor Unit of the Green Bay West Shores State Wildlife Area, a highly significant group of public lands that border Green Bay, mostly to the south of the Peshtigo's mouth.

## Summary of Biotic Inventory Results

### Rare Vascular Plants

**Twelve** rare plant species (from the NHI Working List) have been documented in or around the PRSF, including one State Threatened species, dwarf milkweed (*Asclepias ovalifolia*). One species that was known only from historical records (*Vaccinium pallidum*) was found during this study. Most of the rare plants found within the study area are associated with either the dry uplands (including barrens remnants, dry forests, and bedrock glades) or the wetlands, both forested and open types. Three of the 12 species are associated with Northern Dry-mesic and Northern Mesic forests.

### Rare Animals

**Nineteen** rare animal species (from the NHI Working List) have been documented in the study area, including one State Endangered and three State Threatened species, and the Federally Threatened Bald Eagle (Table 5). A timber wolf (Federally Endangered) pack is known from the northern portion of the study area, and there is another known from just outside of the northern end of the study area (based on field signs and reports of wolf observations - see [dnr.wi.gov/org/land/er/mammals/wolf/](http://dnr.wi.gov/org/land/er/mammals/wolf/) for more information). The majority of rare animals documented within the study area are associated with aquatic or wetland habitats. The Peshtigo River provides important habitat for many of these species, including five that are globally rare. The dry uplands are also important for some species including a rare tiger beetle (*Cicindela patruela patruela*). Only one nest territory for the Northern Goshawk was located on the PRSF, as the State Forest and State Park lack the larger tracts of mature closed canopy forest needed to sustain this and other rare birds, including the Red-shouldered Hawk. However, there are areas on the forest that could provide opportunities to benefit these species in the future (e.g., see the "Primary Sites").

### Natural Communities

For brief descriptions of the individual Natural Community types that are represented in the study area by relatively undisturbed occurrences, see Appendix C. Among the communities included are:

#### Forest Communities:

- Northern Dry Forest
- Northern Dry-mesic Forest
- Northern Mesic Forest
- Northern Wet Forest
- Northern Wet-mesic Forest

#### Savanna Communities

- Pine Barrens

#### Shrub Communities

- Alder Thicket
- Shrub-carr

#### Herbaceous Communities:

- Bedrock Glade
- Open Bog
- Southern Sedge Meadow
- Emergent Marsh

## **Aquatic Features**

The Peshtigo River originates in a predominantly forested landscape in Forest County and flows for 148 miles before emptying into Green Bay. The river falls approximately 1,050 vertical feet in that distance. Roughly the upstream half is classified as trout water and harbors a good diversity of cool water aquatic animals. As the stream becomes larger and is impounded by several hydroelectric power dams, the fauna becomes more characteristic of a warm water stream system. A good diversity of warm water aquatic animals is found in the middle section of the river. Power dams are the source of the most significant alterations to the hydrology of the River. Relatively short sections of free flowing river with medium gradient and warm water are found between these impoundments, except for the more extensive stretch below the Johnson Falls Dam.

Natural lakes are uncommon in this landscape, although there are a few examples of undeveloped or nearly undeveloped natural lakes in or near the PRSF. The predominance of aquatic or wetland animals (over 83%) on the list of rare animals for the PRSF reflects on the nature of the properties surveyed, the focus of this inventory, and the diversity of the Peshtigo River and its tributaries. Especially significant is the number of species found here that are restricted to medium-sized warm water streams with moderate current, as well as the number of Globally Rare species. Tributaries and associated wetlands are also important habitat types for rare animal species including wood turtle, Blanding's turtle, four-toed salamander, and bullfrog.

## **Priority Opportunities for Biodiversity Conservation**

More information about these priorities and how they were derived is available in the "Priority Opportunities for Biodiversity Conservation" section of this report. The priority opportunities are associated primarily with: 1) free-flowing segments of the Peshtigo River and its tributaries; 2) Northern Wet-mesic Forest (white cedar swamp); 3) Northern Dry-mesic Forest, which are best developed and least disturbed on the steep slopes along the river; 4) Bedrock Glades, with associated Pine Barrens and Dry Forest restoration opportunities; 5) large, contiguous blocks of mesic forest (the best opportunities lie outside of the PRSF); and 6) scattered sites, usually at small scales, that harbor relatively isolated occurrences of a natural community, waterbody, or rare species population.

## **Protection and Management Opportunities**

Ecologically important areas, based on inventory findings have been grouped into "Primary Sites" (see Appendix B); these vary in size from 45 ac. to 358 ac. The larger, more connected, and less isolated sites have the greatest potential value for conserving rare resources over the long-term, as they are capable of supporting the greatest number of species, including area-sensitive species, species that are adversely affected by fragmentation impacts and isolation effects, habitat specialists, and species that use different habitats at different stages in their life cycles and must be able to move between them. Larger, more connected sites may be better able to recover from disturbance, as species that are lost will potentially have pathways from which to recolonize a site, and patches of undisturbed habitat are more likely to persist.

## **Restoration & Management Opportunities and Needs**

Focus areas for restoration activities might include planning for the development of older forests, particularly within: 1) larger blocks of forest; 2) at locations or in settings where there is good potential for providing the needs of species that prefer older forest; 3) where the forest types and successional stages now present are appropriate for the consideration of establishing older forests; 4) where allowing for the development of such forests will have secondary benefits, such as protecting the watersheds of waterbodies or wetlands of high conservation value, meeting aesthetic objectives of forest users, creating interpretive educational opportunities for the state or county. This could be accomplished by incorporating extended harvest rotations or by creating reserves or benchmarks. Fire could be used to manage Northern Dry Forests, Pine Barrens, Oak Barrens, and Bedrock Glades to maintain unique structural and

compositional characteristics.

## **Primary Sites: Significance and Summaries**

This report highlights **seven** ecologically important sites, including two aquatic sites. These “Primary Sites” were identified because they contain high-quality natural communities of both rare and representative types (including lakes and streams), provide important habitat for rare species, offer opportunities for restoration, may provide important ecological connections between sites or landscapes, or some combination of the above factors.

Descriptions of each of the sites can be found in Appendix B. Information provided there includes: location information, a site map showing occurrences of significant communities and species, a brief summary of the natural features present, the site’s ecological significance, and management considerations.

## **Future Needs**

The following are suggested surveys and monitoring efforts that could provide beneficial information for managing the forest.

### **Surveys**

- Breeding Bird Surveys, targeting those habitats that are well represented on this property, and/or that will be most altered by forest management activities
- Non-vascular plants associated with communities such as Bedrock Glade; Northern Wet-mesic Forest (white cedar swamp); Seeps and Spring Runs
- Invasive Plants (this is also a monitoring need)
- Small mammal surveys (these could not be covered during this project)

### **Monitoring**

- Invasive plants
- Deer browse
- Light demanding plants
- Abundance of community types that are regarded as difficult to manage, of low economic value, or both. Examples include xeric forests, dominated by either jack pine or “scrub” oak, and thinly timbered Bedrock Glade
- Forests impacted directly or indirectly by gypsy moth infestation or gypsy moth control measures (monitoring could include the treatment used, the location, how extensive the treatments were, and the treatment results)

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# Introduction

## Project Purpose and Objectives

This report presents the results of a multi-year project to inventory and analyze selected biotic resources of the Peshtigo River State Forest (PRSF) and the surrounding landscape. This project was undertaken by the Natural Heritage Inventory section of the Wisconsin Department of Natural Resources' Bureau of Endangered Resources, in cooperation with the Division of Forestry, to provide baseline information on the rare species, natural communities, and ecology of the study area relevant to the development of a new property Master Plan for the PRSF and the conservation of biological diversity. Governor Thompson State Park was included in the project to provide information for future master planning efforts and to provide a landscape perspective for these state properties.

This inventory and analysis is one of a number of assessments identified as critical for developing a new state forest master plan. The information provided in this report consolidates background information useful for property master planning and is intended to be used in conjunction with other master planning assessments along with other sources of information to develop overall recommendations for the forest. It is our hope that this information will also be useful to a wider audience that includes managers, administrators, conservation groups, private landowners, and others who have an interest in conserving the biological diversity of this landscape.

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- The identification of especially important protection, management, and restoration opportunities, focusing on both unique and representative natural features of these properties, as well as the surrounding landscape,
- The interpretation and transfer of the information gathered for use by the property master planning team, as well as managers, administrators, and others involved in the implementation of land use decisions on the Peshtigo River State Forest and Governor Thompson State Park, as well as other parts of the surrounding landscape.

## Overview of Methods

The Wisconsin Natural Heritage Inventory (NHI) program is part of an international network of heritage programs. The defining characteristic of this network, and the feature that unites the individual programs, is the use of a standard methodology for collecting, processing, and managing data on the occurrences of natural biological diversity. This network of data centers was established by The Nature Conservancy and is coordinated by NatureServe, an international non-profit organization (see [www.natureserve.org](http://www.natureserve.org) for more information).

Natural Heritage Inventory programs focus on rare plant and animal species, natural communities, and other natural features. The Wisconsin NHI Working List is the official list of Endangered, Threatened, and Special Concern plants and animals for Wisconsin. (Special concern species are those that are suspected to be rare but for which not enough information is known). The Working List also includes a list of natural communities known to occur in Wisconsin. The list changes over time as the populations of species change (both up and down) and as knowledge about species status and distribution increases. The most recent Working List for Wisconsin is available on the Internet through the WDNR Endangered Resources Program ([dnr.wi.gov/org/land/er/](http://dnr.wi.gov/org/land/er/)).

The Wisconsin NHI database houses inventory results, in addition to data contributed by cooperating scientists and gleaned from museums, herbaria, and published reports. This database is the central repository for occurrences of

rare species and high quality natural communities. Natural Heritage Inventory data are used for a variety of purposes including land management, state land master planning, community planning, conservation planning, and environmental review of public and private activities across the state. All actions that the WDNR conducts funds or approves on public or private lands must be screened for potential impacts to rare species.

The Wisconsin NHI program utilizes a standard approach for biotic inventory work that supports master planning. Generally, the approach involves data collection and development, data analysis, and report writing. Many sources were consulted to aid in the identification and prioritization of survey sites within the PRSF. Our basic references included the PRSF stand/compartments reconnaissance data, interpretations of local and regional land cover from recent aerial photographs and satellite imagery, and GIS data on landforms, vegetation, and soils. We also drew upon the NHI database for previous records from this landscape. An Ecological Assessment was prepared to highlight potentially ecologically important areas for concentrating our survey work.

Fieldwork for the Peshtigo River State Forest biotic inventory projects was conducted primarily during 2002-2003, and supplemented with information obtained by NHI staff prior to 2002. Staff employed a coarse filter – fine filter inventory approach (Appendix A). Coarse filter surveys conducted during the first year identified those natural communities, aquatic features, and rare priority taxa that warranted more detailed inventory. Fine filter inventory, initiated in Year 2, focused on more intensive surveys conducted by experts targeting high priority taxa. A limited number of additional surveys were conducted during Year 2 to fill information gaps for high priority sites and natural communities. Table 1 summarizes the individual surveys conducted along with the principal investigator(s) for each survey.

Standard methods were used for surveying for each taxa group. For most of the surveys, data was collected for the entire suite of species present at a given survey site. Many common species, such as most tree species, were not covered by this inventory.

**Table 1.** Field surveys conducted during the biotic inventory

<b>Survey</b>	<b>Year</b>	<b>Biologist(s)</b>
Aquatic insects	2002	Kurt Schmude, Matt Brust
Birds	2003	Robert Howe
Botany	2002, 2003	Craig Anderson, Andy Clark, and Eric Epstein
Ecological Assessment	2002	Robert Wernerehl, Jedd Ungrodt
Forest raptors	2005	John Krause, Jim Woodford
Herptiles	2003	Gary Casper, Richard Sajdak
Natural communities	2002, 2003	Andy Clark, Eric Epstein, Elizabeth Spencer, and Patrick Robinson
Terrestrial invertebrates	2002, 2003	Kathryn Kirk, Matt Brust

Following completion of fieldwork and data processing, NHI staff analyzed the inventory data and refined site boundaries that include important assemblages of natural communities and rare species. Individual sites and their associated features are described in the “Primary Sites: Significance and Summaries” section of this report.

## Study Area Background from Statewide Analyses

The WDNR’s Ecosystem Management Planning Team has developed the **Ecological Landscapes of Wisconsin Handbook**, designed to help natural resource professionals “analyze alternatives in the context of ecosystem management and work towards the mission and goals of the Department of Natural Resources” (WDNR 2005, pg. 1). The handbook provides information to assist in determining where best to manage for what types of resources. The handbook provides data for each of Wisconsin’s 16 Ecological Landscapes, and contains numerous maps, tables, descriptions of natural communities, and identifies opportunities to manage for biological diversity in each landscape. The current handbook contains summarized information for the Northeast Sands Ecological Landscape (the landscape

encompassing the PRSF – see the “Ecoregions” section of this report and [dnr.wi.gov/landscapes](http://dnr.wi.gov/landscapes)), and an expanded chapter is in preparation. The handbook identified the Peshtigo River State Forest as an important management opportunity for the Northeast Sands, along with other opportunities that include the protection of unusual plant communities associated with rock outcrops, maintenance of jack pine-scrub oak forests and Pine Barrens, protection of white cedar swamps, and several others.

At the request of the Wisconsin Natural Resources Board, the WDNR prepared the Wisconsin **Land Legacy Report** (WDNR 2006a), to identify places that will be critical in meeting both conservation and recreation needs through 2050. (The criteria used by the Land Legacy Study for identifying critical places are broader than those used in this report and include recreational uses). The sites were ranked for different categories, including “Conservation Significance.” The Peshtigo River was chosen as a “Legacy Place” and rated as having *good* ecological properties and *outstanding* recreational potential. Several other Legacy Places were identified within the Northeast Sands but were outside of the study area, including a portion of the Chequamegon - Nicolet National Forest, Brazeau Swamp, and Athelstane Barrens.

**The Wisconsin Wildlife Action Plan** (WWAP) (WDNR 2006b) was developed to identify and provide information on animal species with low and/or declining populations that are in need of conservation action (“Species of Greatest Conservation Need” or SGCN). The plan also identified ecological priorities and conservation actions for each of these species, by habitat or natural community type, within each Ecological Landscape. Based on the plan, the Northeast Sands contains eight habitat (or natural community) types for which there are *major* management opportunities, and 12 habitat types for which there are *important* opportunities. An additional seven habitat types are present in the Northeast Sands, but there are better opportunities to sustain these types in other Ecological Landscapes. The WWAP listed 82 vertebrate SGCNs that are associated with this landscape. In addition, there are numerous invertebrate SGCNs (as well as rare plants which could not be included in the plan) that are known from this part of the state. Appendix D contains vertebrate SGCN along with their associated habitats for the Northeast Sands Ecological Landscape.

# Description of the Study Area

## Location

The Peshtigo River State Forest (PRSF) is located in Marinette County in northeastern Wisconsin. The study area was designed to include the state forest, as well as the adjacent Governor Thompson State Park, and other nearby ecologically connected areas. Lands adjacent to the Peshtigo River (based on a one-mile buffer) north of the state forest were also included in the study area. A second portion of the study area includes the free-flowing stretches of the Peshtigo River proper, as well as an area surrounding the Peshtigo Harbor unit of the Green Bay West Shores Wildlife Area. The primary focus, and the area most intensively surveyed, was the portion of the study area occupied by the PRSF and Governor Thompson State Park. Figure 1 depicts the study area.

## Ecoregions

An *ecoregion* is a geographic area that has a relatively consistent pattern of climate, geology, landforms, hydrology, soils, vegetation, and natural processes. The most widely used ecoregion classification scheme is the U.S. Forest Services *National Hierarchical Framework of Ecological Units* (NHFEU) (Cleland et al. 1997).

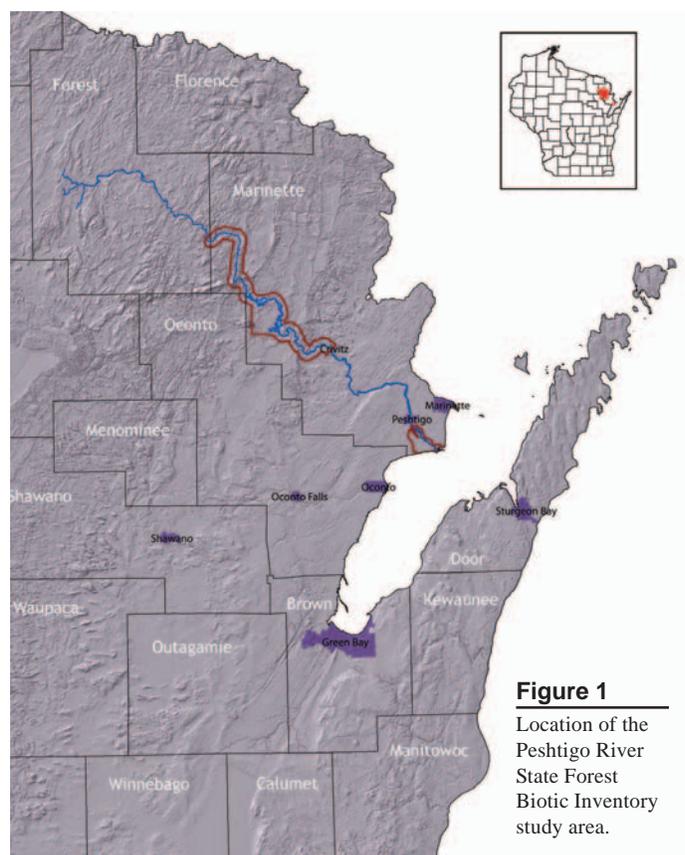
This system divides North America into four ecosystem *Domains*; each Domain is further divided into

*Divisions, Provinces, Sections, Subsections, and Landtype Associations (LTAs)*. Finer divisions have been developed for local use, sometimes at the individual property level (e.g., for the Chequamegon-Nicolet National Forest). To meet its own administrative and management needs, the WDNR has developed another level of classification, called an *Ecological Landscape*, between the Section and Subsection levels. WDNR's Ecological Landscapes are aggregations of Subsections that are taken directly from the NHFEU.

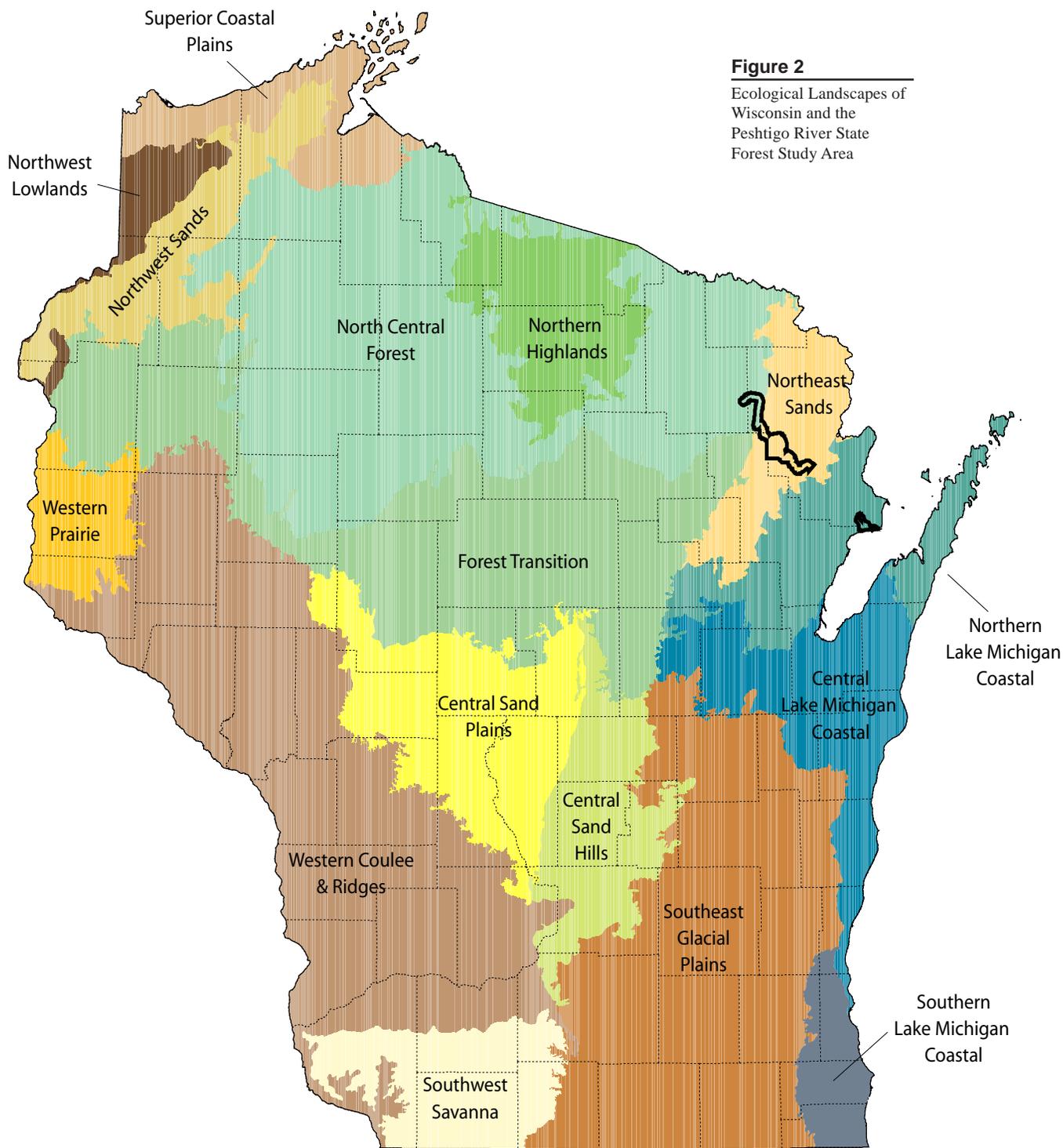
The majority of the study area, including all of the PRSF, is located in the Northeast Sands Ecological Landscape (Fig. 2). From the NHFEU, the unit most relevant to the PRSF and surrounding lands is subsection 212Tc (Athelstane Sandy Outwash and Moraines). In the NHFEU, this Subsection is further divided into a number of Landtype Associations (LTAs). The LTAs that comprise Subsection 212Tc are differentiated primarily by their geomorphology. Morainal remnants and heads-of-outwash make up one group of LTAs, outwash plain LTAs make up another, and a third group is formed in glacial lake plains. Outwash LTAs are further differentiated by the presence or absence of collapse topography (Wisconsin LTA Team 2005). Figure 3 illustrates the distribution of these LTAs, and brief LTA descriptions are provided in Appendix E.

