



## **Rapid Ecological Assessment for the Door County State Parks Planning Group**

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**A Summary of Biodiversity Values Focusing on Rare Plants, Selected Rare Animals, and High-quality Natural Communities in Preparation for the Development of a New Master Plan for the Door County State Parks**

July 2010

### **Wisconsin's Natural Heritage Inventory Program**

Bureau of Endangered Resources  
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Cover photo by Robert H. Read of the Newport State Park shoreline.

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\*Includes detailed location information for rare species; not available for public distribution. For more information on NHI data and data sharing agreements, please visit the NHI data webpage: <http://dnr.wi.gov/> keyword: "NHI data"

## Purpose and Objectives

This report addresses issues specifically related to the conservation of biological diversity and is intended to be used in conjunction with other sources of information for developing a new master plan for the Door County State Parks Planning Group (DPPG), comprised of the following state-managed properties:

- Europe Bay Woods State Natural Area
- Grand Traverse Island State Park
- Newport Conifer-Hardwoods State Natural Area
- Newport State Park
- Peninsula Park Beech Forest State Natural Area
- Peninsula Park White Cedar Forest State Natural Area
- Peninsula State Park
- Potawatomi State Park
- Rock Island State Park
- Rock Island Woods State Natural Area
- Whitefish Dunes State Natural Area
- Whitefish Dunes State Park

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

Survey efforts for the DPPG were limited to a “rapid assessment” for 1) identifying and evaluating ecologically important areas, 2) documenting rare species occurrences, and 3) documenting occurrences of high quality natural communities. This report can serve as the “Biotic Inventory” document used for master planning, although both the time and effort expended were less than some projects for larger properties, such as state forests. The information collected was the result of numerous survey efforts on the Door Peninsula and Grand Traverse Islands. There will undoubtedly be gaps in our knowledge of the biota of this planning group, especially for certain taxa groups; some of these have been identified in the future needs section.

## Methods

The Wisconsin Natural Heritage Inventory (NHI) program is part of the Wisconsin DNR’s Bureau of Endangered Resources and a member of an international network of natural heritage programs representing all 50 states, as well as portions of Canada, Latin America, and the Caribbean. These programs share certain standardized methods for collecting, processing, and managing data for rare species and natural communities. NatureServe, an international non-profit organization (see [www.NatureServe.org](http://www.NatureServe.org) for more information), coordinates the network.

Natural heritage programs track certain *elements* of biological diversity: rare plants, rare animals, high-quality examples of natural communities, and other selected natural features. The NHI Working List contains the elements tracked in Wisconsin; they include endangered, threatened, and special concern plants and animals, as well as the natural community types recognized by NHI. The NHI Working List is periodically updated to reflect new information about the rarity and distribution of the state’s plants, animals, and natural communities. The most recent Working List is available from the Wisconsin DNR Web site (<http://dnr.wi.gov/org/land/er/wlist/>).

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

Scientific names for all species mentioned in the text are included in a list on page 59.

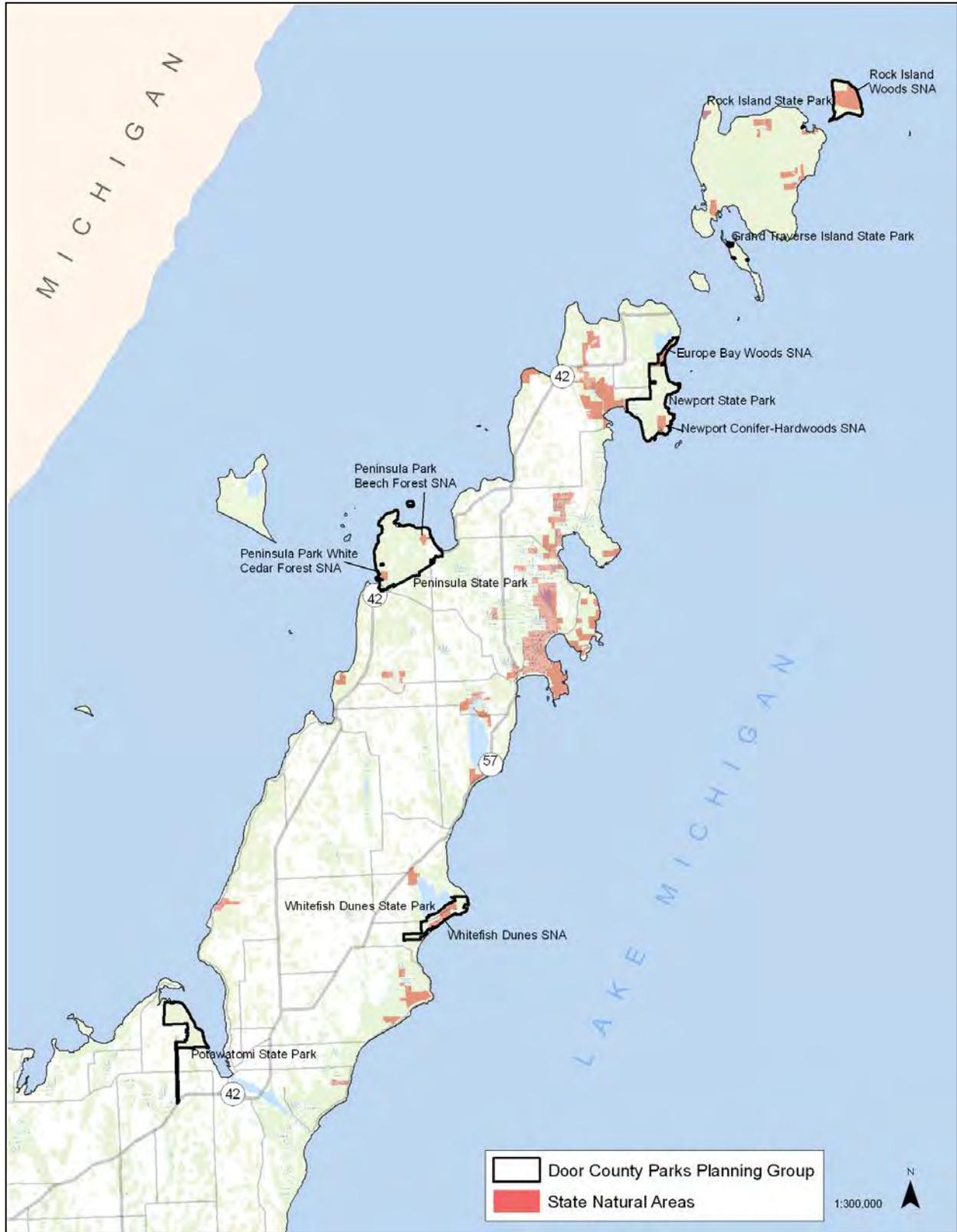
## General Background Information

The Door County State Parks Planning Group is located in Door County and comprises ca. 9,193 acres (Figure 1).

Properties included within the DPPG are:

- **Grand Traverse Island State Park** (22 acres) is located on Detroit Island.
- **Newport State Park** (2,468 acres) is located along the eastern side of the tip of the Door Peninsula with shoreline on Lake Michigan and Europe Lake. Two State Natural Areas lie within the park: **Europe Bay Woods State Natural Area** is located at the north end of the park and **Newport Conifer-Hardwoods State Natural Area** is at the south end of the park. The Mink River Estuary State Natural Area connects to the west-end of the park.
- **Peninsula State Park** (3,776 acres) is located on the western side of the Door Peninsula between Fish Creek Harbor and Eagle Harbor on a peninsula jutting into Green Bay. **Peninsula Park Beech Forest State Natural Area** and **Peninsula Park White Cedar Forest State Natural Area** are located within the property.
- **Potawatomi State Park** (1,174) is located one mile north of the city of Sturgeon Bay on the western side of the Door Peninsula along Green Bay.
- **Rock Island State Park** (985 acres) is located within the Grand Traverse Island Chain. **Rock Island Woods State Natural Area** is within the park.
- **Whitefish Dunes State Park** (872 acres) is located between Whitefish Bay and Clark Lake along the eastern side of the Door Peninsula.

**Figure 1**  
Location of properties within the Door County State Parks Planning Group



## Previous Efforts Recognizing the Importance of the DPPG

### Land Legacy Report

Past surveys and inventory efforts have highlighted the ecological importance of the DPPG including the Land Legacy Report (WDNR 2006a) which was designed to identify Wisconsin's most important conservation and recreation needs for the next 50 years.

The following four "Legacy Places" were assigned a score of five points on a five-point scale for conservation significance, meaning it possesses "outstanding ecological qualities, is of adequate size to meet the needs of the critical components, and/or harbors natural communities or species of global or continental significance." This category implies that if restoration efforts are needed for the area, conservation actions would have a high likelihood of long-term success.

- The Niagara Escarpment
- Grand Traverse, containing Grand Traverse Island State Park and Rock Island State Park
- Mink River Estuary – Newport State Park – Europe Lake
- Shivering Sands

The following two "Legacy Places" were assigned a score of three points on a five-point scale for conservation significance, meaning it possesses "very good ecological qualities, is of adequate size to meet the needs of some of the critical components, and/or harbors natural communities or species of state significance." This category implies restoration efforts are important and have a very good chance of success.

- Peninsula State Park to Jacksonport Corridor
- Peninsula State Park

### Wisconsin Wildlife Action Plan Conservation Opportunity Areas

The Wisconsin Wildlife Action Plan (WDNR 2006b) recognized the Great Lakes and their shorelines and the Niagara Escarpment as being globally significant. Within this geographic area, northern Door County contains numerous Conservation Opportunity Areas (COAs). Conservation Opportunity Areas are places in Wisconsin that contain ecological features, natural communities, or habitat for Species of Greatest Conservation Need for which Wisconsin has a unique responsibility for protecting when viewed from the global, continental, upper Midwest, or state perspective.

The Conservation Opportunity Areas present on this planning group include:

- The Potawatomi State Park COA
- Whitefish Dunes to Sturgeon Bay COA
- Bailey's Harbor to Peninsula COA
- Mink River to Europe Bay COA
- Detroit Harbor COA, containing Grand Traverse Island State Park
- Rock Island COA

### Important Bird Areas

Important Bird Areas (IBA) are critical sites for the conservation and management of Wisconsin's birds. Two IBAs have been recognized within the DPPG (WDNR 2007).

- The Whitefish Dunes – Shivering Sands IBA (1,235 acres) is important for breeding birds and as a migratory bird stopover site.
- The Mink River Estuary – Newport State Park IBA (4,200 acres) provides high quality habitat for breeding birds, including wetland birds.

**Forest Certification**

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

**Ice Age National Scenic Trail**

The eastern terminus of the 1,000 mile long footpath, the Ice Age National Scenic Trail, is at Potawatomi State Park ([www.nps.gov/iatr](http://www.nps.gov/iatr)).

**Niagara Escarpment Final Report: Inventory Findings 1999-2001 and Considerations for Management**

Anderson, et al (2002) recognized the importance of the Niagara Escarpment within Door County as a prominent feature in the county and habitat for numerous rare species. The DPPG was included within the study area for the project.

**Coastal Wetlands Assessment**

Newport State Park and Whitefish Dunes State Park were surveyed as part of the Coastal Wetlands Assessment (Epstein et al. 2002).

## Ecological Context

The study area is located on what is referred to as the “Door Peninsula,” in Door County, Wisconsin, within the Northern Lake Michigan Coastal Ecological Landscape (Figure 2). The Niagara Escarpment is the exposed portion of a 650 mile sickle-shaped bedrock ridge that runs from the northeastern United States south of Rochester, New York, across portions of southeastern Canada, and then southward north and west of Lake Michigan to southeastern Wisconsin (Anderson et al. 2002). In Wisconsin, the Escarpment extends for over 230 miles (Martin 1965), from Rock Island, off the northern tip of the Door Peninsula, south to northern Waukesha and Milwaukee counties (Watermolen 1997). The Niagara Escarpment (hereafter “Niagara Escarpment” refers to both the escarpment and cuesta of the formation commonly known as the Niagara Escarpment. See the Glossary for detailed definitions of these terms and others throughout the document.) characterizes the Door Peninsula from the majestic bluffs on the west side of the peninsula to the broad horizontal bedrock “beaches” well developed on the east side of the peninsula. Sand dunes and beaches are found along the Lake Michigan shoreline, as are several areas of complex ridge and swale topography. Embayment lakes and freshwater estuaries are other physical features of the easternmost part of the Landscape.