## Size

The PRSF is the smallest of Wisconsin's northern state forests, comprising approximately 9,200 acres. The property is long and linear in shape, and surrounds the Peshtigo River and associated flowages (impounded stretches of the river) from Roaring Rapids (northwest of the Caldron Falls Flowage) to an area northwest of the Sandstone Flowage. The property borders approximately 25 miles of the Peshtigo River.



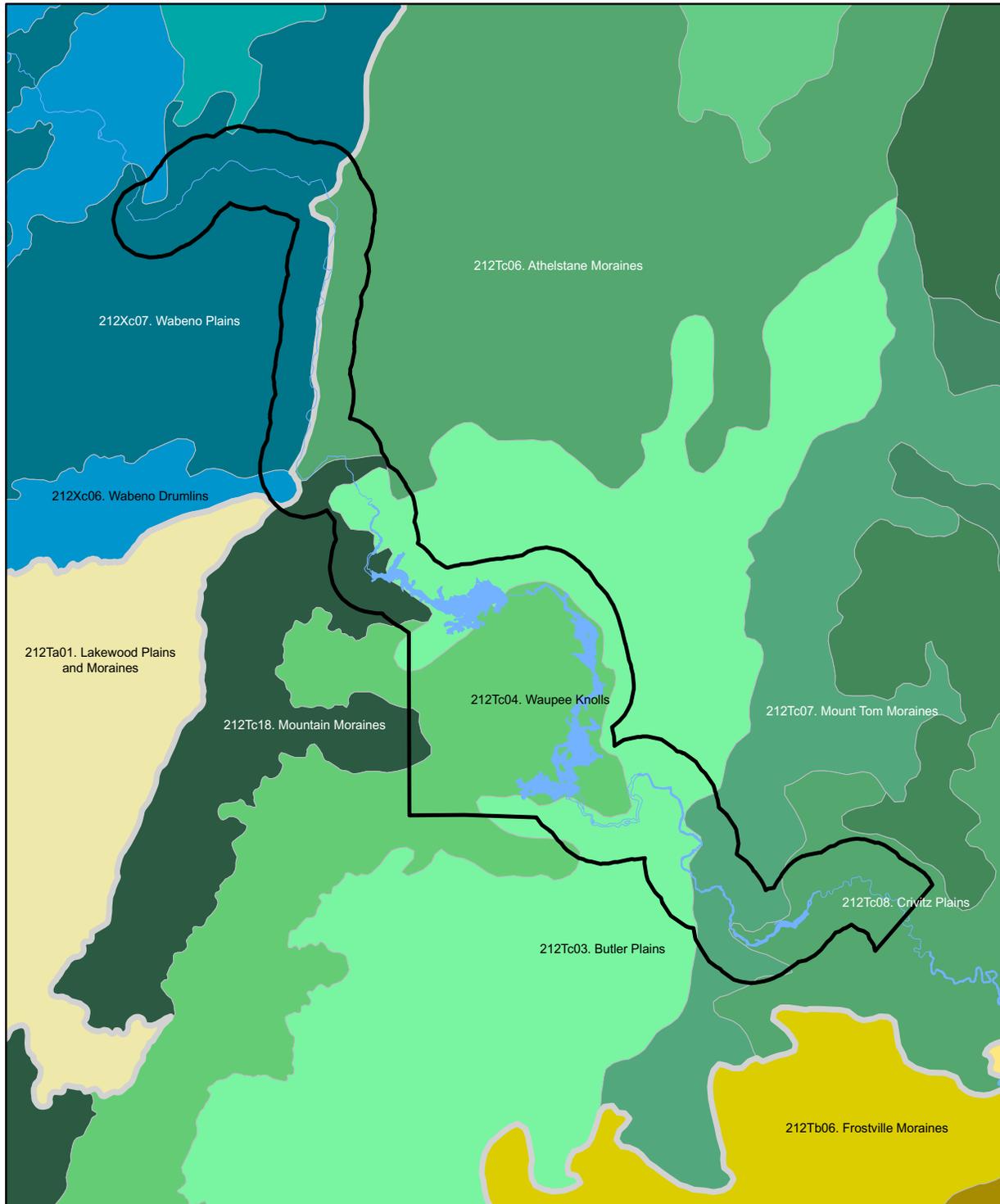
**Figure 1**  
Location of the Peshtigo River State Forest Biotic Inventory study area.



**Figure 2**  
 Ecological Landscapes of Wisconsin and the Peshtigo River State Forest Study Area

**Figure 3**

Landtype Associations (LTAs) of the Peshtigo River State Forest Study Area. Grey lines delineate NHFEU Subsections (see page 10 for more information). Appendix E provides brief LTA descriptions.



1:250,000



## Public Lands

The public lands within this study area include the PRSF, Governor Thompson State Park, other small and scattered state lands, and significant portions of the Marinette County Forest, the state's second-largest county forest at over 200,000 acres. The 3600-acre Peshtigo Harbor Unit of the Green Bay West Shores Wildlife Area makes up most of the southernmost portion of the study area. The Nicolet section of the Chequamegon-Nicolet National Forest is adjacent to the PRSF to the west. The Nicolet covers portions of Florence, Forest, Langlade, Oconto, and Vilas counties, and contains the headwaters of the Peshtigo River.

## General Land Use

The major land uses in the study area are commercial forestry and recreation. A few farms and residences are scattered within the study area. As with many other areas in the northernmost parts of the state, population, road density, and housing density are relatively low at this time, although on a percentage basis, population density has increased in recent years (WDNR 2006a).

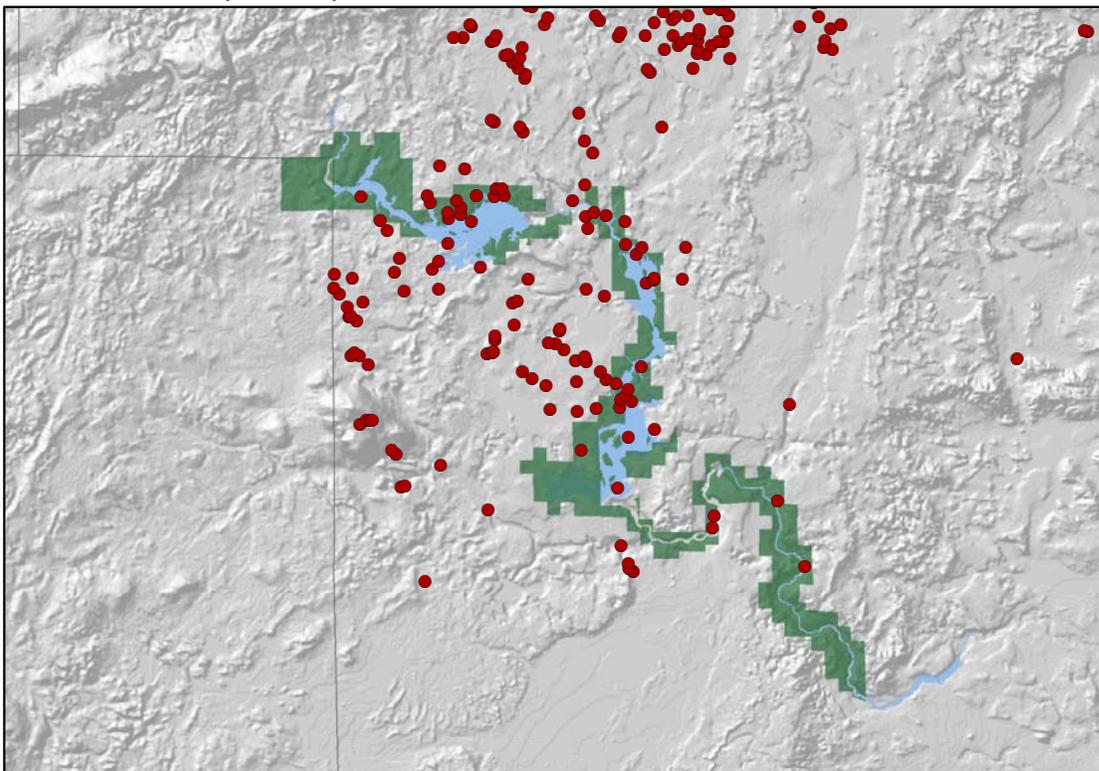
## Physical Environment

### Geography / Geology / Soils

The PRSF and surrounding areas are underlain by igneous, metamorphic, and volcanic rocks, with the exceptions of the area surrounding Potato Rapids that is underlain by carbonates. Igneous and metamorphic bedrock exposures are common throughout the PRSF and surrounding landscape and the PRSF contains many good examples of rock outcrops (Fig 4). The PRSF, like the rest of the Athelstane Sandy Outwash and Moraines Subsection, formed under the center of the Green Bay Lobe during the latter part of the Wisconsin glaciation and was overwashed and reworked by outflow from the Langlade Lobe. The thickness of glacial drift over the bedrock varies from 0-100 feet deep. The thickest glacial drift deposits are found in the southern half of the forest (WDNR 1985). In some places, till is thin enough that bedrock characteristics directly affect vegetation, and bedrock outcrops can be seen frequently throughout the forest, often forming ridges and knolls.

**Figure 4**

Rock outcrop locations for the Peshtigo River State Forest and surrounding areas from the Marinette County Soil Survey (USDA 1991)



The surface of the Athelstane Sandy Outwash and Moraines subsection is dominantly outwash sand. Many parts of the outwash surface feature “collapsed” topography that formed when stranded blocks of glacial ice melted, and overlying outwash material collapsed into the depressions. Heads-of-outwash are distinctive landforms here; these hilly areas were formed at recessional positions of the Green Bay Lobe when ice was melting and thinning rapidly. In places where large amounts of sand and gravel were deposited atop the thin edge of the ice sheet, and when the ice melted, a “head-of-outwash” ridge remained (see Wisconsin LTA team 2005).

The soils of much of the PRSF and surrounding areas are excessively drained and sandy. Common soils in the study area are of the Menahga Association, with significant areas of Pence-Padus Association closer to the Forest County line. There are scattered areas of the following associations in the upper part of the study area: Mancelona-Emmet-Menahga, and Saronia-Keweenaw. The main soil associations in the lower stretches of the Peshtigo River are Wainpola-Deford and Cunard-Emmet (USDA 1991). However, the Subsection also includes remnant loamy end moraines and ground moraines that were not completely buried by outwash materials. These areas are among the few in the immediate study area that support mesic hemlock hardwood or northern hardwood forests. Kettle lakes are few. Most of the lowland soils are very poorly drained acid peats or non-acid mucks, and are currently occupied by bogs, sedge meadows, shrub swamps, and lowland forests.

## Hydrology

The entire study area sits within the Peshtigo River drainage basin, which covers about 2 percent of the total area of Wisconsin. The Peshtigo is a hard water river that begins in Forest County near Argonne and flows 148 miles to the southeast, emptying into Green Bay below the city of Peshtigo in Marinette County. The river falls approximately 1,050 vertical feet in that distance (Oakes and Hamilton, 1973). The Forest Co. segment of the Peshtigo is classified as trout water, and is fed primarily by groundwater. The stream here is medium-sized with low to moderate gradient. As it enters the Study Area in Marinette County, the Peshtigo becomes a large groundwater-dominated stream, with moderate gradient and remains trout water. The most significant alterations to the hydrology of the Peshtigo River in Marinette County are the six hydroelectric power dams owned and operated by The Wisconsin Public Service Corporation (WPSC). These dams create six flowages that cover a total surface area of 3,940 acres at high water (FERC EIS 1997). Below the Johnson Falls Dam there is a relatively long free flowing section of river with low gradient. Otherwise, relatively short sections of free flowing river with medium gradient and warm water are found between these impoundments. Below the confluence with the outlet from Lake Noquebay the Peshtigo waters become mixed with ground water and surface water contributions, but remains groundwater dominated. Gradient decreases. From the Hwy 64 Bridge downstream, the relative contribution from groundwater becomes low. Below the city of Peshtigo the river has no barriers to its outlet at Lake Michigan. Natural lakes are uncommon in this landscape, although there are a few examples of undeveloped or nearly undeveloped natural lakes in or near the PRSF.

## Vegetation

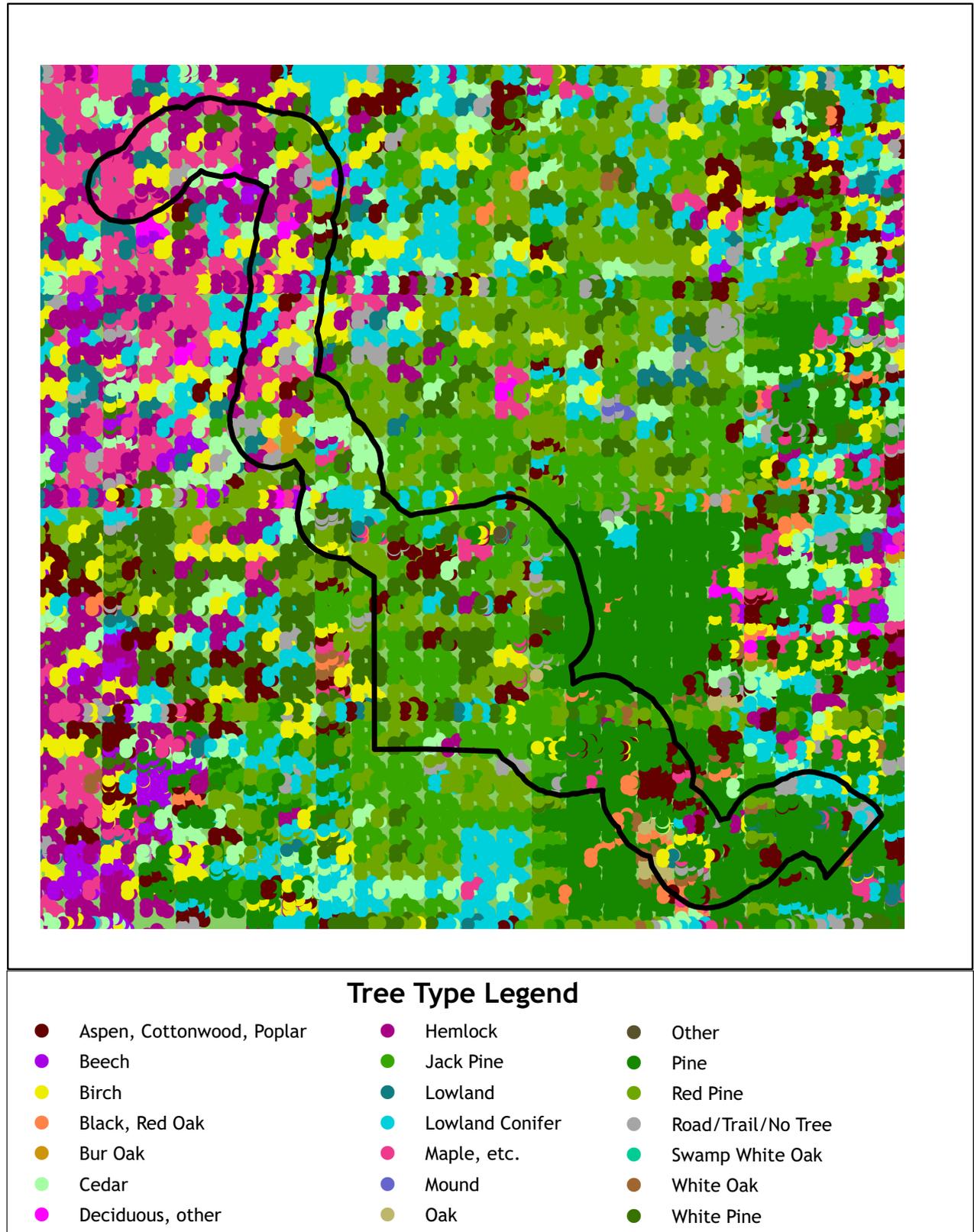
### Historic Vegetation

Based on Finley’s (1976) interpretation of the Public Land Survey records collected in the mid-1800s, the lands now making up the PRSF and surrounding landscape were vegetated with pine-oak barrens, interspersed with localized areas of lowland conifer forest and hemlock-dominated mesic forest. The northern stretches of the river that currently flow through portions of the Marinette County Forest were dominated by northern hardwoods, hemlock-hardwoods, and pine.

Surveyor’s records indicate that much of the area was open, with widely spaced trees that commonly included small diameter red pine (*Pinus resinosa*) and jack pine (*Pinus banksiana*). Aspen (*Populus* sp.) and tamarack (*Larix laricina*) were common in some areas. Fires were historically common in this landscape, owing to the dry sandy soils, fire-adapted vegetation, and the relatively level or rolling terrain which had few major water or wetland barriers. Figure 5 illustrates the major tree species documented during the General Land Office surveys of the mid-1800s.

**Figure 5**

Pre-European settlement tree species from the study area based on the original General Land Office Surveys (from the WDNR GIS coverage Pre-European Settlement Vegetation Database of Wisconsin: Differentiated Section and Quarter Section Corners prepared by the University of Wisconsin-Madison Forest Landscape Ecology Lab, 2001).



## Current Vegetation

The PRSF and surrounding landscape are mostly forested. Deciduous forests (aspen, oaks, maples) are the most widespread, and are interspersed with pine plantations, and small areas of lowland conifer forest and grassland. Agricultural lands are common just south of the PRSF near the city of Crivitz.

Based on the most recent (1989 but partially updated) forest reconnaissance data for the PRSF, aspen is the most common cover type, followed by scrub oak, red pine, undifferentiated oak, northern hardwoods, and jack pine (Table 2). Swamp conifers and hardwoods, spruce-fir, white pine, and white birch cover types make up the remaining forested acreage. Based on these data, the forests are mostly composed of small size classes, including poles (83%) and saplings (16%); small and large sawtimber together made up only 1% of the acreage of the PRSF (Fig 6).

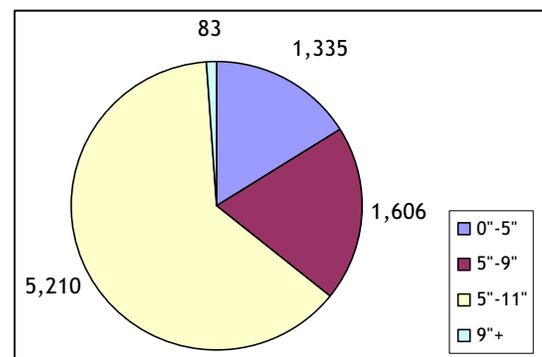
Larger forest size classes in the PRSF are limited mainly to the steep slopes immediately adjacent to the Peshtigo River. These slopes support several distinct forest communities, and contain seeps that sometimes harbor rare plants and interesting plant assemblages.

**Table 2.** Cover types for the Peshtigo River State Forest from Forest Reconnaissance data. These cover types are only approximations, as they are based on the dominant vegetation present and the data need updating.

Cover Type	Size Class	Sub-total	Total	Percent
Aspen	0"-5"	1,066	2,459	27.2%
	5"-11"	1,393		
Fir-Spruce	5"-9"		55	0.6%
Lowland Conifer			417	4.6%
Black Spruce	0"-5"	16		
Swamp Conifer	0"-5"	39		
	5"-9"	204		
White Cedar	5"-9"	158		
Lowland Hardwoods	0"-5"	15	85	0.9%
	5"-11"	70		
Northern Hardwoods			789	8.7%
Northern Hardwoods	5"-11"	701		
Red Maple	5"-11"	88		
Oak			705	7.8%
	5"-11"	689		
	11"-15"	16		
Scrub Oak			2,152	23.8%
	0"-5"	36		
	5"-11"	2,103		
	11"-15"	13		
Jack Pine	0"-5"	130	362	4.0%
	5"-9"	232		
Red Pine	0"-5"	35	1,011	11.2%
	5"-9"	957		
	9"-15"	19		
White Pine	15"+		27	0.3%
White Birch	5"-11"	167	175	1.9%
	11"-15"	8		
<b>Sub-total of Forested Acres</b>			8,237	91.1%
Emergent Veg			186	2.1%
Grassland			62	0.7%
Rock Outcrops			92	1.0%
Shrubland			96	1.1%
Other			369	4.1%
<b>Sub-total of Non-forested Acres</b>			805	8.9%
<b>TOTAL ACRES</b>			9,042	100.0%

**Figure 6**

Tree size classes for the Peshtigo River State Forest from Forest Reconnaissance data. These data are only approximations, and the data need updating. Note: the 5"-9" category is for "softwood" tree species and the 5"-11" category is for hardwood species.