## Land Type Associations

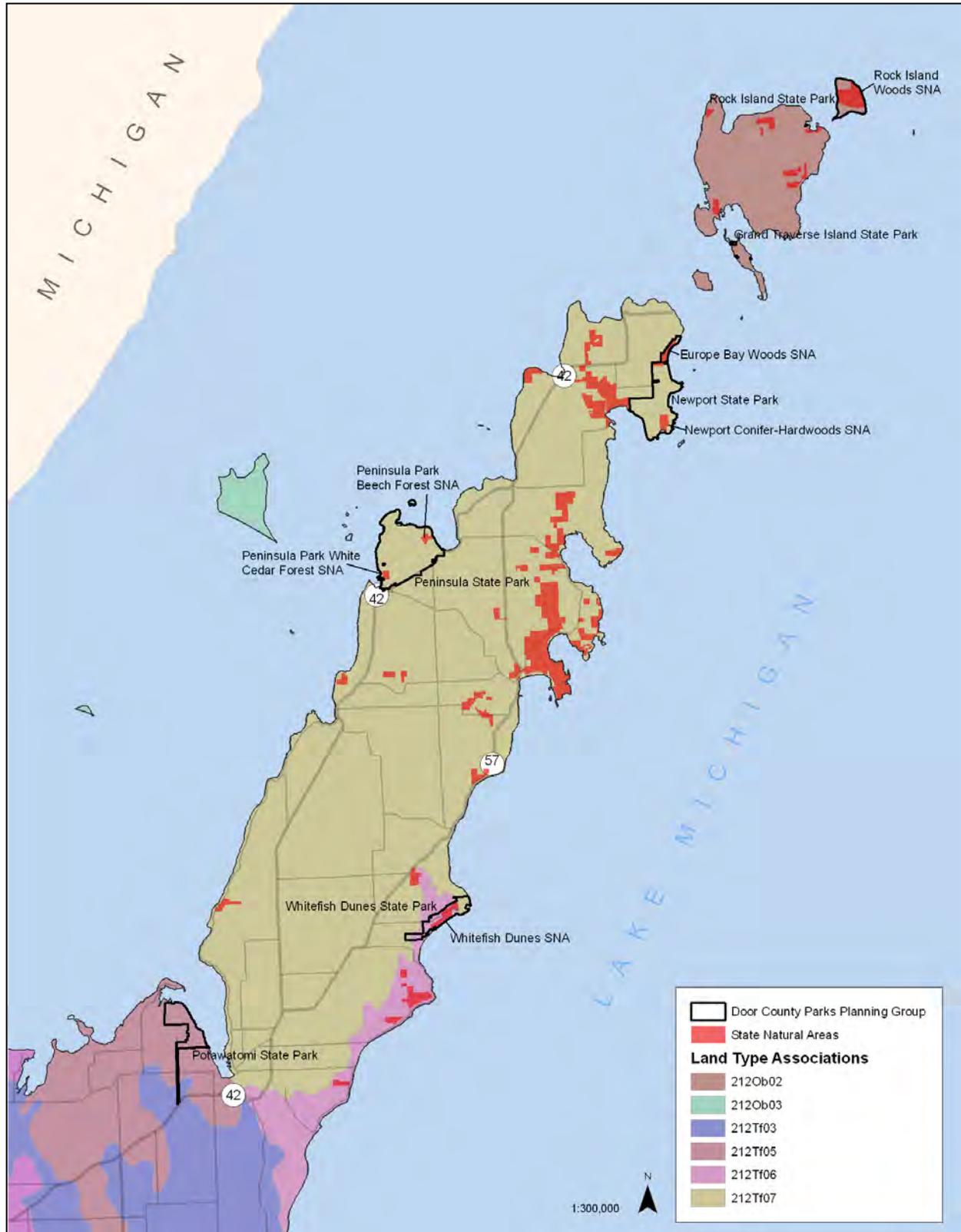
The DPPG is located within six Landtype Associations (LTAs) (Figure 3):

- Algoma Moraines (212Tf03). The characteristic landform pattern is undulating moraine with many small- and medium-sized swamps. Soils are predominantly well drained sandy loam over calcareous sandy loam till.
- Nasewaupsee Moraines (212Tf05). The characteristic landform pattern is nearly level beach with dunes. Soils are predominantly somewhat moderately well drained fine sand over outwash or lacustrine.
- Whitefish Beach (212Tf06). The characteristic landform pattern is nearly level beach with dunes. Soils are predominantly somewhat moderately well drained fine sand over outwash or lacustrine.
- Door Peninsula (212Tf07). The characteristic landform pattern is undulating bedrock-controlled moraine with many swamps. Soils are predominantly well drained loam over dolomite bedrock.
- Chambers Islands (212Ob03). The characteristic landform pattern is gently sloping with beaches common. Soils are predominantly sandy.
- Washington Islands (212Ob02). The characteristic landform pattern is islands of undulating bedrock-controlled moraines. Soils are loamy soils over dolomite bedrock and gently sloping beaches with sandy soils.



**Figure 2**  
The Ecological Landscapes of Wisconsin. Door County is outlined to indicate the location of the Door County State Parks Planning Group.

**Figure 3**  
 Land Type Associations for the Door County Parks Planning Group Primary Sites



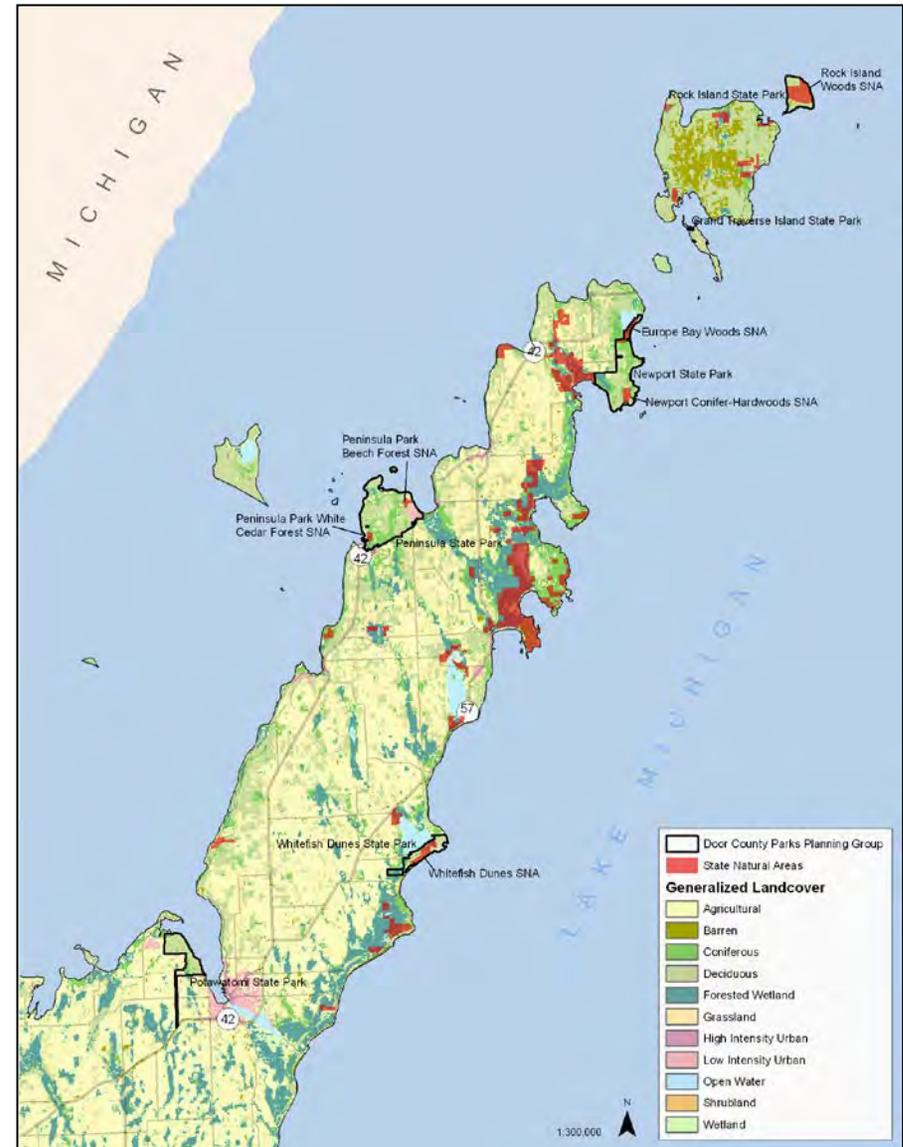
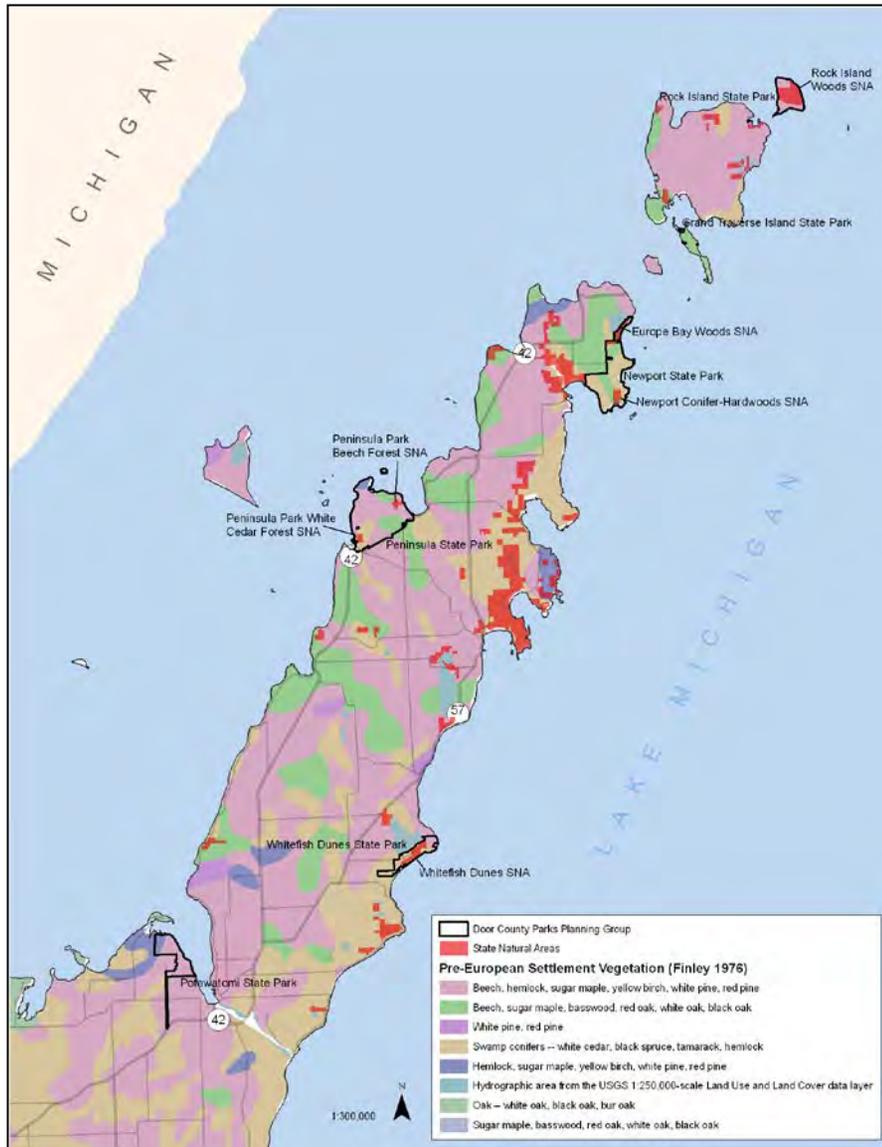
### **Historic Vegetation**

Data from the original Public Land Surveys are often used to infer vegetation cover types for Wisconsin prior to widespread Euro-American settlement. Public Land Surveys for the area comprising the DPPG were conducted between 1832 and 1855. Finley's (1976) Original Vegetation Map described the majority of the area that now comprises the DPPG as upland forests characterized by American beech (*Fagus grandifolia*), hemlock (*Tsuga canadensis*), sugar maple (*Acer saccharum*), basswood (*Tilia americana*), and yellow birch (*Betula alleghaniensis*) and wetland forests characterized by northern white-cedar (*Thuja occidentalis*), black spruce (*Picea mariana*), tamarack (*Larix laricina*), and hemlock.

The landscape surrounding the DPPG has changed dramatically since pre-European settlement, with much of the land being converted from forest to agriculture. The comparison of pre-Euro-American settlement to current landcover data (Figure 4) shows how dramatic the landscape has changed. Forested wetlands and forests within the DPPG are generally the only areas where historic vegetation has remained.

**Figure 4**

Map on the left is the pre-European settlement vegetation for the Door County State Parks Planning Group. Data are from Finley (1976). Map on the right is the generalized landcover for the Door County State Parks Planning Group from the Wisconsin DNR WISCLAND GIS coverage (WDNR 1993).



## Current Vegetation

Physical and climatic influences, due to the proximity of Lake Michigan (water level, wind, temperature, humidity, lake effect snow, ice, fog), have greatly affected the past and present vegetation at the DPPG. The current vegetation is also influenced by deer herbivory, invasive species, and anthropogenic uses of the parks.

Low water levels of Lake Michigan from 1997 – 2007 (NOAA 2010) have led to an increase in exposed Great Lakes shoreline, including the rare Great Lakes Alkaline Rockshore. This dynamic natural community includes dolomite cobbles interspersed with small pockets of marly soils over relatively flat and unfractured bedrock. Variations range from large areas of small cobbles with a large proportion of habitable marly sands, to mostly large blocks and unbroken plates of dolostone with few habitable soil-filled cracks and pockets (Fewless 2000a). When the water level of Lake Michigan rises, these areas are submerged and characteristic flora is absent. When water levels fall sufficiently to expose the rockshore, the flora recolonizes the site, mostly from seeds in the soil. Stable water level may result in the colonization of the site by more competitive species including herbaceous plants and several species of trees and shrubs. These species are removed from the site with the return of high water or by ice-scouring during spring. Thus, naturally fluctuating Great Lakes water levels are an important ecosystem process that helps maintain this natural community.

The characteristic flora of the Great Lakes Alkaline Rockshore natural community at the DPPG includes: Crawe sedge (*Carex crawei*; special concern), elk sedge (*Carex garberi*; state threatened), tufted hairgrass (*Deschampsia cespitosa*; special concern), few-flower spikerush (*Eleocharis quinqueflora*; special concern), variegated horsetail (*Equisetum variegatum*; special concern), bird's-eye primrose (*Primula mistassinica*; special concern), low calamint (*Calamintha arkansana*; special concern), and lesser fringed gentian (*Gentianopsis procera*; special concern).

Low water levels of Lake Michigan have also led to an increase in emergent aquatics, especially the invasive variety of common reed grass (*Phragmites australis*). Many emergent aquatic species require occasional low water levels to expose the lake bottom for seedling establishment (Keddy and Reznicek 1986). This leads to the most abundant populations of emergent aquatic species within the normal water level and the extreme minimum level.

Great Lakes Beaches within the DPPG vary from exposed wet sand to upper beaches that are often dry and can form low dunes. Wet sand beaches often have very little vegetation because they have only been exposed for a short period of time. During high water these dynamic areas are influenced by alternating erosion and deposition of sand, which does not allow for preservation of a large seed bank that may be found in many other natural communities. Eventually, wet beaches are colonized by wetland species such as bushy knotweed (*Polygonum ramosissimum*), curly-top knotweed (*Polygonum lapathifolium*), common boneset (*Eupatorium perfoliatum*), common yellow-cress (*Rorippa palustris*), bottlebrush sedge (*Carex hystericina*), fox sedge (*Carex vulpinoidea*), jointed rush (*Juncus nodosus*), cat-tail (*Typha sp.*) seedlings, and “weedy” species of broader distribution including common reed grass, common yarrow (*Achillea millefolium*), common mullein (*Verbascum thapsus*), and bittersweet nightshade (*Solanum dulcamara*). Tree seedlings of white birch (*Betula papyrifera*), balsam poplar (*Populus balsamifera*), quaking aspen (*Populus tremuloides*), willow (*Salix spp.*), etc. may be present.