# Summary of Findings

## Natural Communities of the Study Area

Element occurrence quality stands of the following natural communities have been documented in and around the study area. Other community types are also present, but these were represented by stands that were too small, too highly disturbed, or too altered to warrant inclusion in the NHI database. Table 3 summarizes the types of natural community occurrences that resulted from this project.

General descriptions of the natural communities that are found in this landscape are provided in Appendix C. More detailed accounts of individual community occurrences can be found in the Site Descriptions section of this report, and additional information is archived as manual files in the Bureau of Endangered Resources (WDNR, Madison). The following sections on rare plants and animals relate the occurrences of these species to the condition and abundance of the habitats and natural communities present.

**Table 3.** NHI natural community types documented within the study area.

	Year	State Rank	Global Rank
Bedrock Glade	2003	S3	G2
Northern Dry-mesic Forest	2003	S3	G4
Northern Mesic Forest	2003	S4	G4
Northern Wet Forest	2003	S4	G4
Northern Wet-mesic Forest	2003	S3S4	G3?
Open Bog	2003	S4	G5
Southern Sedge Meadow	2003	S3	G4?
Stream--Fast, Hard, Cold	2003	S4	GNR

## Rare Vascular Plants of the Study Area

The Wisconsin Natural Heritage Database tracks 12 rare plant species in the study area, including one State Threatened species, dwarf milkweed (*Asclepias ovalifolia*) (Table 4). The opposing extremes of dry uplands and saturated or inundated wetlands provide habitat for most of the rare plant species that occur in the study area. Three species, dwarf milkweed, Deam's rockcress (*Arabis missouriensis* var. *deamii*), and Blue Ridge blueberry (*Vaccinium pallidum*), were documented in remnants of barrens, in northern dry forests, or on bedrock glades. Prior to this study, Blue Ridge blueberry was known only from three widely scattered locations: a 1938 collection from Green County, a 1981 collection from Iron County, and a 1991 collection from Monroe County. This inventory documented three new populations, doubling the number of locations in Wisconsin. Dwarf milkweed (Wisconsin Threatened) is only found in the Northwest Sands, Northeast Sands, and Central Sand Plains Ecological Landscapes. Deam's rockcress is a biennial mustard species, and the 42 documented populations are scattered in the area from roughly Marinette County south to Waushara County and northwest to Washburn County. In the study area, Deam's rockcress has been located on bedrock outcrops, and in other parts of Wisconsin, the species has been found on dry cliffs and in barrens. Blue Ridge blueberry has rarely been found in Wisconsin, and the majority of extant occurrences (three) are in this study area, all in barrens remnants, on bedrock glades, or, in one instance, within a power-line right-of-way.

**Table 4.** NHI Working List plants documented within the study area.

Scientific Name	Common Name	Year	State Rank	Global Rank	State Status
<i>Arabis missouriensis</i> var. <i>deamii</i>	Deam's Rockcress	2003	S2	G4G5QT3?Q	SC
<i>Arethusa bulbosa</i>	Swamp-pink	1991	S3	G4	SC
<i>Asclepias ovalifolia</i>	Dwarf Milkweed	2003	S3	G5?	THR
<i>Carex assiniboensis</i> <sup>1</sup>	Assiniboine Sedge	1981	S3	G4G5	SC
<i>Carex vaginata</i>	Sheathed Sedge	2003	S3	G5	SC
<i>Cypripedium reginae</i>	Showy Lady's-slipper	2003	S3	G4	SC
<i>Epilobium palustre</i> <sup>1</sup>	Marsh Willow-herb	2003	S3	G5	SC
<i>Malaxis monophyllos</i> var. <i>brachypoda</i>	White Adder's-mouth	1992	S3	G4Q	SC
<i>Medeola virginiana</i>	Indian Cucumber-root	1997	S3	G5	SC
<i>Platanthera hookeri</i> <sup>1</sup>	Hooker Orchis	1960	S2S3	G5	SC
<i>Platanthera orbiculata</i>	Large Roundleaf Orchid	2003	S3	G5?	SC
<i>Vaccinium pallidum</i>	Blue Ridge Blueberry	2003	S1	G5	SC

1. These species were not located within the Peshtigo River State Forest boundary.

Another group of rare plants, including white adder's-mouth (*Malaxis monophyllos* var. *brachypoda*), sheathed sedge (*Carex vaginata*), showy lady's-slipper (*Cypripedium reginae*), swamp-pink (*Arethusa bulbosa*), and marsh willow-herb (*Epilobium palustre*), are associated with either forested or open wetlands. White adder's-mouth is most often found in white cedar swamps, and there are about 50 documented occurrences statewide, mainly north of the Tension Zone. Likewise, the Special Concern sheathed sedge generally occurs in white cedar swamps and most documented populations are either in northeast Wisconsin or in Douglas County. Showy lady's-slipper grows in a variety of forested wetlands and seeps and is scattered throughout the state. Swamp-pink generally grows in acidic bogs and open muskegs, but it can also grow in peat deposits in alkaline fens as well. Most of our records are from the northern third of the state and the counties along Lake Michigan from Manitowoc County south. There are currently 35 records of marsh willow-herb in the NHI database, and those are concentrated in the northern two tiers of counties and in the Central Sand Plains. Assiniboine sedge (*Carex assiniboinensis*) is generally found on mesic terraces in floodplain forests.

The remaining Special Concern plant species from this part of the study area were associated with northern dry-mesic and northern mesic forests. Indian cucumber-root (*Medeola virginiana*) is usually found in rich forests. These populations are near the northern edge of the range of the 63 occurrences in Wisconsin; most of our extant records for Indian cucumber-root occur in Oconto, Menimonee, Shawano, and Brown counties. Hooker orchid (*Platanthera hookeri*) and large roundleaf orchid (*Platanthera orbiculata*) generally inhabit mixed conifer-hardwood dry-mesic forests. Both orchids have populations that are scattered around the state. The Hooker orchid record is from 1960 and is considered historical. The species was not observed during this inventory.

## Rare Animals of the Study Area

**Nineteen** NHI Working List animal species have been documented in the study area, including one State Endangered and three State Threatened species, and the Federally Threatened Bald Eagle (Table 5). A timber wolf (Federally Endangered) pack is known from the northern portion of the study area, and there is another known from just outside of the northern end of the study area (based on field signs and reports of wolf observations – see [dnr.wi.gov/org/land/er/mammals/wolf/](http://dnr.wi.gov/org/land/er/mammals/wolf/) for more information). Figure 7 illustrates the timber wolf distribution in Wisconsin for 2006.

The predominance of aquatic or wetland animals (over 83%) on this list reflects both on the focus of the inventory and the diversity of the Peshtigo River and its tributaries. Especially significant is the number of species found here that are restricted to medium-sized warm water streams with moderate current (8), as well as the number of Globally Rare species (5). Tributaries and associated wetlands were also important habitat types for rare animal species including wood turtles, Blanding's turtle, four-toed salamander, and bullfrog.

Terrestrial rare animals include *Cicindela patruela patruela*, a globally rare tiger beetle tied to Pine Barrens habitat, and the West Virginia White, a butterfly restricted to large populations of its larval food plant toothwort (*Dentaria* spp.). One nest territory of the Northern Goshawk was located. Larger tracts of older growth closed canopy forest, which are preferred by Northern Goshawks, Red-shouldered Hawks, and other rare birds were not generally present in the Study Area.

There are numerous Species of Greatest Conservation Need (SGCN) known from the Northeast Sands, including 58 birds, three fish, seven herptiles, and 14 mammals. Table 6 lists SGCN from the Northeast Sands according to the probability that they occur in that landscape. Appendix D contains a list of habitats with the best management opportunities in the Northeast Sands along with the associated SGCN for each habitat.

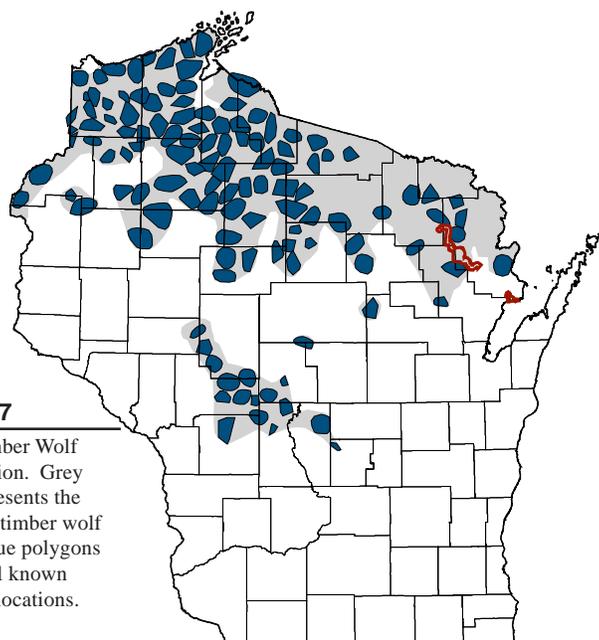
**Table 5.** NHI Working List animals documented within the study area.

Scientific Name	Common Name	Year	State Rank	Global Rank	State Status	Federal Status
<b>Beetle</b>						
<i>Cicindela patruela patruela</i> <sup>1</sup>	A Tiger Beetle	2002	S2	G3T3	SC/N	
<b>Bird</b>						
<i>Accipiter gentiles</i>	Northern Goshawk	2002	S2B,S2N	G5	SC/M	
<i>Haliaeetus leucocephalus</i>	Bald Eagle	2002	S3B	G4	SC/FL	LT, PD
<i>Pandion haliaetus</i>	Osprey		S3S4B	G5	THR	
<b>Butterfly</b>						
<i>Pieris virginiensis</i> <sup>1</sup>	West Virginia White	2002	S3	G3G4	SC/N	
<b>Crustacean</b>						
<i>Oreonectes propinquus</i>	Northern Clearwater Crayfish		SU	G5	SC/N	
<b>Dragonfly</b>						
<i>Gomphurus lineatifrons</i>	Splendid Clubtail	1991	S3	G4	SC/N	
<i>Gomphurus ventricosus</i> <sup>1</sup>	Skillet Clubtail	2002	S3	G3	SC/N	
<i>Gomphus quadricolor</i>	Rapids Clubtail		S4	G3G4	SC/N	
<i>Gomphus viridifrons</i>	Green-faced Clubtail		S3	G3	SC/N	
<i>Nasiaeschna pentacantha</i>	Cyrano Darner	1988	S3	G5	SC/N	
<i>Neurocordulia yamaskanensis</i>	Stygian Shawdowfly		S3	G5	SC/N	
<i>Ophiogomphus anomalus</i>	Extra-striped Snaketail		S1	G3	END	
<i>Ophiogomphus carolus</i>	Riffle Snaketail	1980	S3	G5	SC/N	
<i>Ophiogomphus howei</i>	Pygmy Snaketial		S3	G3	THR	
<b>Frog</b>						
<i>Rana catesbeiana</i>	Bullfrog	2003	S3	G5	SC/H	
<b>Salamander</b>						
<i>Hemidactylium scutatum</i> <sup>1</sup>	Four-toed Salamander	2003	S3	G5	SC/H	
<b>Turtle</b>						
<i>Clemmys insculpta</i>	Wood Turtle	2003	S3	G4	THR	
<i>Emydoidea blandingii</i> <sup>1</sup>	Blanding's Turtle	2002	S3	G4	THR	

1. These species were not located within the Peshtigo River State Forest boundary.



Bald Eagle. Photo by Dave Menke, US Fish & Wildlife Service



**Figure 7**

2006 Timber Wolf Distribution. Grey area represents the probable timber wolf range; blue polygons are actual known territory locations.

**Table 6.** Vertebrate Species of Greatest Conservation Need occurring in the Northeast Sands Ecological Landscape. See the Wisconsin Wildlife Action Plan (WDNR 2006b) for more information.

	Species with a <b>high</b> degree of probability of occurring in this Ecological Landscape	Species with a <b>moderate</b> degree of probability of occurring in this Ecological Landscape	Species with a <b>low</b> degree of probability of occurring in this Ecological Landscape
Mammals	Northern Flying Squirrel	Gray Wolf	Eastern Red Bat
	Water Shrew	Woodland Jumping Mouse	Silver-haired Bat
			Hoary Bat
			Northern Long-eared Bat
			Moose
Birds	Osprey	American Bittern	Horned Grebe
	Bald Eagle	Northern Harrier	Trumpeter Swan
	American Woodcock	Northern Goshawk	Blue-winged Teal
	Black-billed Cuckoo	Red-shouldered Hawk	Canvasback
	Whip-poor-will	Sharp-tailed Grouse	Lesser Scaup
	Red-headed Woodpecker	Solitary Sandpiper	Spruce Grouse
	Least Flycatcher	Upland Sandpiper	American Golden Plover
	Veery	Canada Warbler	Whimbrel
	Wood Thrush	Lark Sparrow	Hudsonian Godwit
	Brown Thrasher	Rusty Blackbird	Marbled Godwit
	Golden-winged Warbler		Dunlin
	Field Sparrow		Short-billed Dowitcher
	Vesper Sparrow		Black Tern
	Grasshopper Sparrow		Yellow-billed Cuckoo
	Bobolink		Black-backed Woodpecker
	Red Crossbill		Olive-sided Flycatcher
			Willow Flycatcher
			Boreal Chickadee
			Loggerhead Shrike
			Blue-winged Warbler
		Black-throated Blue Warbler	
		Kirtland's Warbler	
		Dickcissel	
		Henslow's Sparrow	
		Eastern Meadowlark	
		Western Meadowlark	
Herptiles	Wood Turtle	Four-toed Salamander	Northern Ribbon Snake
	Mudpuppy	Pickerel Frog	
	Mink Frog	Blanding's Turtle	
Fishes	Lake Sturgeon		Greater Redhorse
			Western Sand Darter

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# Threats to Natural Communities, Aquatic Systems, and Rare Species

As discussed throughout this report, rare species and high quality natural communities are now known to occur on the PRSF and in surrounding areas. However, there are threats to the species and important habitats of this area. Important examples of threats relevant to the PRSF (although not an exhaustive list) are described below. Avoiding, eliminating, or, in some cases, reversing these threats will play a key role in conserving the biological diversity of this landscape. These concepts are covered in more detail in many other sources, including the DNR report entitled “Wisconsin’s Biodiversity as a Management Issue” (Addis et al. 1995).

## Invasive Species

As of this writing, some of the invasive plants that have been problematic in other parts of the state, such as garlic mustard, are not yet established in the PRSF. However, there are invasive species of concern, such as spotted knapweed, that have been observed in the PRSF and at nearby Governor Thompson State Park. Other invasive plant species that were observed during this project included exotic yellow and orange hawkweeds, white and yellow sweet clovers, butter and eggs, bird’s-foot trefoil, and crown vetch. Leafy spurge has been found in the Governor Thompson State Park and has the potential to become a serious problem throughout the study area. These species can affect dry forests, barrens remnants, and Bedrock Glades by negatively impacting native species.

Forests are vulnerable to infestation by exotic

honeysuckles and common buckthorn. Invasive species of concern for conifer swamps include glossy buckthorn and Eurasian marsh thistle. Open wetlands may be affected by purple loosestrife and reed canary grass. Glossy buckthorn is an established pest at Peshtigo Harbor on the lower river, and could become established in wetland communities in the PRSF and GTSP. The reservoirs (flowages) are used heavily for various sorts of recreation and may be subject to the introduction of Eurasian milfoil and other aquatic invasive plants or by animals such as the rusty crayfish.

All of these species, whether terrestrial or aquatic, have the potential to out-compete and displace native species, leading to ecological simplification and habitat loss. Management techniques should be designed to minimize the spread of invasive species wherever possible. Controlling outbreaks while they are small and localized, especially in ecologically important areas, seems to be the best strategy. It will be important for resource personnel who spend a high proportion of their time in the field on the PRSF and nearby properties to be able to identify those invasive species that are threats here. Control measures will need to be implemented, wherever possible, to avoid major infestations such as those that now occur in many other parts of the state. There are a wide variety of materials available regarding identification and control of these species in Wisconsin (e.g. Czarapata 2005, Hoffman and Kearns 1997) in addition to information on the WDNR Web site ([dnr.wi.gov/invasives](http://dnr.wi.gov/invasives)).

## Ecological Simplification and Habitat Loss

In many areas throughout the state, dry forest and barrens communities have been replaced by planted stands that emphasize a single desired species (usually red pine). Converting more complex natural communities to plantations



Barrens infested with leafy spurge (yellow patch near center of photo), Eau Claire County. Photo by Eric Epstein, WDNR.

can eliminate or drastically reduce habitat for many native species, both rare and common. Such modifications greatly simplify community structure and composition. Chemical treatments sometimes used in the site preparation process may negatively affect or eradicate sensitive native plants, including rare plants, or the host plants needed by rare animals. Fire suppression policies have protected human life and property, but have also made it difficult to regenerate some tree species (e.g., oaks, and jack pine) and maintain the full complement of light-demanding plants and animals native to this landscape.

Because of the potential impacts of plantations, it will be important to consider 1) the locations of rare species occurrences, 2) landscape vegetation patterns, and 3) the overall distribution of plants and animals that contribute to the area's biodiversity when considering siting of plantations on the PRSF. There are many areas that are significant for biodiversity conservation where this type of management should be avoided.

Deer browse is another way ecological simplification may be a threat in this landscape. Excessive herbivory by high populations of deer can inhibit reproduction of certain trees, especially those species that are preferred forage for herbivores. Heavy herbivory can also subject some herbs and shrubs to pressures they cannot withstand, resulting in loss of vigor or population size. Cedar swamps are notoriously known to be negatively affected by excessive deer browse, and cedar regeneration is now severely limited in most wet-mesic conifer swamps throughout the state and beyond. In addition to developing more effective methods to control deer densities, the mosaic of vegetation types surrounding the cedar-dominated conifer swamps of the PRSF should be assessed to try to limit negative impacts such as excessive deer browse when planning and conducting management activities.

On the two state properties, as in many locations in the region and throughout the state, there is a lack of older forest, as well as the large habitat patches needed to sustain certain species and ecological processes. While one nest territory of the Northern Goshawk was located, larger tracts of older growth closed canopy forest, which are preferred by Northern Goshawks, Red-shouldered Hawks, and other rare birds, were not generally present in the Study Area.

Habitat loss and ecological simplification can be the result of management decisions, both decisions made in the past and those that are made today. Preventing ecological simplification and habitat loss for some species may require active management strategies such as 1) preventing access by recreation vehicles to certain areas, 2) burning techniques, 3) establishing special designations in some areas, and 4) landscape-level planning (treating on a stand level but managing for the entire landscape).

## **Hydrological Modifications**

The effects of dams and their water regimes on rare species and natural communities are well documented. Dams affect natural fluctuations in a river's flow regime thereby affecting natural communities and species that require seasonal fluctuations. In addition, aquatic habitats are fragmented into disjunct segments, preventing the movements of some species between different stretches of streams. Recommendations for the management of dams that would emphasize compatibility between biological diversity and dam operation could be developed. As the six dams located within the study area come up for re-licensing, each could be evaluated for their continued need.

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# Priority Opportunities for Biodiversity Conservation

The priority opportunities for biodiversity conservation in the study area emerged primarily from our analysis of the data collected during the recent field inventory. We also included relevant information from past studies and were able to utilize tools that permit an effective analysis of large landscapes. These included: satellite imagery and associated interpretations such as WISCLAND; Geographic Information Systems (GIS); the NHFEU, various analyses of pre-European settlement vegetation data. The priorities reflect inventory and assessment of the natural features both within and around the PRSF. Conservation opportunities are not equivalent throughout the study area, and we have emphasized those sites (locations) that based on our inventory findings (e.g. see Appendix B), contain the best examples of rare and representative native ecosystems, aquatic features, and sensitive species populations. For communities, priorities are determined by identifying community occurrences that are 1) relatively unmodified from a natural condition 2) that occur in a context which is compatible with maintaining that community over time, and 3) which are represented by relatively large stands. To conserve and manage for diversity efficiently, both rare and representative community types are evaluated (e.g., Northern Mesic Forest is abundant in Wisconsin, but old growth stands, stands dominated by conifers, and stands constituting large patches are now rare and may continue to decline). Opportunities are presented in the context of conserving and enhancing the biological diversity of this landscape.