On both dry beaches and low dunes American beach-grass (*Ammophila breviligulata*) and Canada wild-rye (*Elymus canadensis*) dominate and beach pea (*Lathyrus japonicus*) is common on the lakeward side. Creeping juniper (*Juniperus horizontalis*) and common juniper (*Juniperus communis*) are prominent

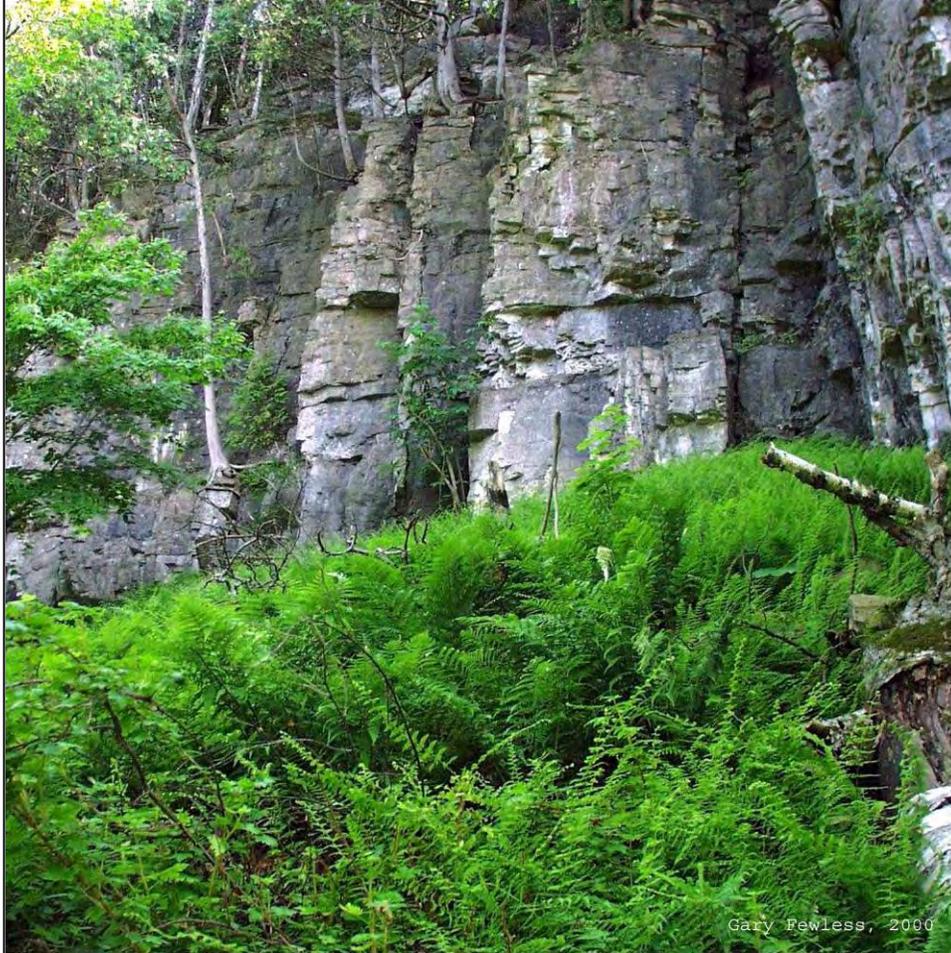
where the upper ridges grade into the adjacent forest. The flora composition of this dynamic natural community varies and includes: common yarrow, sand cress (*Arabis lyrata*), bearberry (*Arctostaphylos uva-ursi*), field sage-wort (*Artemisia campestris*), thick-spike wheat grass (*Elytrigia dasystachya* ssp. *psammophila*), common scouring rush (*Equisetum hyemale*), Baltic rush (*Juncus arcticus*), fringed bindweed (*Polygonum cilinode*), silver-weed (*Argentina anserina*), bracken fern (*Pteridium aquilinum*; mostly near forest), wild rose (*Rosa blanda*), dune goldenrod (*Solidago simplex* var. *gillmanii*; state threatened), and the invasive yellow sedum (*Sedum acre*), spotted knapweed (*Centaurea biebersteinii*), and poison-ivy (*Toxicodendron radicans*). Tree seedlings of white birch, balsam poplar, and quaking aspen are present.

Other natural community types associated with lakeshore include Northern and Southern Sedge Meadows, small Emergent Marshes, small areas of calcareous wet meadows, Northern Wet-mesic Forests, and Hardwood Swamps.

Stabilized dunes and beach ridges of the DPPG support Boreal Forest and Northern Dry-mesic Forest natural communities. Boreal forests of the Door Peninsula, found on sand dunes or thin soil over Niagara dolostone, represent a unique variant of this type. Wind throw and high levels of humidity, snowfall, and summer fog and mist help maintain this type. Boreal Forests of the DPPG are characterized by northern white-cedar, balsam fir (*Abies balsamea*), quaking aspen, white birch, and white spruce (*Picea glauca*). Northern Dry-mesic Forests are also found on stabilized dunes and beach ridges of the DPPG and are characterized by red oak (*Quercus rubra*) with red pine (*Pinus resinosa*), white pine (*Pinus strobus*), red maple (*Acer rubrum*), hemlock, and American beech.

The steep cliffs of the Niagara Escarpment are 10 to 150 feet tall and vary from bare dolostone to moss and shade covered. Open areas, those lacking a forested canopy, are characterized by open soil with northern white-cedar litter, bare dolostone, and some areas of moss-covered dolostone. The understory is virtually absent and the ground layer is represented by scattered patches of polypody (*Polypodium virginianum*), bulblet fern (*Cystopteris bulbifera*), and small numbers of marginal wood fern (*Dryopteris marginalis*), rattlesnake fern (*Botrychium virginianum*), twinflower (*Linnaea borealis*), Canada mayflower (*Maianthemum canadense*), snowberry (*Symphoricarpos albus*), the invasive helleborine orchid (*Epipactis helleborine*), and near the top of the escarpment, false melic grass (*Schizachne purpurascens*). Shaded areas of the escarpment support a forest dominated by northern white-cedar (many trees in the 4 to 6 inch diameter at breast height [dbh] range) with white birch. The understory and groundlayer are virtually absent and the soil is essentially bare with a patchy covering of dead northern white-cedar needles and twigs. The few groundlayer species that may be present are wild columbine (*Aquilegia canadensis*), hairy rock-cress (*Arabis hirsuta*), Dewey's sedge (*Carex deweyana*), bittersweet nightshade, and bristle-leaf sedge (*Carex eburnea*).

Below the escarpment, the talus slope is characterized by a canopy of northern white-cedar and white birch with balsam fir and basswood, as associates. In canopy openings mountain maple (*Acer spicatum*) is common, with round-leaved dogwood (*Cornus rugosa*), red-berried elder (*Sambucus pubens*), and prickly currant (*Ribes lacustre*). Bulblet fern is abundant on the talus in many areas, with marginal wood fern, wild columbine, sweet-scented bedstraw (*Galium triflorum*), rattlesnake fern, and hairy rock-cress.



Talus slope, dominated by fragile fern, beneath the Niagara Escarpment in Peninsula State Park.  
Photo by Gary Fewless.

The forests of the cuesta are generally characterized as Northern Mesic Forests. The conditions of these forests vary from young to mature stands and generally have a diverse canopy of sugar maple, American beech, hemlock, red oak, and white birch. In some forests, standing dead trees and coarse woody debris provide habitat for animals and substrate for tree seedlings. Canadian yew, along with other shrubs and saplings, has been an important component of many of these stands in the past, but its presence has decreased due to high levels deer herbivory.

Within the forests on the cuesta are Forested Seeps and small outcrops of Niagara dolostone. Forested Seeps are rare on the Door Peninsula due to the generally shallow soil. At Rock Island State Park, Forested Seeps are found within a mature Northern Mesic Forest and are dominated by ostrich fern (*Matteuccia struthiopteris*); wild leek (*Allium tricoccum*) is also common. Small outcrops of Niagara dolostone found within the forests are often less than five feet tall and generally irregular and discontinuous, sometimes appearing more like a linear series of separate boulders rather than the Niagara Escarpment.

## Rare Species and High Quality Natural Communities of the Door County State Parks Planning Group

Numerous rare species and high-quality examples of native communities have been documented on the State Parks Planning Group properties. Table 1 shows the rare species and high-quality natural communities currently stored in the NHI Database. Listing status based on July 2010.

See Appendix C for summary descriptions for the species and natural communities that occur on the DPPG.

Table 1. Documented rare species and high-quality natural communities for the Door County State Parks Planning Group. Under Property, dates indicate the most recent documented observation. More than one element occurrence of a particular species or natural community may be at each property. For an explanation of state and global ranks, as well as state status, see Appendix D. Species with a "W" under Tracked by NHI are "Watch List" species; data collected for these species are not currently stored in the NHI database. For a table of specific property observations, see Appendix F.

Common Name	Scientific Name	Last Year Observed	State Rank	Global Rank	State Status	Federal Status	SGCN	Tracked by NHI
<b>Animal</b>								
American Woodcock	<i>Scolopax minor</i>	2010	S4B	G5	SC/M		Y	W
Appalachian Pillar	<i>Cochlicopa morseana</i>	1997	S2	G5	SC/N		Y	Y
Bald Eagle	<i>Haliaeetus leucocephalus</i>	2003	S4B,S 2N	G5	SC/P		Y	Y
Beach-dune Tiger Beetle	<i>Cicindela hirticollis rhodensis</i>	1999	S2	G5T4	SC/N		Y	Y
Black Striate	<i>Striatura ferrea</i>	1997	S2	G5	SC/N		Y	Y
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	2009	S4B	G5	SC/M		Y	W
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>	2006 <sup>1</sup>	S3B	G5	SC/M		Y	Y
Blue-winged Warbler	<i>Vermivora pinus</i>	2009	S4B	G5	SC/M		Y	W
Bobolink	<i>Dolichonyx oryzivorus</i>	2009	S4B	G5	SC/M		Y	W
Boreal Top	<i>Zoogenetes harpa</i>	1997	S1	G5	SC/N		Y	Y
Brilliant Granule	<i>Guppya sterkii</i>	1997	S2S3	G5	SC/N		Y	Y
Canada Warbler	<i>Wilsonia canadensis</i>	2008	S3B	G5	SC/M		Y	Y
Cape May Warbler	<i>Dendroica tigrina</i>	1999	S3B	G5	SC/M			Y
Cherrystone Drop	<i>Hendersonia occulta</i>	2007	S3	G4	THR		Y	Y
Clear-winged Grasshopper	<i>Camnula pellucida</i>	2008	S3?	G5	SC/N		Y	Y
Dentate Supercoil	<i>Paravitrea multidentata</i>	1998	S2S3	G5	SC/N		Y	Y
Eastern Ribbonsnake	<i>Thamnophis sauritus</i>	2008	S1	G5	END		Y	Y
Field Sparrow	<i>Spizella pusilla</i>	2009	S4B	G5	SC/M		Y	W
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	1990	S4B	G5	SC/M		Y	W
Iowa Pleistocene Vertigo	<i>Vertigo sp. 2</i>	1998	S1S2	G3Q	SC/N		Y	Y
Lake Huron Locust	<i>Trimerotropis huroniana</i>	2008	S1	G2G3	END		Y	Y
Least Flycatcher	<i>Empidonax minimus</i>	2000	S4B	G5	SC/M		Y	W
Merlin	<i>Falco columbarius</i>	2008	S3BS2 N	G5	SC/M			W

<sup>1</sup> More information is needed on this occurrence before it is mapped in the NHI database.

Common Name	Scientific Name	Last Year Observed	State Rank	Global Rank	State Status	Federal Status	SGCN	Tracked by NHI
Midwest Pleistocene Vertigo	<i>Vertigo hubrichti</i>	1998	S1	G3	END		Y	Y
Mudpuppy	<i>Necturus maculosus</i>	2008 <sup>1</sup>	S3S4	G5	SC		Y	Y
Mystery Vertigo	<i>Vertigo paradoxa</i>	1997	S1	G4G5Q	SC/N		Y	Y
Northern Cricket Frog	<i>Acris crepitans</i>	1983	S1	G5	END		Y	Y
Northern Goshawk	<i>Accipiter gentilis</i>	2004	S2B,S 2N	G5	SC/M		Y	Y
Northern Ring-necked Snake	<i>Diadophis punctatus edwardsii</i>	2009 <sup>1</sup>	S3?	G5T5	SC/H			Y
Phyllira Tiger Moth	<i>Grammia phyllira</i>	1991	S2	G4	SC/N		Y	Y
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	2007	S3B	G5	SC/M		Y	W
Red-shouldered Hawk	<i>Buteo lineatus</i>	2008	S3S4B ,S1N	G5	THR		Y	Y
Sculpted Glyph	<i>Glyphyalinia rhoadsi</i>	1997	S2	G5	SC/N		Y	Y
Veery	<i>Catharus fuscescens</i>	2000	S4B	G5	SC/M		Y	W
Willow Flycatcher	<i>Empidonax traillii</i>	1978	S4B	G5	SC/M		Y	W
Wood Thrush	<i>Hylocichla mustelina</i>	2007	S4B	G5	SC/M		Y	W