## Landscape Level Priorities

The study area presents opportunities to maintain large blocks of contiguous forest, with embedded, undeveloped lakes, streams, and wetlands, that 1) are representative of the types (forest communities, wetland communities, and waterbodies) occurring in this region; 2) highlight types that are rare locally, regionally, or statewide; or 3) emphasize types that are outstanding because of their size, diversity, value to rare species, or recovery from past disturbance.

The Marinette County Forest is one of the largest public lands in the state (over 220,000 acres). As this is a ‘working forest’, young and medium-aged forests, in a mosaic of relatively small patches, are well represented and provide ample habitat for those species associated with such vegetation. Older, less disturbed forests, especially in larger patches, are not well represented, even in the county parks. Detailed surveys of the county forest have not been conducted, but among the significant natural features identified are several outstanding aquatic features (including free-flowing stretches of the Peshtigo and several of its tributaries), undisturbed wetlands, and relatively mature northern hardwoods and hemlock hardwoods forests with significant components of beech, hemlock, and locally, white and red pines.

The Peshtigo River corridor has the potential to provide an almost uninterrupted linkage between the vast forests of the Nicolet National Forest and Marinette County with the shores of Lake Michigan. Many of the important sites identified within the PRSF and GTSP are in close proximity to the river, which presents an important opportunity to consider during planning deliberations.

Peshtigo Harbor occupies a strategic location, situated at the junction of the Peshtigo River with Lake Michigan. The mouth of the Peshtigo River features an extensive complex of wetlands: marsh, meadow, shrub swamp, and lowland forest, that are of high significance to native plants and animals, including many rare species. The Peshtigo Harbor Unit of the Green Bay West Shores State Wildlife Area is just one of a system of important (ecologically, economically, recreationally, and aesthetically) public holdings that occur along the West Shore of Green Bay. Additional survey work is needed for the entire complex of public lands along the West Shore to clarify its significance, and determine the magnitude of the serious threats to its integrity and long-term viability .

## Ecological Connections

The study area presents opportunities to maintain or re-establish ecological connectivity between significant inventory sites identified within this landscape. Forest and lake connections need to be recognized in management plans. Look for opportunities to provide travel corridors by protecting shoreline vegetation along streams and lakes.

## Community Level Priorities

Natural Community Conservation priorities on PRSF and GTSP include:

- Northern Dry-mesic Forest.
- Northern Wet-mesic Forest
- Bedrock Glade/Pine Barrens
- Forested Seep

Lower priorities (at this time) include:

- Northern Dry Forest
- Northern Wet Forest
- Northern Mesic Forest
- Alder Thicket
- Southern Sedge Meadow



Bedrock Glade near High Falls.  
Photo by Patrick Robinson, WDNR.

## Upland Forest Communities

The most abundant upland forest communities on the two state properties at this time are dry types (Northern Dry Forest). Common cover types include “scrub” oak (northern pin, white, and bur oaks occur in these stands, with northern pin oak typically the most abundant oak), aspen, pine (jack, red, and white), mixtures of these species, and pine plantations. Old growth management guidelines have not yet been developed, or even discussed in any detail, for dry forest types. Some of the dominant tree species of the dry forest communities are short-lived, and few of the stands examined on the state lands offer legitimate old growth management opportunities at this time. The issue needs additional discussion and consideration.

At this time, important conservation considerations for the dry forests include maintaining gaps and other openings, which were formerly much more abundant and widespread in this landscape, and upon which numerous native plants and animals are dependent. Extensive conversion of dry forest to conifer plantation monocultures has occurred in many parts of the state recently (especially in northwestern and central Wisconsin). This will result in greatly reduced habitat availability for many native plants and animals (including common and popular “game” species), and reduce management options elsewhere. Large scale opportunities to manage for dry forest communities do not exist on the state lands in this study area because of the properties generally linear configuration and relatively small size.

Northern Dry-mesic Forests are best developed and least disturbed on the steep slopes bordering the Peshtigo River. Several of the surveyed stands are now mature, composed of relatively large trees, feature high crown closure, and support representative ground layers. Cover types vary, and include white pine, red pine, red oak, red maple, and big tooth aspen, sometimes with small amounts of hemlock and white spruce. Mixtures are common, but there are patches dominated by hardwoods, and other patches where conifers are prevalent. Away from the riverside bluffs, several of our survey sites contain or adjoin second-growth stands of dry or dry-mesic forest that offer good, long-term opportunities to manage for larger forest blocks, a large diameter tree component, higher conifer cover, and the development of the older forest attributes that are presently scarce in this landscape.

Mesic northern hardwood and hemlock hardwood forests are limited on the state properties (to a single site on the State Forest), but management opportunities occur at large scales on some of the Marinette County Forest lands to the north, and especially, on the Nicolet National Forest to the west. The mesic forests in this region are of special

interest because of their extent, the relatively healthy ‘matrix’ they provide for many of the region’s lakes, streams, and wetlands, and the significant component of American beech they contain (a dominant forest tree that is restricted in distribution to parts of eastern Wisconsin).

### **Conifer Swamps (Northern Wet and Northern Wet-mesic Forests)**

The PRSF and surrounding areas contain several good examples of the Northern Wet-mesic Forest community – forested wetlands often dominated by white cedar. These forests provide habitat for numerous rare plants and should be given special consideration during forest planning and management activities. Most of the stands examined within the study area are small and have been heavily impacted by excessive deer browse. The best examples in terms of their overall condition and ecological context have been included in the ‘Primary Sites’ section of this report. Large-scale management and protection opportunities for Northern Wet-mesic Forest in this Ecological Landscape occur to the east of the study area in the nearby Brazeau Swamp, one of the largest wetlands in northeastern Wisconsin.

### **Pine and Oak Barrens**

This part of Wisconsin historically supported extensive areas of semi-open Pine and Oak Barrens vegetation. Due to the combination of conversion to other uses or cover types, and long periods of fire suppression, the Barrens communities are now rare not only in Wisconsin, but globally. The PRSF and surrounding areas contain a few remnant stands, but these are very small and isolated, with limited potential to support the full range of plant and animal diversity associated with this community type. On the two state properties, the most intact remnants are associated with rock outcroppings and very thin soils (“Bedrock Glade”), where severe site conditions inhibited the growth of trees and shrubs and maintain small openings. There are also several small, linear remnants that have persisted within powerline rights-of-way, or along roads. On the PRSF, arguably the best barrens remnant is bisected by roads and powerlines, and has been subjected to abuse by inappropriate ATV/ORV use. In general, barrens conservation opportunities on the PRSF and GTSP are very limited. Restoration may be possible at a few sites, but the largest of these locally occur outside of the study area. Only small examples of the barrens communities that were formerly dominant in many parts of this landscape still exist on the state properties here, and these tend to be overgrown with woody plants, and/or overrun with weeds.

Places in this Ecological Landscape that provide better opportunities for relatively large scale Pine Barrens management including the Athelstane Barrens, an area just to the east of the PRSF and GTSP, currently used primarily for pulp production, and Dunbar Barrens, north of the study area, which is managed by WDNR’s Bureau of Wildlife Management. Larger management units are desirable to ensure the viability of area sensitive species and provide for the needs of certain habitat specialists (e.g., the Upland Sandpiper or the northern blue butterfly). However, even some of the small barrens remnants within the PRSF/GTSP support rare plants, and these remnants should be considered carefully during management and planning activities for those properties. The best examples of barrens management opportunities found within the study area during this inventory are included in the “Primary Sites” section of this report. Effective restoration efforts for barrens communities in the PRSF will likely require the use of methods such as prescribed fire, mechanical brushing, timber harvest, and, possibly, herbicides to treat infestations of invasive plants.

### **Forested Seep**

Within the study area, many spring seeps were found along the Peshtigo River usually near the bases of steep slopes or bluffs where they often support a canopy of hardwoods or mixed conifer-hardwoods. The seepage areas, with active discharges of groundwater, sometimes host uncommon or rare plant and animal species. These features are highly susceptible to damage, and land use practices that lead to soil or hydrological disturbance should be avoided. A management focus that protects the water quality and aesthetic value of the main stem of the Peshtigo River would be generally consistent with protecting these resources but recharge areas need to be identified and managed carefully if the springs and seeps are to remain functional.

### **Bedrock Glade**

The high concentration of igneous bedrock outcroppings characteristic of this landscape is unique among Wisconsin's State Forests. The PRSF and surrounding landscape contain many examples of bedrock exposures (Figure 4). The 'Glades' are dry, thin-soiled, sparsely vegetated sites that support specialized plants and animals, including some that require or prefer relatively open conditions and are usually associated with prairies, barrens, or savannas. Other habitat specialists are associated directly with the bare substrate afforded by the outcroppings of rock.

### **Free-flowing stretches of the Peshtigo River and adjacent areas**

The free-flowing stretches of the river 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 mature forests, as well as forested seeps that can harbor rare plant assemblages. A river "buffer" that accounts for steepness of slope, soil type, vegetative cover, and the habitat needs of sensitive species that are, or could be, present would be best for protecting species associated with the river. A buffer based solely on a prescribed linear distance from the bank, similar to Best Management Practices (BMPs), will not be an effective means of protecting water quality here and may have little relevance to identifying habitats that are needed by sensitive species.



The Peshtigo River near Spring Rapids.  
Photo by Drew Feldkirchner, WDNR.

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# Primary Sites: Significance and Summaries

**Seven** ecologically important sites were identified as a result of the biotic inventory. These “Primary Sites” were identified because they contain relatively undisturbed, high-quality, natural communities, provide important habitat for rare species, offer opportunities for restoration, may provide important ecological connections, or some combination of the above factors. Figure 8 illustrates the locations of the Primary Sites. Rare species populations were also documented at several locations outside of the Primary Sites.

Descriptions of each of the sites can be found in Appendix B. Information provided includes: location information, a site map showing occurrences of significant communities and species, a brief summary of the natural features present, the site’s ecological significance, and management considerations.

Each site map shows the site location against a background of a scanned USGS topographic quadrangle. The scale of the maps varies depending upon the size of each site and information presented (original USGS resolution is 1:24,000). Occurrences of rare or endangered species or natural communities are portrayed as dot symbols. Only those species or communities within the site or within 200 meters of the site boundary are portrayed in order to emphasize their location(s) relative to the boundary. Please note that: 1) there may be more than one occurrence of one or more species or communities represented by any single symbol, 2) these symbols may overlap, and 3) the significance of the site is not based only on the presence of rare species occurrences. In addition, the area of land a species or community occupies may be much larger than the dot representation. The coverage does not represent legal ownership boundaries and may encompass errors in presentation.

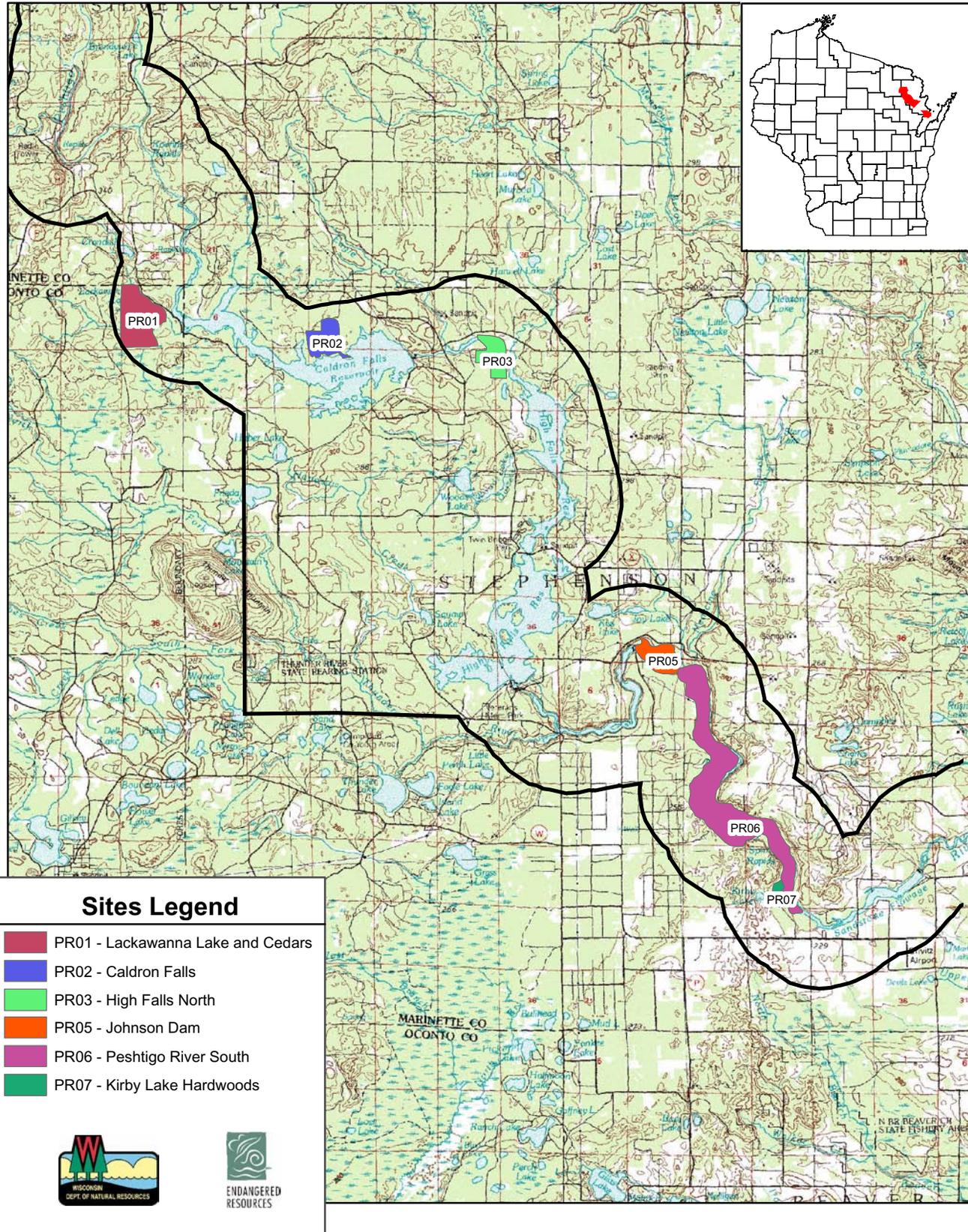
## Primary Sites

- PR01. Lackawanna Lake and Cedars
- PR02. Caldron Falls
- PR03. High Falls North
- PR05. Johnson Dam
- PR06. Peshtigo River South
- PR07. Kirby Lake Hardwoods  
Peshtigo River North\*

\*Outside of the Peshtigo River State Forest boundary and not shown on Figure 8

**Figure 8**

Location of Peshtigo River State Forest Study Area Primary Sites. Site descriptions are provided in Appendix B.



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# Future Needs

The following are suggested surveys and monitoring efforts that could provide beneficial information for managing the forest.

## Surveys

- Breeding Bird Surveys, targeting those habitats that are well represented on this property, and/or that will be most altered by forest management activities
- Non-vascular plants associated with communities such as Bedrock Glade; Wet-mesic Forest (white cedar swamp); Seeps and Spring Runs
- Invasive Plants (this is also a monitoring need)

## Monitoring

- Invasive plants
- Deer browse
- Light demanding plants
- Abundance of community types that are regarded as difficult to manage, of low economic value, or both. Examples include xeric forests, dominated by either jack pine or “scrub” oak, and thinly timbered Bedrock Glade
- Forests impacted directly or indirectly by gypsy moth infestation or gypsy moth control measures (monitoring could include the treatment used, the location, how extensive the treatments were, and the treatment results)

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# Glossary

**DBH** - diameter at breast height (a standard height for measuring tree diameter of 4.5 ft or 1.37 m above the ground on the uphill side of the tree).

**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>)

**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.

**ecoregion** - geographic units that are differentiated by climate, geology, geomorphology, physiography, hydrology, soils, and vegetation. These units have been defined and organized in different ways by various institutions but in this document we use the National Hierarchical Framework of Ecological Units (NHFEU). As described by Cleland et al. (1997), the NHFEU can provide a basis for assessing resource conditions at multiple scales. In this report we have most frequently referred to ecoregions of the "subsection" level, which are intermediate in scale within the NHFEU and typically cover areas of hundreds to thousands of square miles. In recent years the NHI has found the ecoregions of the NHFEU to be useful tools for work planning, interpreting the collected data, and communicating across political and administrative boundaries.

**flowage** - a body of standing water (an impoundment) created by constructing a dam or other water control structure across a stream or flowing ditch.

**Landtype Association (LTA)** - a level in the National Hierarchical Framework of Ecological Units representing an area of thousands to hundreds of thousands of acres. Similarities of landform, soil, and vegetation are the key factors in delineating LTAs.

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

**natural community occurrence** - a place on the landscape that supports an example of a natural community that has been surveyed and evaluated by ecologists using standard NHI methodology and meets minimum criteria for condition, context, and size.

**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.”

**“rare” natural community** - in this context the modifier can refer either to the relative scarcity of the community type itself, to the scarcity of a particular developmental stage, or to a specific attribute of the community occurrence

**“relatively intact” (or “closed canopy”)** - crown closure that approximates what may be achieved in the absence of artificial or major natural disturbance. This will vary somewhat by forest type.

**Subsection** - This is a level in the NHFEU that is intermediate in scale. Subsections in Wisconsin are often based on associated groups of glacial features such as morainal systems. In the parts of the state not glaciated during the Wisconsin Ice Age, patterns of topography formed by erosion on different bedrock surfaces are the basis for differentiating Subsections. The Ecological Landscapes developed by the WDNR are largely based on Subsections.

**survey site** - see “inventory site.”

**xeric** - characterized by excessive dryness. Plants and animals dwelling in xeric habitats must have adaptations that allow them to cope with periodic moisture deficits if they are to persist at such sites.

# Species List

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

Common Name	Scientific Name	Type of Organism
a tiger beetle	<i>Cicindela patruela patruela</i>	Beetle
American Bittern	<i>Botaurus lentiginosus</i>	Bird
American Golden Plover	<i>Pluvialis dominica</i>	Bird
American Woodcock	<i>Scolopax minor</i>	Bird
Arctic shrew	<i>Sorex arcticus</i>	Mammal
aspen	<i>Populus tremuloides</i>	Tree
Assiniboine sedge	<i>Carex assiniboinensis</i>	Forb
badger	<i>Taxidea taxus</i>	Mammal
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Bird
Bay-breasted Warbler	<i>Dendroica castanea</i>	Bird
beech	<i>Fagus grandifolia</i>	Tree
Belted Kingfisher	<i>Ceryle alcyon</i>	Bird
big tooth aspen	<i>Populus grandidentata</i>	Tree
bird's-foot trefoil	<i>Lotus corniculata</i>	Invasive Forb
black oak	<i>Quercus velutina</i>	Tree
Black Rail	<i>Laterallus jamaicensis</i>	Bird
black spruce	<i>Picea mariana</i>	Tree
Black Tern	<i>Chlidonias niger</i>	Bird
Black-backed Woodpecker	<i>Picoides arcticus</i>	Bird
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	Bird
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>	Bird
Blanding's turtle	<i>Emydoidea blandingii</i>	Herptile
Blue Ridge blueberry	<i>Vaccinium pallidum</i>	Shrub
Blue-winged Teal	<i>Anas discors</i>	Bird
Blue-winged Warbler	<i>Vermivora pinus</i>	Bird
Bobolink	<i>Dolichonyx oryzivorus</i>	Bird
Boreal Chickadee	<i>Poecile hudsonica</i>	Bird
Brown Thrasher	<i>Toxostoma rufum</i>	Bird
bullfrog	<i>Rana catesbeiana</i>	Herptile
butter and eggs	<i>Linaria vulgaris</i>	Invasive Forb
Canada lynx	<i>Lynx canadensis</i>	Mammal
Canada Warbler	<i>Wilsonia canadensis</i>	Bird
Canvasback	<i>Aythya valisineria</i>	Bird
common buckthorn	<i>Rhamnus cathartica</i>	Invasive Shrub
crown vetch	<i>Coronilla varia</i>	Invasive Forb
Cyano darner	<i>Nasiaeschna pentacantha</i>	Dragonfly
Deam's rockcress	<i>Arabis missouriensis</i> var. <i>deamii</i>	Forb
Dickcissel	<i>Spiza americana</i>	Bird
Dunlin	<i>Calidris alpina</i>	Bird
dwarf milkweed	<i>Asclepias ovalifolia</i>	Forb
Eastern Meadowlark	<i>Sturnella magna</i>	Bird
eastern red bat	<i>Lasiurus borealis</i>	Mammal
Eurasian marsh thistle	<i>Cirsium palustre</i>	Invasive Forb
Eurasian water milfoil	<i>Myriophyllum spicatum</i>	Invasive Aquatic Plant
extra-striped snaketail	<i>Ophiogomphus anomalus</i>	Dragonfly
Field Sparrow	<i>Spizella pusilla</i>	Bird
four-toed salamander	<i>Hemidactylum scutatatum</i>	Herptile
glossy buckthorn	<i>Rhamnus frangula</i>	Invasive Shrub
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	Bird
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	Bird
gray wolf	<i>Canis lupus</i>	Mammal
greater redhorse	<i>Moxostoma valenciennesi</i>	Fish
green-faced clubtail	<i>Gomphus viridifrons</i>	Dragonfly
Haliaeetus leucocephalus	<i>Bald Eagle</i>	Bird

hemlock	<i>Tsuga canadensis</i>	Tree
Henslow's Sparrow	<i>Ammodramus henslowii</i>	Bird
Hill's oak	<i>Quercus ellipsoidalis</i>	Tree
hoary bat	<i>Lasiurus cinereus</i>	Mammal
honeysuckle	<i>Lonicera x bella</i>	Invasive Shrub
	<i>Lonicera morrowii</i>	Invasive Shrub
Hooker Orchis	<i>Platanthera hookeri</i>	Forb
Horned Grebe	<i>Podiceps auritus</i>	Bird
Hudsonian Godwit	<i>Limosa haemastica</i>	Bird
Indian cucumber-root	<i>Medeola virginiana</i>	Forb
jack pine	<i>Pinus banksiana</i>	Tree
Kirtland's Warbler	<i>Dendroica kirtlandii</i>	Bird
lake sturgeon	<i>Acipenser fulvescens</i>	Fish
large roundleaf orchid	<i>Platanthera orbiculata</i>	Forb
Lark Sparrow	<i>Chondestes grammacus</i>	Bird
leafy spurge	<i>Euphorbia esula</i>	Invasive Forb
Least Flycatcher	<i>Empidonax minimus</i>	Bird
Lesser Scaup	<i>Aythya affinis</i>	Bird
Loggerhead Shrike	<i>Lanius ludovicianus</i>	Bird
Marbled Godwit	<i>Limosa fedoa</i>	Bird
marsh willow-herb	<i>Epilobium palustre</i>	Forb
mink frog	<i>Rana septentrionalis</i>	Herptile
moose	<i>Alces alces</i>	Mammal
mudpuppy	<i>Necturus maculosus</i>	Herptile
northern clearwater crayfish	<i>Oronectes propinquus</i>	Crustacean
Northern Flicker	<i>Colaptes auratus</i>	Bird
northern flying squirrel	<i>Glaucomys sabrinus</i>	Mammal
Northern Goshawk	<i>Accipiter gentilis</i>	Bird
Northern Harrier	<i>Circus cyaneus</i>	Bird
northern long-eared bat	<i>Myotis septentrionalis</i>	Mammal
northern ribbon snake	<i>Thamnophis sauritus</i>	Herptile
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Bird
orange hawkweed	<i>Hieracium aurantiacum</i>	Invasive Forb
Osprey	<i>Pandion haliaetus</i>	Bird
pickerel frog	<i>Rana palustris</i>	Herptile
Prairie Warbler	<i>Dendroica discolor</i>	Bird
purple loosestrife	<i>Lythrum salicaria</i>	Invasive Forb
pygmy shrew	<i>Sorex hoyi</i>	Mammal
pygmy snaketail	<i>Ophiogomphus howei</i>	Dragonfly
rapids clubtail	<i>Gomphus quadricolor</i>	Dragonfly
Red Crossbill	<i>Loxia curvirostra</i>	Bird
Red Knot	<i>Calidris canutus</i>	Bird
red maple	<i>Acer rubrum</i>	Tree
red oak	<i>Quercus rubra</i>	Tree
red pine	<i>Pinus resinosa</i>	Tree
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	Bird
Red-shouldered Hawk	<i>Buteo lineatus</i>	Bird
reed canary grass	<i>Phalaris arundinacea</i>	Invasive Grass
rifle snaketail	<i>Ophiogomphus carolus</i>	Dragonfly
Rusty Blackbird	<i>Euphagus carolinus</i>	Bird
rusty crayfish	<i>Oronectes rusticus</i>	Invasive Crustacean
Sharp-tailed Grouse	<i>Tympanuchus phasianellus</i>	Bird
sheathed sedge	<i>Carex vaginata</i>	Forb
Short-billed Dowitcher	<i>Limnodromus griseus</i>	Bird
showy lady's-slipper	<i>Cypripedium reginae</i>	Forb
silver-haired bat	<i>Lasiorycteris noctivagans</i>	Mammal
skillet clubtail	<i>Gomphurus ventricosus</i>	Dragonfly
Solitary Sandpiper	<i>Tringa solitaria</i>	Bird
southern bog lemming	<i>Synaptomys cooperi</i>	Mammal
splendid clubtail	<i>Gomphurus lineatifrons</i>	Dragonfly
spotted knapweed	<i>Centaurea biebersteinii</i>	Invasive Forb
Spruce Grouse	<i>Falcipennis canadensis</i>	Bird

Stygian shawdowfly	<i>Neurocordulia yamaskanensis</i>	Dragonfly
sugar maple	<i>Acer saccharum</i>	Tree
swamp-pink	<i>Arethusa bulbosa</i>	Forb
tamarack	<i>Larix laricina</i>	Tree
Trumpeter Swan	<i>Cygnus buccinator</i>	Bird
Upland Sandpiper	<i>Bartramia longicauda</i>	Bird
Veery	<i>Catharus fuscescens</i>	Bird
Vesper Sparrow	<i>Pooecetes gramineus</i>	Bird
water shrew	<i>Sorex palustris</i>	Mammal
West Virginia white	<i>Pieris virginiensis</i>	Butterfly
Western Meadowlark	<i>Sturnella neglecta</i>	Bird
western sand darter	<i>Ammocrypta clara</i>	Fish
Whimbrel	<i>Numenius phaeopus</i>	Bird
Whip-poor-will	<i>Caprimulgus vociferus</i>	Bird
white adder's-mouth	<i>Malaxis monophyllos</i> var. <i>brachypoda</i>	Forb
white birch	<i>Betula papyrifera</i>	Tree
white cedar	<i>Thuja occidentalis</i>	Tree
white oak	<i>Quercus alba</i>	Tree
white pine	<i>Pinus strobes</i>	Tree
white spruce	<i>Picea glauca</i>	Tree
white sweet clover	<i>Melilotus alba</i>	Invasive Forb
Willow Flycatcher	<i>Empidonax traillii</i>	Bird
Wood Thrush	<i>Hylocichla mustelina</i>	Bird
wood turtle	<i>Glyptemys insculpta</i>	Herptile
woodland jumping mouse	<i>Napaeozapus insignis</i>	Mammal
yellow hawkweed	<i>Hieracium canadense</i>	Invasive Forb
yellow sweet clover	<i>Melilotus officinalis</i>	Invasive Forb
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Bird

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# References

- Addis, J., R. Eckstein, A. Forbes, D. Gebken, R. Henderson, J. Kotar, B. Les, P. Matthiae, W. McCown, S. Miller, B. Moss, D. Sample, M. Staggs, and K. Visser. 1995. Wisconsin's biodiversity as a management issue: a report to Department of Natural Resources managers. Wisconsin Department of Natural Resources, Madison, WI. RS-915-95.
- Attig, J.W. and Batten, W.G. 2004. Quaternary Geology of the Peshtigo River State Forest Area. Open-File Report 2004-05. Wisconsin Geological and Natural History Survey, Madison, WI. Map, 1 pp.
- Bailey, R.G. 1995. Description of the Ecoregions of the United States. Misc. Publ. 1391. USDA, Forest Service. Washington, DC. 107 pp.
- Casper, G. 2004. An Amphibian and Reptile Inventory of the Peshtigo River State Forest, Wisconsin.
- Chadde, S.W. 1998. A Great Lakes Wetland Flora. Pocketflora Press, Calumet, MI.
- Clark, A. 2002. Rapid Assessment of the Plant Communities and Rare Plant Potential in the Upper Peshtigo River Basin of Northeast Wisconsin.
- Clark, A. 2003. Report on the Plant Community and Rare Plant Inventory of the Peshtigo River in Marinette County, Wisconsin.
- Cleland, D.T., P.E. Avers, W.H. McNab, M.E. Jensen, R.G. Bailey, T. King, and W.E. Russell. 1997. National Hierarchical Framework of Ecological Units. Published in, Boyce, M. S.; Haney, A., ed. 1997. Ecosystem Management Applications for Sustainable Forest and Wildlife Resources. Yale University Press, New Haven, CT. pp. 181-200.
- Coffin, B. and L. Pfannmuller. 1988. Minnesota's Endangered Fauna and Flora. Univ. of Minnesota Press, Minneapolis.
- Crum, H. 1988. A Focus on Peatlands and Peat Mosses. University of Michigan Press, Ann Arbor, MI.
- Curtis, J. T. 1959. The Vegetation of Wisconsin. University of Wisconsin Press, Madison, WI. 657 pp.
- Czarapata, E.J. 2005. Invasive Plants of the Upper Midwest : An Illustrated Guide to Their Identification and Control. University of Wisconsin Press, Madison, WI. 236 pp.
- Epstein, E.J., E.J. Judziewicz, and E.A. Spencer. 2002. Wisconsin Natural Community Abstracts. Department of Natural resources, Bureau of Endangered Resources, Madison, WI.
- FERC EIS. 1997. *Peshtigo River Multiple Project. Final Environmental Impact Statement*. Federal Energy Regulatory Commission Office of Hydropower Licensing.
- Finley, R.W. 1976. Original Vegetation Cover of Wisconsin. Map compiled from General Land Office Notes. University of Wisconsin Extension, Madison, WI.
- Gleason, H.A. and A. Cronquist. 1963. Manual of the Vascular Plants of the Northeastern United States and adjacent Canada. Van Nostrand Co. 810 pp. [plus 1991 revision].

- Green, J.C. 1995. *Birds and Forests. A Management and Conservation Guide*. Minnesota Department of Natural Resources, St. Paul, MN. 182 pp.
- Hoffman, R. and K. Kearns. 1997. *Wisconsin Manual of Control Recommendations for Ecologically Invasive Plants*. Madison, WI. (available online: [dnr.wi.gov/invasives/pubs/manual\\_TOC.htm](http://dnr.wi.gov/invasives/pubs/manual_TOC.htm)).
- Hole, F.D., M.T. Beatty, C.J. Milfred, G.B. Lee and A.J. Klingelhoets. *Comp. Soils of Wisconsin*. Wisconsin Geological and Natural History Survey. Madison, WI.
- Oakes, E.L and L.J. Hamilton. 1973. *Water Resources of the Wisconsin-Menominee-Oconto-Peshtigo River Basin*. U.S. Geological Survey, Washington D.C.
- Wernerehl, R. and J. Ungrodt. 2002. *Ecological Assessment and Ecological Overview for the Governor Tommy G. Thompson Centennial State Park and Peshtigo River State Forest Marinette County, Wisconsin*. 64 pp.
- Wisconsin Department of Natural Resources. *Depth-to-Bedrock digital database*. 1985. Madison, WI
- Wisconsin Department of Natural Resources. 2005. *Ecological Landscapes of Wisconsin Handbook*. Ecosystem Management Planning Team. Madison, WI.
- Wisconsin Department of Natural Resources. 2005. *Handbook for Old Growth Forests in Wisconsin*. Old Growth Team, WDNR Division of Forestry, Tomahawk WI.
- Wisconsin Department of Natural Resources. 2006a. *Wisconsin Land Legacy Report: An inventory of places critical in meeting Wisconsin's future conservation and recreation needs*. Madison, WI. 250 pp.
- Wisconsin Department of Natural Resources. 2006b. *Wisconsin Wildlife Action Plan*. Available at <http://dnr.wi.gov/org/land/er/wwap/plan/>.
- Wisconsin LTA Team. 2005. *Athelstane Sandy Outwash and Moraines Subsection Description*. In Preparation. Available through the Wisconsin Department of Natural Resources. Madison, WI.

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## APPENDIX A

### Natural Heritage Inventory Overview and General Methodology

The Peshtigo River State Forest biotic inventory and analysis was conducted by the Wisconsin Natural Heritage Inventory (NHI) program, which is part of an international network of NHI programs. The defining characteristic of this network, and the feature that unites the programs, is the use of a standard methodology for collecting, processing, and managing data on the occurrences of natural biological diversity. This network of data centers was established by The Nature Conservancy and is currently coordinated by NatureServe, an international non-profit organization.

Natural Heritage Inventory programs focus on rare species, natural communities, and other rare elements of nature. When NHI programs are established, one of the first tasks facing the staff is to consolidate existing information on the status and location of rare elements. Before proceeding, the NHI program must determine what elements warrant “tracking” and which are more common. Similar to most states, Wisconsin biologists had a general idea of which species in the better-studied taxonomic groups (e.g., mammals, birds, and vascular plants) were rare or declining. For less-studied groups such as macroinvertebrates, the process of assembling the list of species to track and gathering the data were quite dynamic. Initially, NHI staff cast a wide net, collecting data on many species from existing sources (e.g., scientific literature, field guides, books, maps, and museum collections) as well as from direct contact with experts throughout the state. As more data were gathered, it was clear that some species were more common than originally thought and the NHI program stopped collecting data on them. Thus, the list of which elements are tracked, the NHI Working List, changes over time as species’ populations change (both up and down) and as our knowledge about their status and distribution increases. This evolution continues today, with the NHI Working List typically going through several revisions a year. The most current Wisconsin Natural Heritage Working List for the State of Wisconsin is available through the NHI office and on the Endangered Resources Program Web pages ([dnr.wi.gov/org/land/er/](http://dnr.wi.gov/org/land/er/)).

In general, there are two approaches to surveying biodiversity: (1) those focused on locating occurrences of particular elements, and (2) those focused on assessing the components of a particular area. The latter approach employs a “top down” analysis that begins with an assessment of the natural communities and aquatic features present, their relative quality and condition, the surrounding landscape pattern, and current land use and results in the identification of future species-oriented surveys. This approach, commonly referred to as “coarse filter-fine filter,” concentrates inventory efforts on those sites most likely to contain target species. It also allows sites to be placed in a larger, landscape context for more broad applications of ecosystem management principles.

The Peshtigo River State Forest biotic inventory used the top-down, coarse filter-fine filter approach. The initial analysis assessed the entire region and determined the important ecological attributes and the biological processes supporting them. Criteria to evaluate sites were established and then vegetative communities were identified and characterized. Based upon existing habitat characteristics and known habitat preferences of various rare species, sites where species-specific surveys were most appropriate were identified. ***There are likely populations of rare species that were not located through these inventories.*** There are historical records for several species that were not located during this effort for the study area (see Tables 4 and 5). However, by concentrating inventory efforts on the highest quality or otherwise suitable sites, it is most likely that the populations with the highest conservation value were located.

The NHI methodology for organizing and storing data is actually a system of three inter-related data storage techniques: structured manual information files, topographic map files, and a computer database that integrates the various information. The computer component, known as the Biological & Conservation Data System (BCD), was developed by The Nature Conservancy for use by the Heritage Network. It is a sophisticated relational database management application built upon the Advanced Revelation application environment. Owing to the diversity and

complexity of the information managed—from species taxonomy and ecosystem classification to real estate transactions—the system contains 36 database files and more than 2,000 information fields. The data in the Biological & Conservation Data System populate the NHI Geographic Information System.

## Methods of Inventory

The following is a description of standard NHI methods for conducting NHI inventories. Any step 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 Biological & Conservation Data system, housed within DNR's Natural Heritage Inventory. Other databases with potentially useful information may also be queried, such as: forest stand/compartments reconnaissance, which is available for many public agency owned lands; 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; museum/herbarium collections for various target taxa; soil surveys; and the fish distribution database (by watershed, WDNR-Research).

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 contain information on a variety of subjects relevant to the inventory of natural features and are frequently useful.

**Literature Review:** Field biologists involved with a given project consult basic references on the natural history and ecology of the region within which the study area is situated. This can both broaden and sharpen the focus of the investigator.

**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.

**Map Compilation:** USGS 7.5 minute topographic quadrangles serve 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.

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.

Ecoregion maps 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. As these maps evolve, they should become increasingly useful, even for relatively small, localized projects.

Geographic Information Systems (GIS) are increasing our ability to integrate spatial information on lands and waters of the state and are becoming a basic resource tool for the efficient and comprehensive planning of surveys and the analysis of their results.

**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.

**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. These notes also record 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.

**Interviews:** Interviews with scientists, naturalists, land managers or others knowledgeable about the area to be surveyed often yield information not available in other formats.

**Analysis of Compiled Information:** The compiled information is analyzed to identify inventory priorities, determine needed expertise, and develop budgets.

**Meetings:** Planning and coordination meetings are held with all participants to provide an overview of the project, share information, identify special equipment needs, coordinate schedules, and assign landowner contact responsibilities. Team development may be a part of this step.

**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.



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## APPENDIX B

### Primary Inventory Sites within the Peshtigo River State Forest

The ecologically significant sites identified through the biotic inventory are depicted on Figure 8 and described in the following narratives. Each site contains documented, significant occurrences of rare and/or representative natural features of the landscape. All of the sites are within the *Northeast Sands* Ecological Landscape. The communities, aquatic features and rare species populations identified herein will help planners, managers, and the public make informed decisions on appropriate protection and management (land use classification and designation) in the property master plan. Restoration potential for features that are now absent, substantially diminished, isolated, or are not given management emphasis on other properties in the region are discussed along with additional opportunities for management and protection of significant resources on lands adjoining the property.

Site Boundaries displayed on the map are approximations and are not meant to be used as final delineations for planning and management purposes. Following the completion of additional fieldwork in 2006, several new Element Occurrences were added that are not displayed in the tables accompanying each site. For the most current Element Occurrence data, DNR managers should consult the NHI Portal.

#### Table of Sites

PR01. Lake Lackawanna and Cedars.....	2
PR02. Caldron Falls.....	5
PR03. High Falls North.....	7
PR05. Johnson Dam.....	9
PR06. Peshtigo River South.....	12
PR07. Kirby Lake Hardwoods.....	15
Peshtigo River North.....	17

\* site is outside of the state forest boundary

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## PR01. LAKE LACKAWANNA AND CEDARS

### **Location**

USGS 7.5' Quadrangle: Thunder Mountain  
Town-Range-Section: T33N R17E Section 1  
LTA: 212Tc18 Mountain Moraines  
Approximate Size: 358 acres

### **Description of Site**

Lake Lackawanna is a shallow, 9-acre hardwater drainage lake with a maximum depth of only 3 feet. The lake is fed from the north by a small unnamed stream that drains out of the south end of the lake, flows south and east, and empties into the northwest end of Caldron Falls Reservoir, an impoundment on the Peshtigo River. Lake Lackawanna supports floating-leaved and submergent aquatic macrophyte vegetation, and is surrounded by a narrow border of Southern Sedge Meadow. Forested wetlands, hardwood swamp and white cedar-dominated conifer swamp (Northern Wet-mesic Forest) occur on the west side of the lake, and an extensive cedar swamp occurs south of the lake, along the outlet stream and a tributary. Rare plants are present. A tall shrub community, Alder Thicket, borders the lake's outlet stream.

The site occurs on the northwest end of the Peshtigo River State Forest on gently rolling morainal and sandy outwash deposits. The uplands are vegetated mostly with cutover thickets of trembling aspen, patches of heavily logged Hill's oak-dominated Northern Dry Forest, and red pine plantations. The special concern shrub Blue Ridge blueberry (*Vaccinium pallidum*) occurs in a semi-open, barrens-like Hill's oak stand here. The second growth white cedar swamp along the outlet stream south of the lake is composed mostly of 21-35 cm dbh white cedar. Tamarack is a dominant in some areas, and small patches of swamp hardwoods, such as black ash and red maple, are present.

### **Significance of Site**

This site contains an undeveloped drainage lake surrounded by a diverse mosaic of relatively undisturbed wetland communities, most notably a white cedar-dominated Northern Wet-mesic Forest, but also including Tamarack Swamp, Northern Hardwood Swamp, Alder Thicket, and Southern Sedge Meadow. Red-shouldered hawks (State Threatened) were heard calling here. A rare plant has been documented in the cedar swamp, and there is potential for several others in this habitat. The sandy uplands support at least one rare plant and have the potential to harbor others.