#### Plant

American Sea-rocket	<i>Cakile lacustris</i>	1989	S3	G5	SC			Y
Autumn Coral-root	<i>Corallorhiza odontorhiza</i>	2006	S3	G5	SC			Y
Bird's-eye Primrose	<i>Primula mistassinica</i>	2009	S3	G5	SC			Y
Broad-leaf Sedge	<i>Carex platyphylla</i>	2008	S2	G5	SC			Y
Canadian Yew	<i>Taxus canadensis</i>	2008	S4	G5	SC			W
Chilean Sweet Cicely	<i>Osmorhiza chilensis</i>	1999	S3	G5	SC			Y
Climbing Fumitory	<i>Adlumia fungosa</i>	2008	S2	G4	SC			Y
Common Bog Arrow-grass	<i>Triglochin maritima</i>	2008	S3	G5	SC			Y
Crawe Sedge	<i>Carex crawei</i>	2005 <sup>1</sup>	S3	G5	SC			Y
Crinkled Hairgrass	<i>Deschampsia flexuosa</i>	2000	S3	G5	SC			Y
Drooping Sedge	<i>Carex prasina</i>	1999	S3	G4	THR			Y
Dune Goldenrod	<i>Solidago simplex</i> var. <i>gillmanii</i>	2000	S2	G5T3?	THR			Y
Dune Thistle	<i>Cirsium pitcheri</i>	2009	S2	G3	THR	LT		Y
Dwarf Lake Iris	<i>Iris lacustris</i>	2009	S3	G3	THR	LT		Y
Elk Sedge	<i>Carex garberi</i>	2005	S2	G5	THR			Y
Few-flower Spikerush	<i>Eleocharis quinqueflora</i>	2008	S2	G5	SC			Y
Giant Pinedrops	<i>Pterospora andromedea</i>	1999	S1	G5	END			Y
Handsome Sedge	<i>Carex formosa</i>	2000	S2	G4	THR			Y
Hooker's orchid	<i>Platanthera hookeri</i>	Unk. <sup>1</sup>	S2S3	G4	SC			Y
Lake Huron Tansy	<i>Tanacetum huronense</i>	1979	S1	G5T4T5	END			Y
Large Roundleaf Orchid	<i>Platanthera orbiculata</i>	2000	S3	G5	SC			Y
Laurentian Bladder Fern	<i>Cystopteris laurentiana</i>	2006 <sup>1</sup>	S2	G3	SC			Y
Lesser Fringed Gentian	<i>Gentianopsis procera</i>	2009	S3	G5	SC			Y
Long-spur Violet	<i>Viola rostrata</i>	2008	S2S3	G5	SC			Y
Low Calamint	<i>Calamintha arkansana</i>	2000	S2	G5	SC			Y
Maidenhair Spleenwort	<i>Asplenium trichomanes</i>	2008	S3	G5	SC			Y
Mingan's Moonwort	<i>Botrychium minganense</i>	1998	S2	G4	SC			Y
Northern Yellow Lady's-	<i>Cypripedium</i>	2006 <sup>1</sup>	S3	G5T4Q	SC			Y

<sup>1</sup> More information is needed on this occurrence before it is mapped in the NHI database.

Common Name	Scientific Name	Last Year Observed	State Rank	Global Rank	State Status	Federal Status	SGCN	Tracked by NHI
slipper	<i>parviflorum</i> var. <i>makasin</i>							
Ohio Goldenrod	<i>Solidago ohioensis</i>	1998	S3	G4	SC			Y
One-flowered Broomrape	<i>Orobanche uniflora</i>	1986	S3	G5	SC			Y
Rock Whitlow-grass	<i>Draba arabisans</i>	2008	S2	G4	SC			Y
Rugulose Grape-fern	<i>Botrychium rugulosum</i>	1978	S3	G3	SC			Y
Sand Reedgrass	<i>Calamovilfa longifolia</i> var. <i>magna</i>	2000	S2	G5T3T 5	THR			Y
Seaside Spurge	<i>Euphorbia polygonifolia</i>	2000	S2	G5?	SC			Y
Showy Lady's-slipper	<i>Cypripedium reginae</i>	2008	S3	G4	SC			Y
Slim-stem Small-reedgrass	<i>Calamagrostis stricta</i>	1977	S3	G5	SC			Y
Small-flower Grass-of-parnassus	<i>Parnassia parviflora</i>	2004 <sup>1</sup>	S1	G4	END			Y
Spreading Woodfern	<i>Dryopteris expansa</i>	1997	S2	G5	SC			Y
Striped Maple	<i>Acer pensylvanicum</i>	1998	S1	G5	SC			Y
Thickspike	<i>Elymus lanceolatus</i> ssp. <i>psammophilus</i>	2000	S2	G5T3	THR			Y
Tufted Hairgrass	<i>Deschampsia cespitosa</i>	2000	S2	G5	SC			Y
Variiegated Horsetail	<i>Equisetum variegatum</i>	2000	S3	G5	SC			Y
Western Fescue	<i>Festuca occidentalis</i>	2008	S1	G5	THR			Y
White Camas	<i>Zigadenus elegans</i> var. <i>glaucus</i>	2009	S2S3	G5T4T 5	SC			Y

#### Natural Community

Boreal Forest		2008	S2	G3?	NA			Y
Forested Seep		2008	S2	GNR	NA			Y
Great Lakes Alkaline Rockshore		2008	S2	G3	NA			Y
Great Lakes Beach		2008	S2	G3	NA			Y
Great Lakes Dune		2008	S2	G3	NA			Y
Moist Cliff		2008	S4	GNR	NA			Y
Northern Dry-mesic Forest		2007	S3	G4	NA			Y
Northern Mesic Forest		2008	S4	G4	NA			Y
Northern Sedge Meadow		1983	S3	G4	NA			Y
Northern Wet-mesic Forest		2000	S3S4	G3?	NA			Y
Southern Mesic Forest		1997	S3	G3?	NA			Y
Southern Sedge Meadow		2008	S3	G4?	NA			Y

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

### Deer Herbivory

Herbivory by white-tailed deer (*Odocoileus virginianus*) has been identified as a major disturbances factor contributing to ecological simplification of Wisconsin's forests (Wisconsin Council on Forestry). Ecological simplification can be seen in the change in understory species composition, with the density of native herbaceous species declining and non-native plants and grasses and sedges increasing, as well as simplification of overstory composition, with the increase in American beech saplings and the decline of sugar maple, hemlock, yellow birch, and northern white-cedar saplings. Rooney et al. (2004) found that in surveys of the herbaceous vegetation of natural communities in northern Wisconsin, sites without deer hunting (all state parks in the study), lost 60% of their understory species in the past 50 years, compared with a 16% loss at hunted sites.

Deer herbivory has also been shown to impact songbirds and rare plant abundance and frequency. Decreased cover in the shrub and sapling layer caused by deer herbivory has been shown to negatively impact species richness and abundance of songbirds that nest in that layer (deCalesta 1994, McShea and Rappole 2000). Within the DPPG, Canadian yew was once an important component of the forested natural communities. Currently, this preferred forage species of deer is only found on cliffs and other inaccessible locations.

### Invasive Species

#### Widespread Invaders

Non-native invasive species thrive in new areas because they establish quickly, tolerate a wide range of conditions, are easily dispersed, and are no longer limited by the diseases, predators, and competitors that kept their populations in check in their native range. As a result, the invasive pests kill native plants and the invasive plants out-compete native plants by monopolizing light, water, and nutrients. In situations where invasive plants become dominant, they may even alter ecological processes by limiting the use of prescribed fire, modifying hydrology, and stabilizing naturally shifting dunes and beaches. In addition to the threats on native communities, invasive species negatively impact forestry (by reducing tree regeneration, growth and longevity), recreation (by degrading fish and wildlife habitat and limiting access), agriculture, and human health.