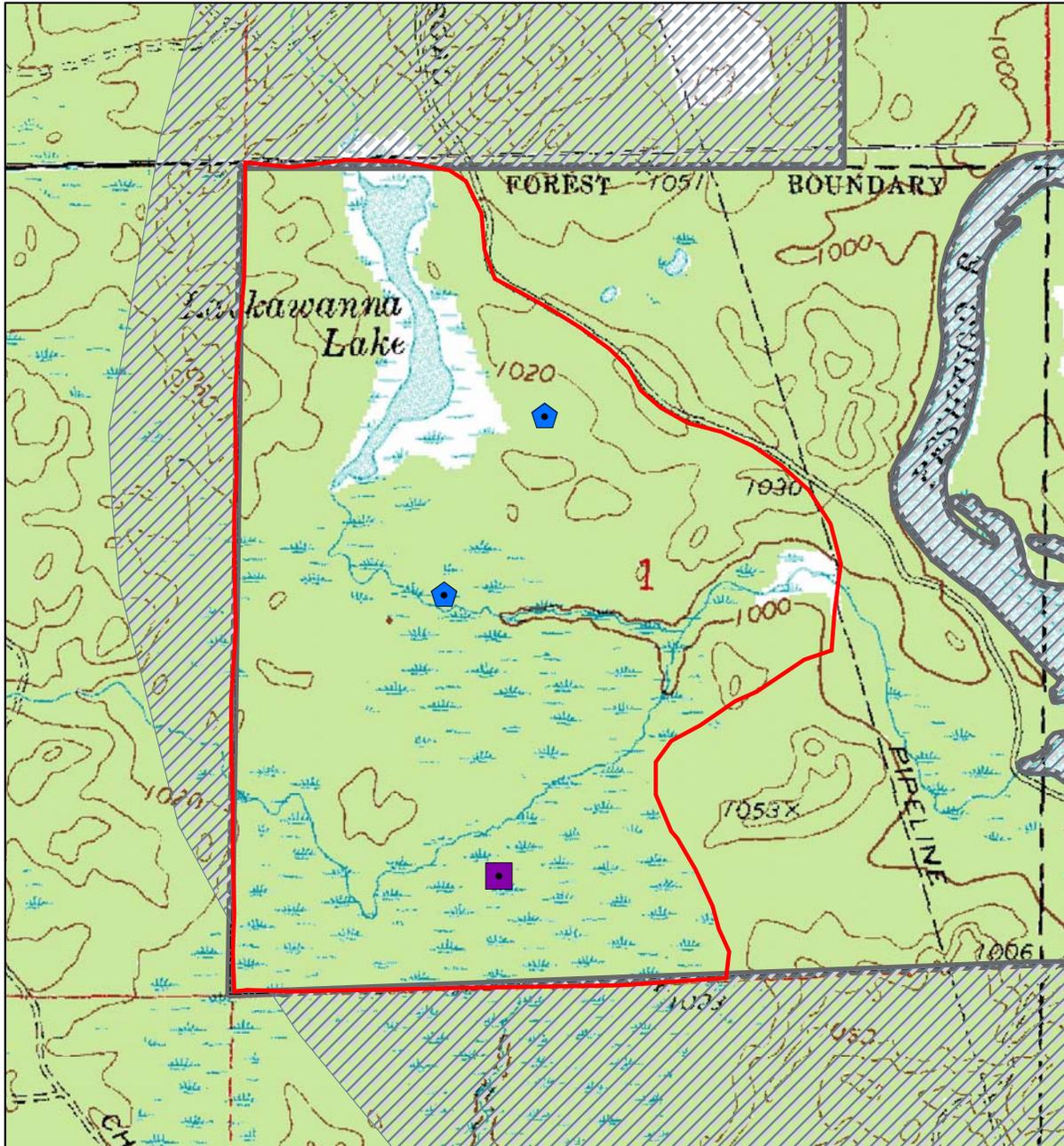
### **Management Considerations**

Some of the uplands at this site have been recently cut, and heavy deer browse on saplings and shrubs is a problem. There is long-term potential for the development of an older dry-mesic forest in which white pine is a significant canopy component. This could benefit sensitive forest species such as the Red-shouldered Hawk, for which there is not much suitable habitat in the local landscape. The high quality of the lake and surrounding wetlands warrant consideration for special management designation status in the property master plan.

## PR01. Lake Lackawanna Element Occurrences

Scientific Name (Common Name)	Lastobs Date	State Rank	Global Rank	State Status	Federal Status
Plants					
<i>Cypripedium reginae</i> (Showy Lady's-slipper)	2003	S3	G4	Special Concern	None
<i>Vaccinium pallidum</i> (Blue Ridge Blueberry)	2003	S1	G5	Special Concern	None
Communities					
Northern wet-mesic forest	2005	S3S4	G3?	None	None

# Peshtigo River State Forest PR01 - Lake Lackawanna and Cedars



**Legend Disclaimer:**

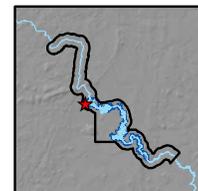
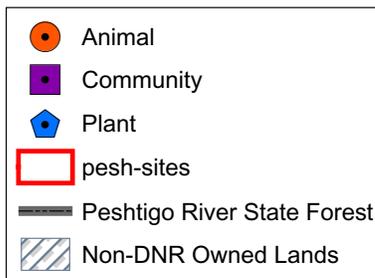
Element Occurrence (EO) locations were generated using Jan 17, 2006 NHI data records. Each symbol may represent more than one EO, and symbols may overlap each other. The absence of evidence does not indicate evidence of absence.

The survey site is approximate, and it should be used only generally, not literally, for management purposes.

Surveys were conducted between 2002-05 for natural communities and priority taxa. The surveys were not comprehensive for all taxa potentially present.

Non-DNR lands include all lands not under full ownership of or management by the WDNR as of 2005.

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## PR02. CALDRON FALLS

### **Location**

USGS 7.5' Quadrangle: Thunder Mountain  
Town-Range-Section: T33N R18E Sections 4 and 9  
LTA: 212Tc03 Butler Plains  
Approximate Size: 167 acres

### **Description of Site**

This site is composed of two shallow depressions occupied by black spruce-dominated acid conifer swamp, surrounded by a block of Northern Dry-mesic Forest bordering the Caldron Falls Reservoir. The canopy is semi-closed, with most of the canopy spruce in the 25-30 cm dbh range. Canopy associates include tamarack and some large white pine (up to about 50 cm dbh).

The dry-mesic upland forest around the spruce swamps is dominated by mixtures of white and red pines, red oak, and red maple. This forest has been selectively logged but retains large, mature trees with diameters of 50 cm dhh and greater.

### **Significance of Site**

The black spruce swamps are small but intact, with excellent context, and are of good quality and high, or at least representative, species diversity for the community type. The Northern Dry Mesic-Forest on the surrounding uplands is one of the better examples of a mature, recovering, mixed pine-oak forest located in the study area during this inventory.

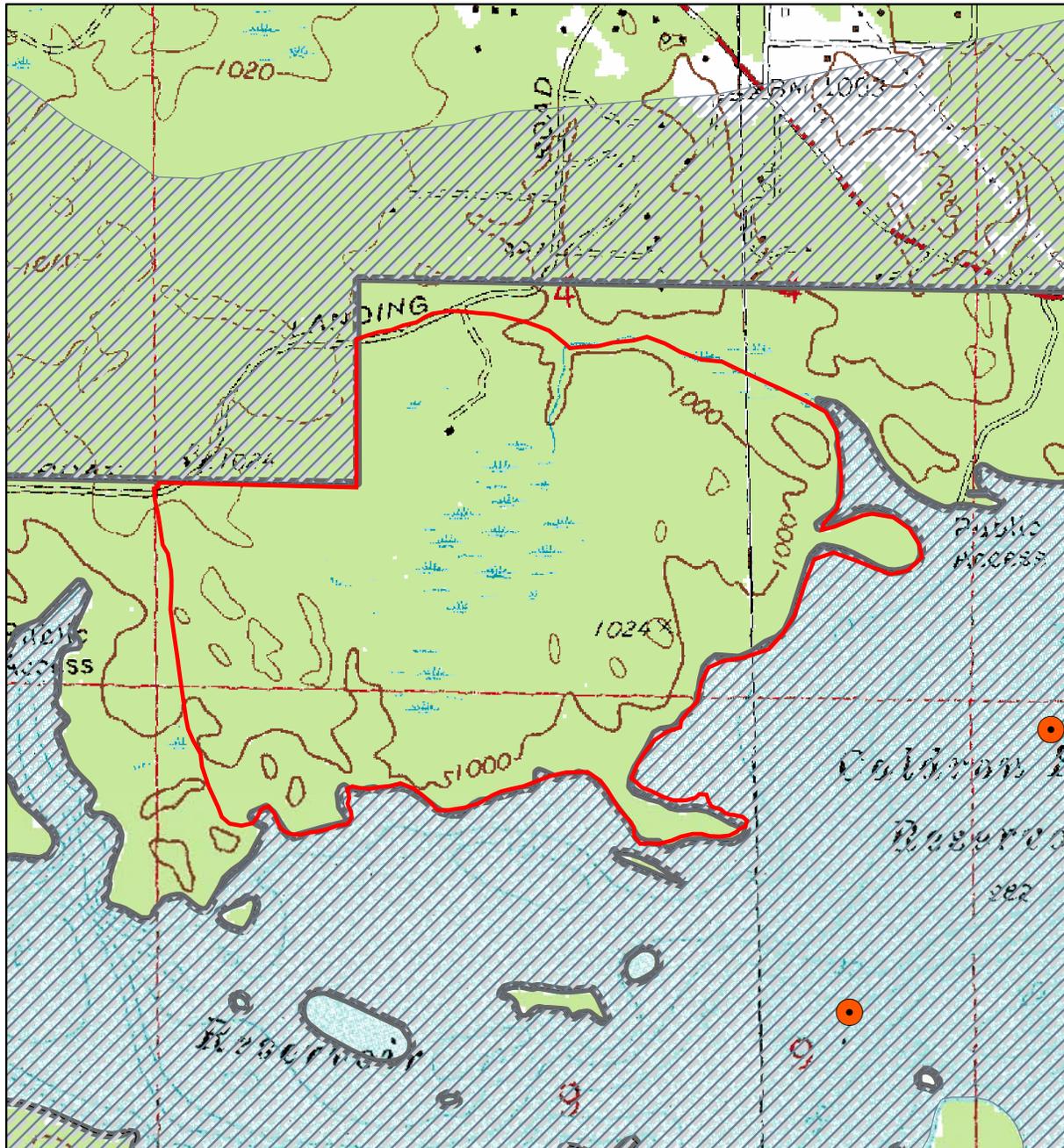
### **Management Considerations**

Blocks of older forest are currently not well represented on the PRSF or throughout much of the surrounding landscape. This site represents one of the best opportunities on the PRSF to manage for a larger, contiguous block of intact Northern Dry-mesic Forest. Over time it could become an excellent candidate for representation of later forest successional stages, or a forest “benchmark” for this type. A Breeding Bird Survey should be conducted here in the near future.

### **PR02. Caldron Falls Element Occurrences**

Scientific Name (Common Name)	Lastobs Date	State Rank	Global Rank	State Status	Federal Status
Animals					
<i>Nasiaeschna pentacantha</i> (Cyrano Darner)	1988	S3	G5	Special Concern	

# Peshtigo River State Forest PR02 - Cauldron Falls



**Legend Disclaimer:**

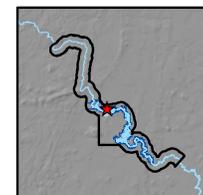
Element Occurrence (EO) locations were generated using Jan 17, 2006 NHI data records. Each symbol may represent more than one EO, and symbols may overlap each other. The absence of evidence does not indicate evidence of absence.

The survey site is approximate, and it should be used only generally, not literally, for management purposes.

Surveys were conducted between 2002-05 for natural communities and priority taxa. The surveys were not comprehensive for all taxa potentially present.

Non-DNR lands include all lands not under full ownership of or management by the WDNR as of 2005.

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## PR03. HIGH FALLS NORTH

### Location

USGS 7.5' Quadrangle: High Falls Reservoir  
 Town-Range-Section: T33N R18E Sections 1, 2, 11, and 12  
 LTA: 212Tc04 Waupee Knolls, 212Tc03 Butler Plains  
 Approximate Size: 154 acres

### Description of Site

This site is located along both sides of the Peshtigo River between the High Falls and Cauldron Falls reservoirs, and features sandy soils with numerous granite outcrops. The site is a complex of xeric scrub oak and aspen forest, interspersed with bedrock glades and scattered remnant conifer stands. Portions of the site may be characterized as second growth Northern Dry-mesic Forest composed of 15-18" d.b.h. red oak, red maple, aspen (bigtooth and trembling are both present), and paper birch. Hill's oak, white oak, and red, white, and jack pines, are more common in the drier areas. Two small patches of Hill's oak "barrens" occur in the southeastern and northernmost ends of the site; the northern portion has been logged recently. Bedrock Glades, some overgrown and others more open, are scattered throughout the site and are major features of interest at this site. The best dry forest management opportunities occur on the west side of the river.

### Significance of Site

Bedrock Glades, embedded in Northern Dry Forest featuring mixtures of pines, oaks, and aspens, are of good quality and are representative features of this landscape. The glades have the potential to support rare plants.

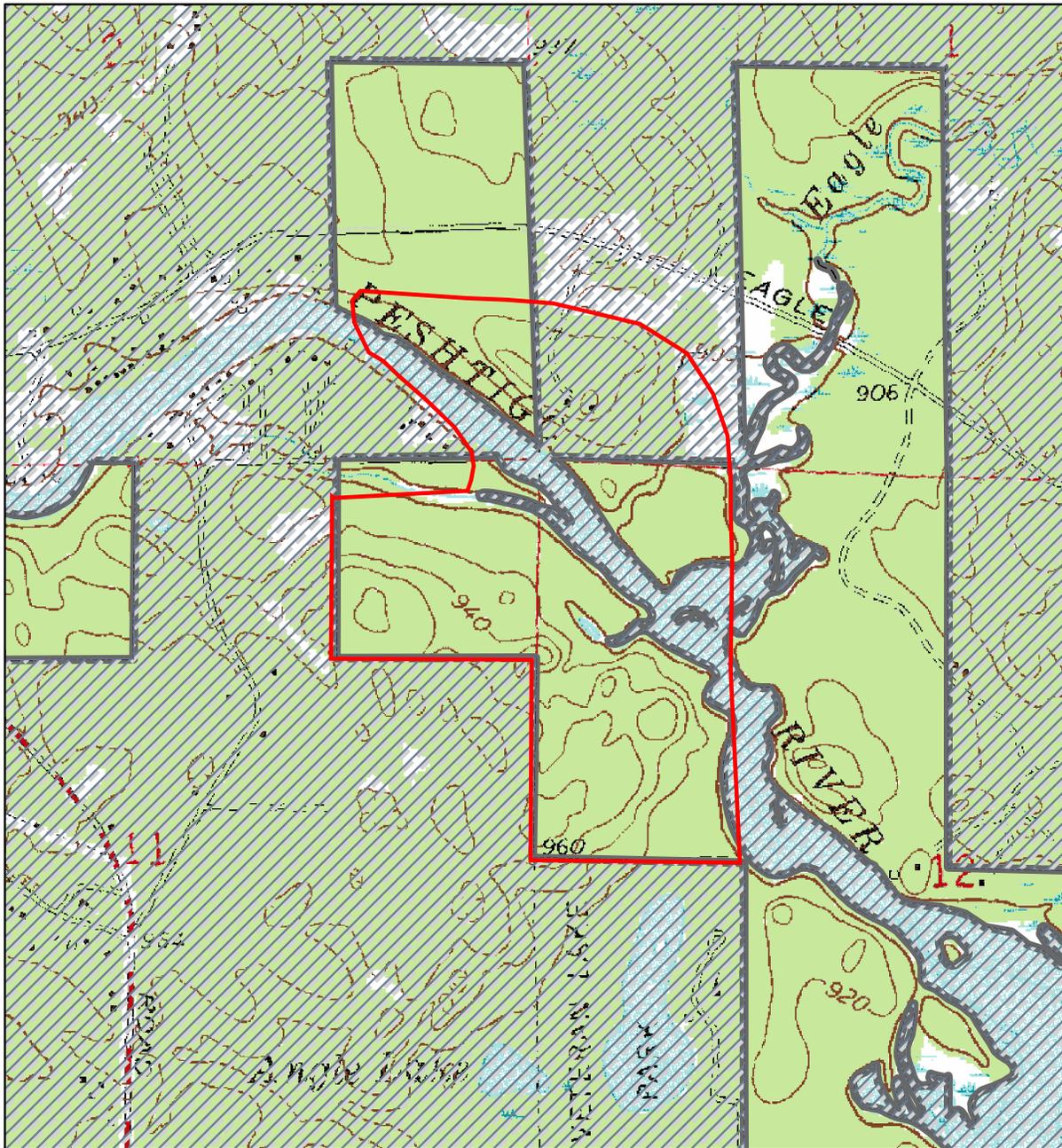
### Management Considerations

In addition to protecting the bedrock glades, this site has opportunities for dry forest management, protection, and restoration. The glades, where appropriate, could be managed to maintain an open condition, which would benefit the light-demanding glade and dry forest/woodland associates. Maintaining a scattered growth of large trees, especially oaks and pines, would not be precluded by adopting such a management regime here and prescribed fire should be considered as an important management tool.

### PR03. High Falls North Element Occurrence

Scientific Name (Common Name)	Lastobs Date	State Rank	Global Rank	State Status	Federal Status
Plants <i>Malaxis monophyllos</i> var. <i>brachypoda</i> (White Adder's Mouth)	1992?	S3	G4Q	Special Concern	None

# Peshtigo River State Forest PR03 - High Falls North



**Legend Disclaimer:**

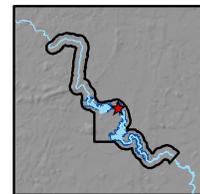
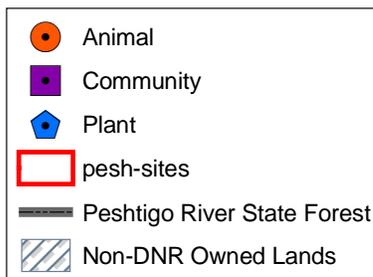
Element Occurrence (EO) locations were generated using Jan 17, 2006 NHI data records. Each symbol may represent more than one EO, and symbols may overlap each other. The absence of evidence does not indicate evidence of absence.

The survey site is approximate, and it should be used only generally, not literally, for management purposes.

Surveys were conducted between 2002-05 for natural communities and priority taxa. The surveys were not comprehensive for all taxa potentially present.

Non-DNR lands include all lands not under full ownership of or management by the WDNR as of 2005.

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## PR05. JOHNSON DAM

### **Location**

USGS 7.5' Quadrangle: High Falls Reservoir  
Town-Range-Section: T32N R19E Section 5  
T33N R19E Sections 32  
LTA: 212Tc03 Butler Plains  
Approximate Size: 167 acres

### **Description of Site**

This site occurs on sandy outwash and is located along both sides of a 1.5-mile section of the Peshtigo River below the Johnson Falls Dam in the Peshtigo River State Forest. This portion of the river flows through a narrow, rock and sand-bottomed valley with steep sandy slopes and gently rolling sand plains above the valley. There are roads and powerline rights-of-way on the north and west sides of the site that support barrens flora including the State Threatened plant dwarf milkweed. The sandy upland plain above the river valley is vegetated with pine plantation, young aspen forest, and logged Hill's oak forest and barrens. The Special Concern plant Deam's rockcress occurs in a red pine plantation on the northeast side of the river.

There is an intact occurrence of white cedar-dominated Northern Wet-mesic Forest with inclusionary springs and seeps on the northeast side of the river with at least two Special Concern plants. There is also good quality Bedrock Glade, and a few small stands of mature red and white pine in the river valley scattered within a logged oak, aspen, and red maple forest.

Adjacent to the site, the uplands above the valley on the southwest side of the river are vegetated mostly with red pine plantation with cutover dry forest of Hill's oak, trembling aspen, and red maple also present. There are a few patches of good quality Oak Barrens in a narrow fringe between the steep riverside slopes and the upland plain. There is disturbed Northern Wet-mesic Forest along the southwest side of the river just below the dam, and a small hardwood swamp along the southwest side of the river one mile below the dam. Mature Northern Dry-mesic Forest (white pine-red pine-balsam fir-hemlock) occurs on steep slopes along the river between 0.5 and 0.9 mile below the dam.

### **Significance of Site**

This site has a diverse mosaic of good quality natural communities including Northern Dry-mesic Forest, Northern Wet-mesic Forest (white cedar swamp), Bedrock Glade, a small hardwood swamp, and inclusionary seeps, springs, and spring runs. The State Threatened plant dwarf milkweed occurs on roadsides along High Falls Road and in powerline rights-of-way along Johnson Falls Road, and three Special Concern plant species have also been documented here. The largest area of mature Northern Dry-mesic Forest in the central portion of the project area occurs on steep slopes along the river between one half and nine tenths mile below the dam.

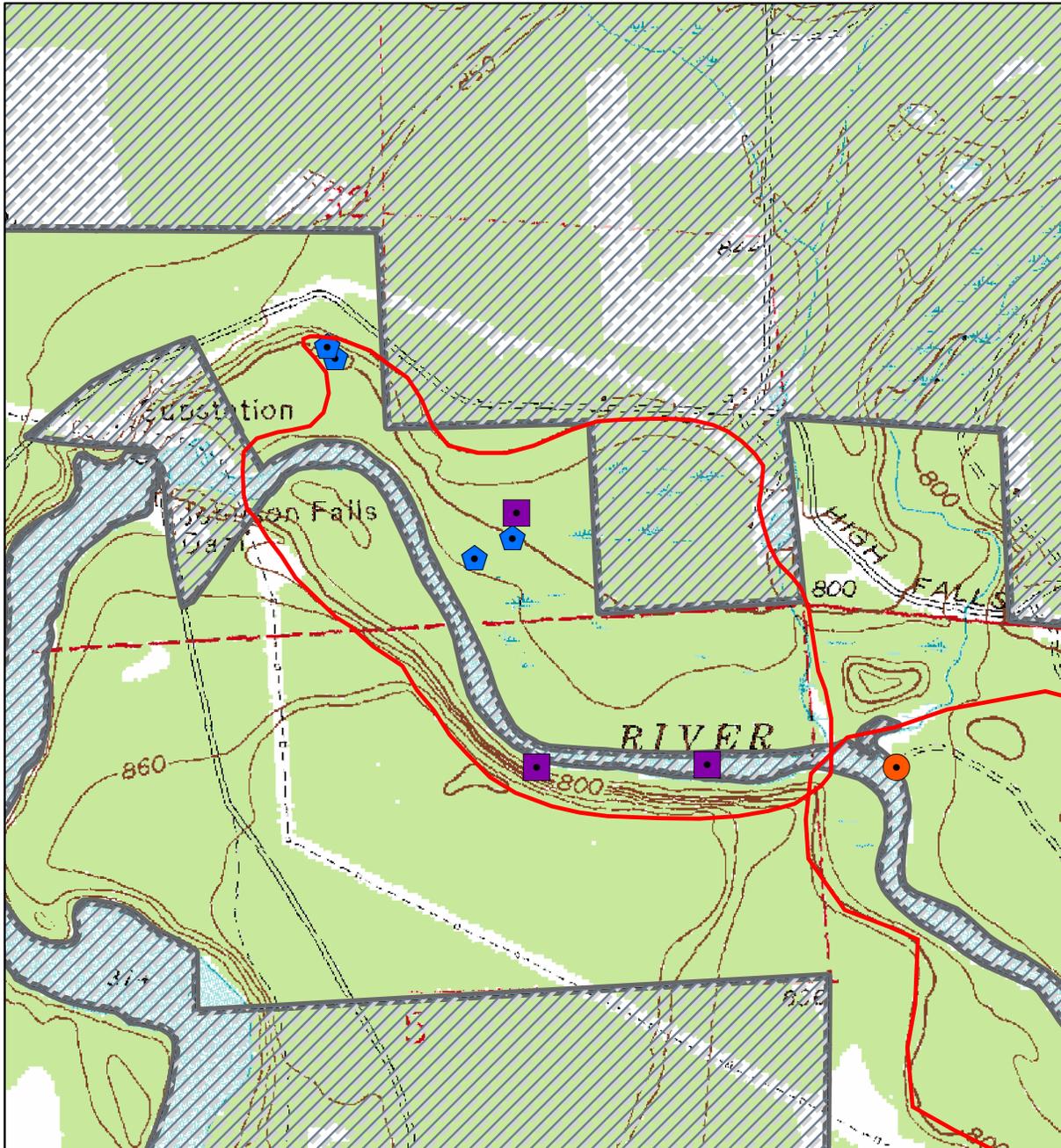
### **Management Considerations**

The overall natural integrity of this site along with the concentration of high quality natural communities and rare plants make this a significant natural area worthy of consideration for special designation in the property master plan. This site should be evaluated for State Natural Area status.

**PR05. Johnson Dam Element Occurrences**

Scientific Name (Common Name)	Lastobs Date	State Rank	Global Rank	State Status	Federal Status
Plants					
<i>Arabis missouriensis</i> var. <i>deamii</i> (Deam's Rockcress)	2003	S2	G4G5QT3?Q	Special Concern	None
<i>Asclepias ovalifolia</i> (Dwarf Milkweed)	2003	S3	G5?	Threatened	None
<i>Carex vaginata</i> (Sheathed Sedge)	2003	S3	G5	Special Concern	None
<i>Cypripedium reginae</i> (Showy Lady's-slipper)	2003	S3	G4	Special Concern	None
Communities					
Northern dry-mesic forest	2003	S3	G4	None	None
Northern wet-mesic forest	2005	S3S4	G3?	None	None
Stream--fast, hard, cold	2006	S4	GNR	None	None

# Peshtigo River State Forest PR05 - Johnson Dam



Legend Disclaimer:  
Element Occurrence (EO) locations were generated using Jan 17, 2006 NHI data records. Each symbol may represent more than one EO, and symbols may overlap each other. The absence of evidence does not indicate evidence of absence.

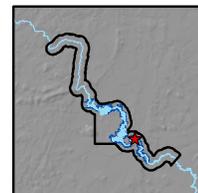
The survey site is approximate, and it should be used only generally, not literally, for management purposes.

Surveys were conducted between 2002-05 for natural communities and priority taxa. The surveys were not comprehensive for all taxa potentially present.

Non-DNR lands include all lands not under full ownership of or management by the WDNR as of 2005.

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-  Animal
-  Community
-  Plant
-  pesh-sites
-  Peshtigo River State Forest
-  Non-DNR Owned Lands



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## PR06. PESHTIGO RIVER SOUTH

### **Location**

USGS 7.5' Quadrangle: High Falls Reservoir, White Potato Lake, and Crivitz  
Town-Range-Section: T32N R19E Sections 4, 9, 15, 16, and 22  
LTA: 212Tc03 Butler Plains, 212Tc07 Mount Tom Moraines, and 212Tc08 Crivitz Plains  
Approximate Size: 1056 acres

### **Description of Site**

This site encompasses a relatively undisturbed, seven-mile, large, “semi-free flowing” warm-water stretch of the Peshtigo River along with associated uplands between the Johnson and Sandstone flowages. Groundwater remains the main water source in this section and flow is considered moderate. The hydroelectric dams on the north and south ends of the site partially control water levels and flow volume.

The amount of land available for large-scale forest management and protection around the river is more restricted here than it is further upstream because public ownership is more limited in this area. The river is bordered by steep slopes at several locations within this site.

### **Significance of Site**

This area includes some of the highest quality natural communities within the Peshtigo River State Forest, and supports several concentrations of several rare plants, as well as a State Threatened reptile. Significant sites include the adjacent Johnson Falls Dam (see PR05), Spring Rapids to Sandstone Flowage along the west side of the river and Medicine Brook to Sandstone Flowage along the east side of the river.

The Spring Rapids to Sandstone portion of the river borders a two-mile stretch of the Peshtigo River on the west side. The most significant features of this site are two tracts of forested seeps and Northern Wet-mesic forest at the north and south ends of the site, which support at least four rare plant species.

The east side of the Medicine Brook to Sandstone Flowage portion of the river is a forested strip between one-quarter and one-half mile wide. This area contains at least one stand of high-quality, mature red pine, white pine, and hemlock on steep slopes, and this is one of the few high quality examples of this type within the study area. Approximately three tenths of a mile southeast of Medicine Brook is a bedrock outcrop with good quality Bedrock Glade and Dry Cliff communities. The Medicine Brook outcrop is one of the better-quality, relatively undisturbed examples of this community type in the study area.

This stretch of river has good species diversity and harbors at least 100 species of macroinvertebrates including three Threatened and several Special Concern species.

### **Management Considerations**

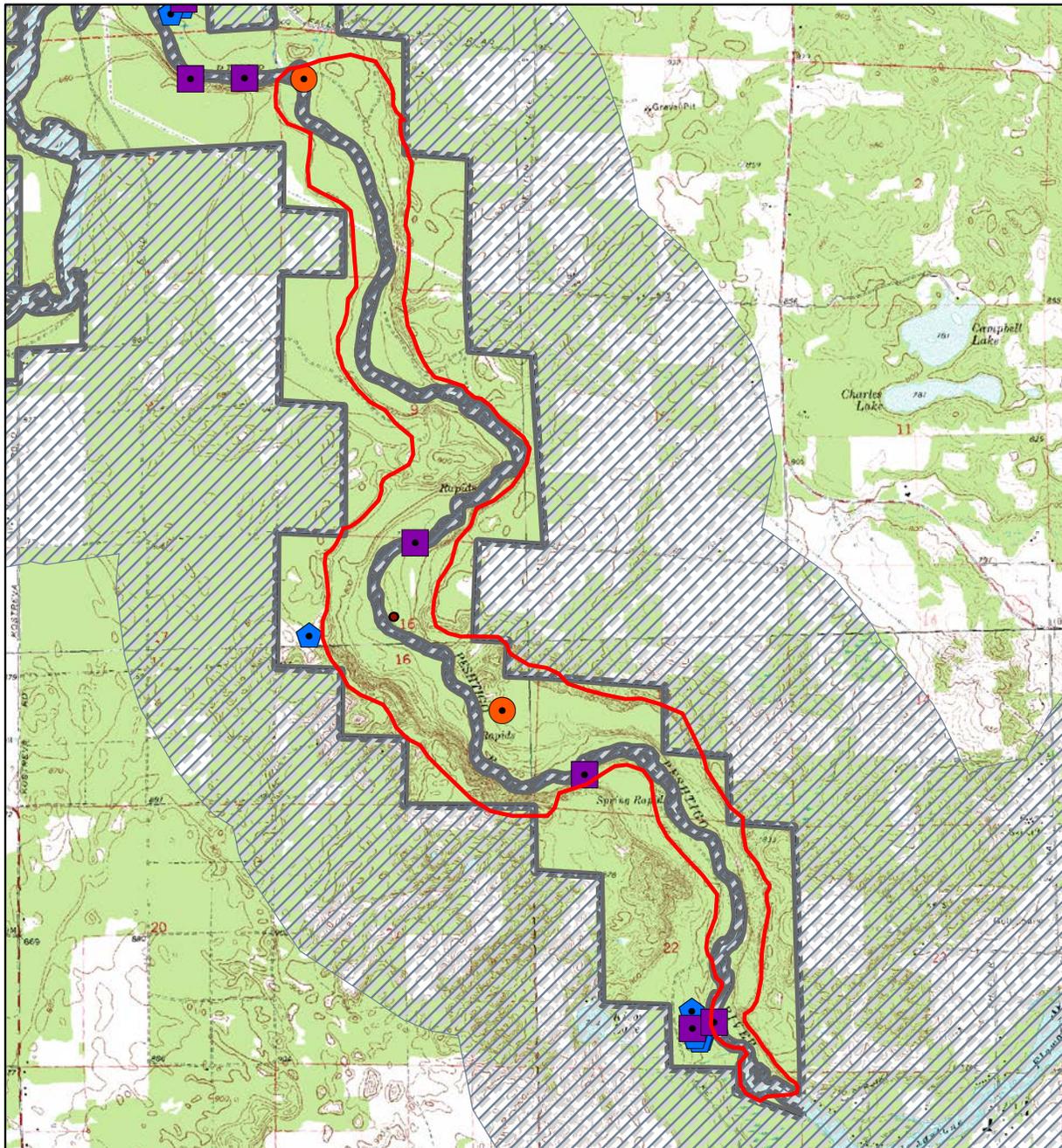
Protecting the entire river corridor along this stretch would benefit the high-quality natural communities and rare species present. A special designation or management emphasis here would preserve diversity, protect water quality, and maintain the valuable aesthetic qualities of this portion of the river. A conservation approach that considers

slope, hydrology, vegetation types, and deer impacts would be more effective than using a fixed-distance “buffer” for delineating the zone or corridor. Boundary refinements are needed, but these should be discussed thoroughly and made with the site’s ecological, aesthetic, and recreational attributes in mind.

**PR06. Peshtigo River South Element Occurrences**

Scientific Name (Common Name)	Lastobs Date	State Rank	Global Rank	State Status	Federal Status
Plants					
<i>Arabis missouriensis</i> var. <i>deamii</i> (Deam's Rockcress)	1992	S2	G4G5QT3?Q	Special Concern	None
Animals					
<i>Clemmys insculpta</i> (Wood Turtle)	2003	S3	G4	Threatened	None
Communities					
Northern wet-mesic forest	2003	S3S4	G3?	None	None
Stream--fast, hard, cold	1981	S4	GNR	None	None

# Peshtigo River State Forest PR06 - Peshtigo River South



**Legend Disclaimer:**

Element Occurrence (EO) locations were generated using Jan 17, 2006 NHI data records. Each symbol may represent more than one EO, and symbols may overlap each other. The absence of evidence does not indicate evidence of absence.

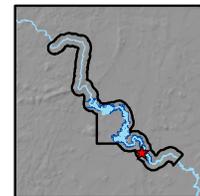
The survey site is approximate, and it should be used only generally, not literally, for management purposes.

Surveys were conducted between 2002-05 for natural communities and priority taxa. The surveys were not comprehensive for all taxa potentially present.

Non-DNR lands include all lands not under full ownership of or management by the WDNR as of 2005.

1:38,000

- Animal
- Community
- Plant
- pesh-sites selection
- Peshtigo River State Forest
- Non-DNR Owned Lands
- pesh-sites\_pts2



## PR07. KIRBY LAKE HARDWOODS

### Location

USGS 7.5' Quadrangle: Crivitz  
 Town-Range-Section: T32N R19E Section 22  
 LTA: 212Tc07 Mount Tom Moraines and 212Tc08 Crivitz Plains  
 Approximate Size: 45 acres

### Description of Site

This site includes patches of cedar swamp and mesic northern hardwoods forest on terraces along the west side of the Peshtigo River, east of Kirby Lake Road. There are scattered mature red and white pines on steep slopes along the river. One patch of mature Northern Mesic Forest supports the Special Concern plant ginseng. The most significant features of this site are the areas of spring seepage, the relatively rich northern hardwoods forest, and the white cedar-dominated Northern Wet-mesic Forest at the north and south ends of the site. The cedar swamps harbor at least four Special Concern plants: Canada yew, sheathed sedge, showy lady's slipper, and large roundleaf orchid.

Near this site is a band of hardwood-dominated Northern Mesic Forest on the east side of the river. This area contains mature hardwoods, with inclusionary seeps and slough-like habitats. The adjacent bluff appears similar to the lower slope forest but is drier. A two-track road going through this area receives foot, vehicle, and bike traffic.

### Significance of Site

The part of the site west of the river is compromised due to its size, context, and the condition of land immediately surrounding the cedar swamps, but it does support significant stands of rich Northern Mesic Forest, Northern Wet-mesic Forest, and a localized concentration of rare plant species. East of the river the Northern Mesic Forest on the steep slopes is of good quality but is not extensive. However, it will provide limited habitat for area sensitive forest interior species. The forested seeps have the potential to support rare species.

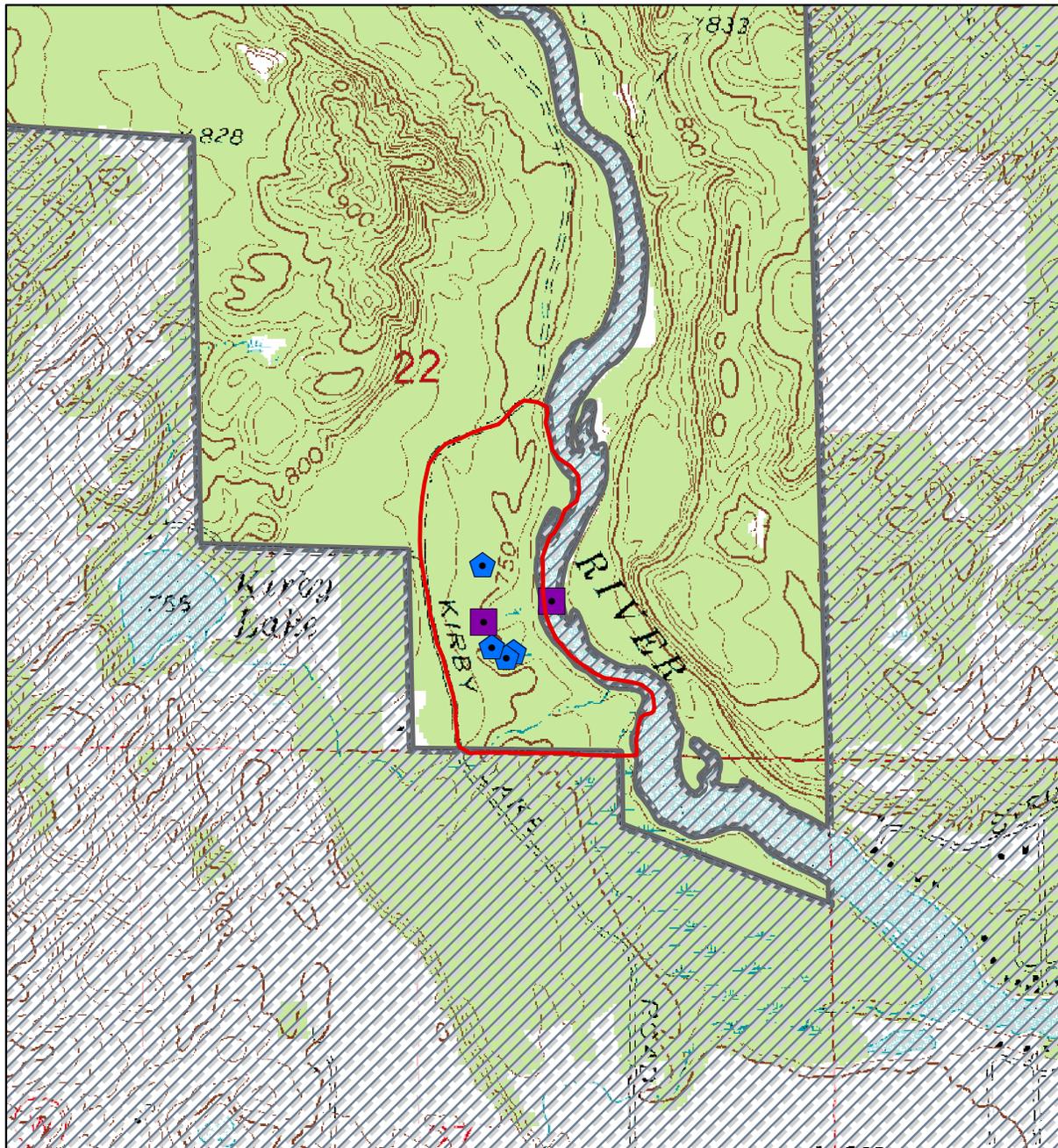
### Management Considerations

This site would benefit from a management strategy that protects the forested river corridor and considers it as a whole. Since parts of this site are ecologically compromised and may not merit a special designation status, a multiple objective approach that protects water quality and aesthetic values of the lands adjacent to this portion of the river should protect the rare species and communities in this area. Foot and vehicle traffic, particularly along the steep slopes, could negatively impact the biodiversity, ecological function and aesthetics of this site through increased erosion and the spread of invasive species. There may be future opportunities to manage the adjacent uplands in ways that would provide ecological connections between the good quality remnants.

### PR07. Kirby Lake Hardwoods Element Occurrences

Scientific Name (Common Name)	Lastobs Date	State Rank	Global Rank	State Status	Federal Status
Plants					
<i>Carex vaginata</i> (Sheathed Sedge)	2003	S3	G5	Special Concern	None
<i>Cypripedium reginae</i> (Showy Lady's-slipper)	2003	S3	G4	Special Concern	None
<i>Malaxis monophyllos</i> var. <i>brachypoda</i> (White Adder's Mouth)	1991	S3	G4Q	Special Concern	None
<i>Platanthera orbiculata</i> (Large Roundleaf Orchid)	2003	S3	G5?	Special Concern	None
Communities					
Northern wet-mesic forest	2005	S3S4	G3?	None	None
Stream--fast, hard, cold	1981	S4	GNR	None	None

# Peshtigo River State Forest PR07 - Kirby Lake Hardwoods



**Legend Disclaimer:**

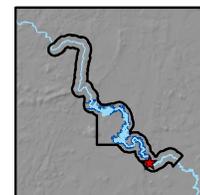
Element Occurrence (EO) locations were generated using Jan 17, 2006 NHI data records. Each symbol may represent more than one EO, and symbols may overlap each other. The absence of evidence does not indicate evidence of absence.

The survey site is approximate, and it should be used only generally, not literally, for management purposes.

Surveys were conducted between 2002-05 for natural communities and priority taxa. The surveys were not comprehensive for all taxa potentially present.

Non-DNR lands include all lands not under full ownership of or management by the WDNR as of 2005.

1:12,000



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# PESHTIGO RIVER NORTH

## ***Description of Site***

This site is outside of the PRSF and encompasses a 21.1-mile, free-flowing stretch of the Peshtigo River, between the Marinette-Forest County line and the Caldron Falls Flowage (located at the northernmost end of the Peshtigo River State Forest). This undeveloped, stretch of the Peshtigo flows through a large, relatively intact natural landscape, much of it part of the Marinette County Forest, with scattered private inholdings. This area includes a large block of working forest around the Peshtigo River that has been repeatedly logged.

The water source here is ground water dominated with some contribution from surface water sources. The entire segment is considered trout water or a cool water stream. The upper end of this segment is classified as a medium sized stream, and the lower two-thirds would be considered a large stream. The upper two-thirds of this segment has a moderate gradient with low gradient in the lower third.

## ***Significance of Site***

This stretch of river has good species diversity and harbors at least 87 species of macroinvertebrates including one Endangered, one Threatened and several Special Concern species. The forests bordering this stretch of the river include ecologically significant plant communities at several locations we refer to as Silver Cliff Hill Woods, Knob Hill Woods, Wolf Lane Woods, Parkway Road Woods - Marinette County Beech Forest, and Wilson Rapids West Woods. More detailed information can be obtained by contacting the NHI Program.

Silver Cliff Hill Woods supports a large tract of Northern Mesic Forest, much of which is periodically logged but includes areas of relatively intact second growth. It is the largest tract of northern mesic forest with a rich herbaceous and spring ephemeral layer within the project area.

Wolf Lane Woods, Parkway Road Woods, Marinette County Beech Forest, and Wilson Rapids West Woods could be combined to form a large area of moderately intact forested lands, which include some high quality plant communities. This area supports extensive tracts of representative Northern Mesic and Northern Dry Mesic forest, including the Marinette County Beech Forest State Natural Area.

## ***Management Considerations***

This area provides excellent opportunities for large scale management of mature interior forest. Opportunities could be identified for establishing older stands with large diameter trees, high canopy closure, and increased representation of coniferous species that have generally been diminished here and elsewhere in northern Wisconsin. Benefits would include provision of suitable habitat for a broader spectrum of interior forest wildlife species and protection of plant communities. Management that would protect and/or restore these sites and the river corridor in general would help preserve biodiversity, protect water quality, provide alternative recreational experiences, and would be a significant contribution to the preservation of Wisconsin's natural heritage.



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## APPENDIX C

### Natural Communities of the Study Area

These descriptions are from the September 2002 Revision of the NHI Natural Community Descriptions prepared by Eric Epstein, Emmet Judziewicz and Elizabeth Spencer. (For the most current descriptions, see [dnr.wi.gov/org/land/er/communities](http://dnr.wi.gov/org/land/er/communities)).

#### Forest Communities

##### Northern Dry Forest

This forest community occurs on nutrient-poor sites with excessively drained sandy or rocky soils. The primary historic disturbance regime was catastrophic fire at intervals of decades to approximately a century. Dominant trees of mature stands include jack and red pines (*Pinus banksiana* and *P. resinosa*) and/or Hill's oak (*Quercus ellipsoidalis*). Large acreages of this forest type were cut and burned during the catastrophic logging of the late 19<sup>th</sup> and early 20<sup>th</sup> century. Much of this land was then colonized by white birch (*Betula papyrifera*) and/or quaking aspen (*Populus tremuloides*), or converted to pine plantations starting in the 1920s. Common understory shrubs are hazelnuts (*Corylus* spp.), early blueberry (*Vaccinium angustifolium*) and brambles (*Rubus* spp.). Common herbs include bracken fern (*Pteridium aquilinum*), starflower (*Trientalis borealis*), barren-strawberry (*Waldsteinia fragarioides*), cow-wheat (*Melampyrum lineare*), trailing arbutus (*Epigaea repens*), and members of the shinleaf family (*Chimaphila umbellata*, *Pyrola* spp.). Vast acreages of open "barrens" were also planted to pine, or naturally succeeded to densely stocked "dry" forests.

##### Northern Dry-Mesic Forest

In this forest community, mature stands are dominated by white and red pines (*Pinus strobus* and *P. resinosa*), sometimes mixed with red oak (*Quercus rubra*) and red maple (*Acer rubrum*). Common understory shrubs are hazelnuts (*Corylus* spp.), blueberries (*Vaccinium angustifolium* and *V. myrtilloides*), wintergreen (*Gaultheria procumbens*), partridge-berry (*Mitchella repens*). Among the dominant herbs are wild sarsaparilla (*Aralia nudicaulis*), Canada mayflower (*Maianthemum canadense*), and cow-wheat (*Melampyrum lineare*). Stands usually occur on sandy loams, sands or sometimes rocky soils.

##### Northern Mesic Forest

This forest complex covered the largest acreage of any Wisconsin vegetation type prior to European settlement. Sugar maple (*Acer saccharum*) is dominant or co-dominant in most stands, while hemlock (*Tsuga canadensis*) was the second most important species, sometimes occurring in nearly pure stands with white pine (*Pinus strobus*). 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 (especially *Dryopteris intermedia*), bluebead lily (*Clintonia borealis*), clubmosses (*Lycopodium* spp.), and Canada mayflower (*Maianthemum canadense*) prevalent, to lush and species-rich with fine spring ephemeral displays. 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 and still are important in many second-growth Northern Mesic Forests. Several distinct associations within this complex warrant recognition as communities, and draft abstracts of these are currently undergoing review.

##### Northern Wet Forest (revised from Curtis (1959), with Black Spruce and Tamarack Swamps split out)

These weakly minerotrophic conifer swamps, located in the North, are dominated by black spruce (*Picea mariana*) and tamarack (*Larix laricina*). Jack pine (*Pinus banksiana*) may be a significant canopy component

in certain parts of the range of this community complex. Understories are composed mostly of sphagnum (*Sphagnum* spp.) mosses and ericaceous shrubs such as leatherleaf (*Chamaedaphne calyculata*), Labrador-tea (*Ledum groenlandicum*), and small cranberry (*Vaccinium oxycoccos*) and sedges such as (*Carex trisperma* and *C. paupercula*). The Natural Heritage Inventory has split out two entities, identified (but not strictly defined) by the two dominant species (see **Black Spruce Swamp** and **Tamarack Swamp**).

#### **Northern Wet-Mesic Forest** (revised from Curtis, with Northern Hardwood Swamp split out)

This forested minerotrophic wetland is dominated by white cedar (*Thuja occidentalis*) and occurs on rich, neutral to alkaline substrates. Balsam fir (*Abies balsamea*), black ash (*Fraxinus nigra*), and spruces (*Picea glauca* and *P. mariana*) are among the many potential canopy associates. The understory is rich in sedges (such as *Carex disperma* and *C. trisperma*), orchids (e.g., *Platanthera obtusata* and *Listera cordata*), and wildflowers such as goldthread (*Coptis trifolia*), fringed polygala (*Polygala pauciflora*), and naked miterwort (*Mitella nuda*), and trailing sub-shrubs such as twinflower (*Linnaea borealis*) and creeping snowberry (*Gaultheria hispidula*). A number of rare plants occur more frequently in the cedar swamps than in any other habitat.

## **Savanna Communities**

### **Pine Barrens**

This savanna community is characterized by scattered jack pines (*Pinus banksiana*), or less commonly red pines (*P. resinosa*), sometimes mixed with scrubby Hill's and bur oaks (*Quercus ellipsoidalis* and *Q. macrocarpa*), interspersed with openings in which shrubs such as hazelnuts (*Corylus* spp.), and prairie willow (*Salix humilis*) and herbs dominate. The flora often contains species characteristic of "heaths" such as blueberries (*Vaccinium angustifolium* and *V. myrtilloides*), bearberry (*Arctostaphylos uva-ursi*), American hazelnut (*Corylus americana*), sweet fern (*Comptonia peregrina*), and sand cherry (*Prunus pensylvanica*). Also present are dry sand prairie species such as june grass (*Koeleria macrantha*), little bluestem (*Schizachyrium scoparium*), silky and sky-blue asters (*Aster sericeus* and *A. azureus*), lupine (*Lupinus perennis*), blazing-stars (*Liatris aspera* and *L. cylindracea*), and western sunflower (*Helianthus occidentalis*). Pines may be infrequent, even absent, in some stands in northern Wisconsin and elsewhere because of past logging, altered fire regimes, and an absence of seed source.

## **Shrub Communities**

### **Alder Thicket**

These wetlands are dominated by thick growths of tall shrubs, especially speckled alder (*Alnus incana*). Among the common herbaceous species are Canada bluejoint grass (*Calamagrostis canadensis*), orange jewelweed (*Impatiens capensis*), several asters (*Aster lanceolatus*, *A. puniceus*, and *A. umbellatus*), boneset (*Eupatorium perfoliatum*), rough bedstraw (*Galium asprellum*), marsh fern (*Thelypteris palustris*), arrow-leaved tearthumb (*Polygonum sagittatum*), and sensitive fern (*Onoclea sensibilis*). This type is common and widespread in northern and central Wisconsin, but also occurs in the southern part of the state.

### **Shrub-Carr**

This wetland community is dominated by tall shrubs such as red-osier dogwood (*Cornus stolonifera*), meadow-sweet (*Spiraea alba*), and various willows (*Salix discolor*, *S. bebbiana*, and *S. gracilis*). Canada bluejoint grass (*Calamagrostis canadensis*) is often very common. Associates are similar to those found in Alder Thickets and tussock-type Sedge Meadows. This type is common and widespread in southern Wisconsin but also occurs in the north.

## **Herbaceous Communities**

### **Bedrock Glade**

These are xeric, sparsely vegetated non-vertical bedrock exposures with very thin, often discontinuous soils. The rock types vary from quartzite (Baraboo Hills, McCaslin Mountain), to basalt (lower St. Croix River valley), to

granite (northeastern Wisconsin). The flora can include prairie, savanna, or barrens components, some at their northern range limits. Trees and shrubs are sparse and may include pines, oaks, and cherries. Xerophytic pteridophytes such as rusty woodsia (*Woodsia ilvensis*) and rock spikemoss (*Selaginella rupestris*) are characteristic, as are lichens and mosses.

### **Emergent Marsh**

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

### **Open Bog**

These non-forested bogs are acidic, low nutrient, northern Wisconsin peatlands dominated by *Sphagnum* spp. mosses that occur in deep layers, often with pronounced hummocks and hollows. Also present are a few narrow-leaved sedge species such as (*Carex oligosperma* and *C. pauciflora*), cotton-grasses (*Eriophorum* spp.), and ericaceous shrubs, especially bog laurel (*Kalmia polifolia*), leatherleaf (*Chamaedaphne calyculata*), and small cranberry (*Vaccinium oxycoccus*). Plant diversity is very low but includes characteristic and distinctive specialists. Trees are absent or achieve very low cover values as this community is closely related to and intergrades with Muskeg. When this community occurs in southern Wisconsin, it is often referred to as a Bog Relict.

### **Southern Sedge Meadow**

Widespread in southern Wisconsin, this open wetland community is most typically dominated by tussock sedge (*Carex stricta*) and Canada bluejoint grass (*Calamagrostis canadensis*). Common associates are water-horehound (*Lycopus uniflorus*), panicled aster (*Aster simplex*), blue flag (*Iris virginica*), Canada goldenrod (*Solidago canadensis*), spotted joe-pye-weed (*Eupatorium maculatum*), broad-leaved cat-tail (*Typha latifolia*), and swamp milkweed (*Asclepias incarnata*). Reed canary grass (*Phalaris arundinacea*) may be dominant in grazed and/or ditched stands. Ditched stands can succeed quickly to Shrub-carr.



# APPENDIX D

## Species of Greatest Conservation Need and Habitats for the Northeast Sands

Vertebrate Species of Greatest Conservation Need (SGCN) from the Northeast Sands Ecological Landscape. Only SGCNs with a high or moderate probability of occurring in the Northeast Sands are shown. Letters indicate the degree to which each species is associated with a particular habitat type (S=significantly association, M=moderate association, and L=low association). See the Wisconsin Wildlife Action Plan (WDNR 2006b) for more information.

	Major Opportunity*										Important Opportunity*										Present*									
	Bracken Grassland	Coldwater streams	Coolwater streams	Northern Dry Forest	Northern Dry-Mesic Forest	Northern Wet-Mesic Forest	Pine Barrens	Warmwater rivers	Alder Thicket	Boreal Rich Fen	Emergent Aquatic	Impoundments/Reservoirs	Inland lakes	Moist Cliff	Northern Hardwood Swamp	Northern Mesic Forest	Northern Sedge Meadow	Northern Wet Forest	Open Bog	Submergent Aquatic	Boreal Forest	Emergent Aquatic-Wild Rice	Ephemeral Pond	Floodplain Forest	Shrub Carr	Surrogate Grasslands (CRP, pasture, Hay)	Warmwater streams			
<b>High Probability of Occurring in the Northeast Sands</b>																														
American Woodcock	L			L	L	L	L				S				M	M	L	L	L		L	L	L	S	L					
Bald Eagle							S					S	S							M		L		L						
Black-billed Cuckoo	L			L	L		M				S				L	M	L	L			L			M	S					
Bobolink	L																S			M							S			
Brown Thrasher	S			L			S																				M			
Field Sparrow	M						M																				M			
Golden-winged Warbler				M	M	L	L			S	L				M	M		M	M		L			S			M			
Grasshopper Sparrow	M						L																				S			
Lake Sturgeon							S				S	S																		
Least Flycatcher				M	M	L								M	S						M			M	L					
Mink Frog		M	S			L	S	M	M	S	S	S		L	L	S	L	S	S	S	L	M	M		M		S			
Mudpuppy		M	L				S				S	S																		
Northern Flying Squirrel				M	S	S	L							M	S		S				S			M						
Osprey							S				S	S									L									
Red Crossbill				S	S		M								L		L				L									
Red-headed Woodpecker				L	L		L																	M						
Veery				L	M	L				S				S	M		M				S			M	S					
Vesper Sparrow	S						S																				L			
Water Shrew		S	S			S		L	M	L		L	M	S	M	L	S	L			S			M	L		M			
Whip-poor-will				M	M		M								L									L						
Wood Thrush					L	L									L	M		L						M						
Wood Turtle	S	S	S			M	S	S	S						M	S	M	M		S			M	S	S		S			
<b>Moderate Probability of Occurring in the Northeast Sands</b>																														
American Bittern								L		S							S		S			L		L	L					
Blanding's Turtle	S	M	M				S	M	M		S	S	S				M			S		S	S	M	M		M			
Canada Warbler				L	M	S			M	M				S	M		M				S			L						
Four-toed Salamander		M	M			S			S		S			L	M	S	M	M	S		M		S	S	S					
Gray Wolf	S			M	S	S	M		S	L				M	S	L	S	M			S			M	M					
Lark Sparrow							M																							
Northern Goshawk				L	M	L								L	S						M									
Northern Harrier	M						M		L	L						S		M			L			L	S					
Pickering Frog		S	S			M		S	M		S	S	M		M	S	M	M	S				S	M	M		S			
Red-shouldered Hawk				L	M	L								L	M								S	S						
Rusty Blackbird								M		M								M					M	S	M					
Sharp-tailed Grouse	M						S									M	L							L	M					
Solitary Sandpiper		M	M					L		S						L		M					S	S	L		M			
Upland Sandpiper	S						M									L											S			
Woodland Jumping Mouse				L	L	M	L		L						M	S	L	M	L		M		M	M	L					

\* Opportunity for sustaining this habitat / community type in the Northeast Sands Ecological Landscape. See the Wisconsin Comprehensive Wildlife Conservation Plan (REF) for more Information.



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## APPENDIX E

### Landtype Associations of the Study Area

Ecoregions are geographic areas of similar physical, chemical, and biological characteristics organized within a hierarchical framework. Each level of the hierarchy shares important ecological attributes such as climate, geology, landform, hydrology, soils, and vegetation. Terminology for the ecoregions presented here follows that developed for the USDA Forest Service by Bailey (1995), the National Hierarchical Framework of Ecological Units (NHFEU) (Avers et al., 1994), and others. Related information using somewhat different methods of classifying broad landscapes of Wisconsin and the western Great Lakes can be found in Albert (1995) and Hole and Germain (1994).

The NHFEU comprises the following eight different scales of mapping (from largest to smallest): Domain, Division, Province, Section, Subsection, Landtype Association, Landtype, and Landtype Phase. These scales range from millions of square miles to less than 100 acres.

The Peshtigo River State Forest is located within **Province** 212 – Laurentian Mixed Forest; **Section** 212T – Northern Great Lakes; and **Subsection** 212Tc – Athelstane Sandy Outwash and Moraines.

The Peshtigo River State Forest is comprised of portions of five **Landtype Associations (LTAs)**. An additional six LTAs comprise the remainder of the study area (including one that makes up the Peshtigo Harbor Unit of the Green Bay West Shores Wildlife Area). Below are brief descriptions for the LTAs that occur within the study area from the Wisconsin LTA Team.

#### **212Ta01. Lakewood Plains and Moraines**

Landforms are rolling pitted and unpitted outwash plains, kames, and hummocky moraine complex with lakes, and bogs common. Soils are predominantly well drained loam over acid gravelly sandy outwash, loamy sand till, or drift. Common habitat types include lowland, AH, AQVb, ATDH, and ATM.

#### **212Tc03. Butler Plains**

The characteristic landform pattern is nearly level outwash plain. Soils are predominantly excessively drained sand over outwash. Common habitat types include QV, forested lowland, and PMV-Vb. This type comprises 36% of the PRSF.

#### **212Tc04. Waupee Knolls**

The characteristic landform pattern is rolling collapsed outwash plain with isolated remnant moraines. Soils are predominantly well drained fine sandy loam over outwash. Common habitat types include AQVb, forested lowland, PMV-Vb, QV, and TMC. This type comprises 31% of the PRSF.

#### **212Tc06. Athelstane Moraines**

Landform pattern is rolling collapsed moraines and outwash plains with bedrock knolls and ridges. Soils are predominantly excessively drained sand over outwash, acid loamy sand till, or igneous/metamorphic bedrock. Common habitat types include PMV-Vb, QV, lowland, and TMC.

#### **212Tc07. Mount Tom Moraines**

The characteristic landform pattern is rolling collapsed moraine. Soils are predominantly somewhat excessively drained loamy sand over calcareous outwash and well drained sandy loam over calcareous sandy loam till. Common habitat types include AQVb, PM-Vb, AFVb, and lowland. This type comprises 9% of the PRSF.

**212Tc08. Crivitz Plains**

The characteristic landform pattern is nearly level outwash plain with isolated morainic knolls. Soils are predominantly excessively drained sand over outwash. Common habitat types include PMV-Vb, QV, ATM, and forested lowland. This type comprises only 1% of the PRSF.

**212Tc18. Mountain Moraines**

The characteristic landform pattern is rolling collapsed moraine dissected with stream terraces. Soils are predominantly well drained sandy loam over sandy loam till or outwash. Common habitat types include AFVb, AQVb-Ha, AQVb, forested lowland, ATFD, and AFAd. This type comprises 11% of the PRSF.

**212Te10. Marinette Plains**

The characteristic landform pattern is nearly level lake plain with many swamps. Soils are predominantly somewhat poorly drained loamy fine sand over sandy lacustrine. Common habitat types include hydromesic, forested lowland, TMC, PMV-Vb, and FArAa. This type comprises 12% of the PRSF.

**212Xc06. Wabeno Drumlins**

The characteristic landform pattern is rolling drumlins and inter-drumlin drainageways. Soils are predominantly moderately well drained silt loam over acid loamy sand till. Common habitat types include AViO/AH, forested lowland, and ATM.

**212Xc07. Wabeno Plains**

The characteristic landform pattern is undulating pitted and unpitted outwash plains and kame terraces with swamps and bogs common. Soils are predominantly well drained sandy loam over outwash. Common habitat types include forested lowland, AViO/AH, ATM, and TMC.

**212Xc09. Bass Lake Drumlins**

The characteristic landform pattern is rolling drumlins and kame terraces. Soils are predominantly well drained sandy loam over acid loamy sand till. Common habitat types include ATM, AViO, forested lowland, PMV-Vb, QV, and AQVb.

## APPENDIX F

### Governor Thompson State Park – Additional Information

Since a master plan was being prepared for the Governor Thompson State Park prior to completion of the PRSF biotic inventory, a rapid “Ecological Assessment” (Wernerehl and Ungrodt 2002) was used to provide information for master planning. Along with other areas within the landscape, the park was later surveyed during the Peshtigo River State Forest Biotic Inventory. Surveying areas that are ecologically connected to the core properties during biotic inventories not only provides useful information about a property but also clarifies its potential roles in the surrounding landscape with respect to local and regional biodiversity. Several rare species and good-quality natural communities were identified on the park during the biotic inventory (Table F.1). Survey efforts within the park boundaries were limited to selected sites, and rare species and natural communities found on the PRSF and the surrounding landscape could be important in the park as well. In addition to having a mostly undeveloped lake, several of the important characteristics described for the PRSF study area are also present at the park, including several bedrock outcrops, wet-mesic forest, and at least one small barrens management opportunity. More specific information regarding the communities listed in Table F.1 is stored in the NHI ecologist’s files, which also include plant species lists and bird observations.

**Table F.1.** NHI Working List species and natural communities documented at the Governor Thompson State Park.

Common Name	Scientific Name	Last Observed	State Rank	Global Rank	State Status
<b>Animals</b>					
Blanding's Turtle	<i>Emydoidea blandingii</i>	2003	S3	G4	THR
Cyrano Darner	<i>Nasiaeschna pentacantha</i>	1988	S3	G5	SC/N
<b>Communities</b>					
Bedrock Glade	Bedrock glade	2003	S3	G2	NA
Hardwood Swamp	Hardwood swamp	2003	S3	G4	NA
Northern Wet Forest	Northern wet forest	2003	S4	G4	NA
Northern Wet-mesic Forest	Northern wet-mesic forest	2003	S3S4	G3?	NA
Southern Sedge Meadow	Southern sedge meadow	2003	S3	G4?	NA
<b>Plants</b>					
Blue Ridge Blueberry	<i>Vaccinium pallidum</i>	2003	S1	G5	SC
Deam's Rockcress	<i>Arabis missouriensis</i> var. <i>deamii</i>	2003	S2	G4G5QT3?Q	SC
Dwarf Milkweed	<i>Asclepias ovalifolia</i>	2003	S3	G5?	THR
Marsh Willow-herb	<i>Epilobium palustre</i>	2003	S3	G5	SC
White Adder's-mouth	<i>Malaxis monophyllos</i> var. <i>brachypoda</i>	1992	S3	G4Q	SC