Non-native invasive species are numerous and widespread on the Door Peninsula (Table 2). Table 2 lists non-native invasive species that are found on the DPPG and those that are not known on DPPG sites, but are potential threats to the habitats of the DPPG. Table 2 does not include non-native plants that are not currently known to be invasive.

Invasive plant species that invade relatively high-quality areas are the most serious threat to biodiversity. Within the DPPG these species are: garlic mustard (*Alliaria petiolata*), common reed grass, common hound's-tongue (*Cynoglossum officinale*), garden forget-me-not (*Myosotis sylvatica*), spotted knapweed, yellow sedum, and glossy buckthorn. In 2006, a surveyor noted that within the mesic forests of Peninsula State Park, the herbaceous understory is surprisingly bare, with only garlic mustard and garden forget-me-not present. Garden forget-me-not was noted to be so abundant that from a distance, the blue flowers give the appearance of a pond within the forest.

Table 2. Widespread non-native invasive species of the Door Peninsula.

Common Name	Latin Name	Type	Upland Habitats		Wetland Habitats		Aquatic
			Open	Wooded	Open	Wooded	
autumn-olive	<i>Elaeagnus umbellata</i>	Plant	X				
birdsfoot trefoil	<i>Lotus corniculatus</i>	Plant	X				
Burnett saxifrage	<i>Pimpinella saxifraga</i>	Plant	X				
Canada thistle	<i>Cirsium arvense</i>	Plant	X				
common buckthorn	<i>Rhamnus cathartica</i>	Plant	X	X	X	X	
common hound's-tongue	<i>Cynoglossum officinale</i>	Plant	X	X			
common reed	<i>Phragmites australis</i>	Plant			X		
common teasel	<i>Dipsacus sylvestris</i>	Plant	X		X		
Cypress spurge	<i>Euphorbia cyparissias</i>	Plant	X				
dame's rocket	<i>Hesperis matronalis</i>	Plant		X		X	
exotic bush honeysuckles	<i>Lonicera</i> spp.	Plant	X	X			
garden forget-me-not	<i>Myosotis sylvatica</i>	Plant	X	X			
garlic mustard	<i>Alliaria petiolata</i>	Plant		X		X	
glossy buckthorn	<i>Rhamnus frangula</i>	Plant	X	X	X	X	
gypsy moth	<i>Lymantria dispar</i>	Animal		X		X	
helleborine orchid	<i>Epipactis helleborine</i>	Plant		X			
Japanese barberry	<i>Berberis thunbergii</i>	Plant		X			
leafy spurge	<i>Euphorbia esula</i>	Plant	X				
narrow-leaved cattail	<i>Typha angustifolia</i>	Plant			X		
oak wilt	<i>Ceratocystis fagacearum</i>	Fungus		X		X	
ox-eye daisy	<i>Leucanthemum vulgare</i>	Plant	X				
orange hawkweed	<i>Hieracium aurantiacum</i>	Plant	X				
purple loosestrife	<i>Lythrum salicaria</i>	Plant			X		
quagga mussel	<i>Dreissena rostriformis bugensis</i>	Animal					X
queen Anne's lace	<i>Daucus carota</i>	Plant	X	X			
reed canary grass	<i>Phalaris arundinacea</i>	Plant			X	X	
sheep sorrel	<i>Rumex acetosella</i>	Plant	X				
smooth brome	<i>Bromus inermis</i>	Plant	X				
spotted knapweed	<i>Centaurea biebersteinii</i>	Plant	X				
wayfaring-tree	<i>Viburnum lantana</i>	Plant	X	X			
wild parsnip	<i>Pastinaca sativa</i>	Plant	X		X		
yellow and white sweet clover	<i>Melilotus officinalis</i> and <i>M. alba</i>	Plant	X				
yellow sedum	<i>Sedum acre</i>	Plant	X				
zebra mussels	<i>Dreissena polymorpha</i>	Animal					X

\*Based on working knowledge of contributors to this report, plus maps and information on the WDNR website.

The high recreational use of the DPPG has contributed to the establishment and spread of invasive species. Campgrounds, common use areas, and trails are typical areas where invasive species become established. Without control, the populations move away from these areas into higher quality areas. Invasive species can also be established and spread through management and maintenance activities such as timber management and mowing and by white-tailed deer. Monitoring and control is essential to removing new infestations and infestations that are already established.

### New or Not Widespread Invaders

A number of invasive species are new or not widespread within the Door Peninsula (Table 3). These species present an opportunity for early detection and rapid response. In addition to the most serious invasive species threats listed above, species with small population sizes could be considered management priorities (Boos et al. 2010).

Table 3. New or not widespread non-native invasive species of the Door Peninsula.

Common Name	Latin Name	Type	Upland Habitats		Wetland Habitats		Aquatic
			Open	Wooded	Open	Wooded	
a fungus [associated with beech bark disease]	<i>Nectria coccinea</i> var. <i>faginata</i> .	Fungus		X			
baby's breath	<i>Gypsophila paniculata</i>	Plant	X				
beech scale	<i>Cryptococcus fagisuga</i>	Animal		X			
black swallowwort	<i>Vincetoxicum nigrum</i>	Plant	X	X			
European marsh thistle	<i>Cirsium palustre</i>	Plant			X		
Japanese hedge parsley	<i>Torilis japonica</i>	Plant		X			
Japanese knotweed	<i>Polygonum cuspidatum</i>	Plant	X	X	X	X	
lyme grass	<i>Leymus arenarius</i>	Plant	X				
water speedwell	<i>Veronica anagallis-aquatica</i>		X		X		

*\*Based on working knowledge of contributors to this report, plus maps and information on the WDNR website.*

### Beech Bark Disease

Beech bark disease, discovered in Door County in late 2009, is a major threat to American beech trees and the wildlife that depend on them. Beech bark disease is the result of an interaction between an insect native to Europe and a fungus. The disease results in a high mortality rate for American beech trees and can change the forest structure and negatively impact species that depend on the nut crop for food or trees for habitat (WDNR 2008). American beech trees are not a preferred species for white-tailed deer browse and thus have become a major component of the sapling layer of many stands in the DPPG.

### Emerald Ash Borer

The emerald ash borer (*Agrilus planipennis*), an invasive, wood-boring beetle that attacks ash trees, was positively identified for the first time in Wisconsin in 2008 and is now found in 11 counties (as of July 2010). The beetle attacks all species of ash (*Fraxinus* spp.) in Wisconsin and the risk to forests is high with models predicting that a healthy forest will lose 98% of its ash trees in 6 years (<http://www.emeraldashborer.wi.gov>). Although not documented in Door County, the potential for introduction is high due to the large numbers of visitors to state parks and their potential to transport the beetle on firewood and that it has been found in nearby counties.

### **High Water Levels and Recreational Beach Use**

Many of the plant populations found along the beaches of the DPPG are subject to strong variability in their population size, due to the fluctuation of Lake Michigan's water level. When water levels are high,

the area of beach is dramatically reduced, compressing available habitat and resulting in very small plant population sizes. During this period, recreational activities on the beaches are also restricted to a smaller area and therefore become more concentrated or intensified on the remaining beach area. The impacts of this concentrated recreational use can pose a critical problem for plant populations. Such periods may constitute a “bottleneck” period for the plants in which species may become extirpated from the area. The area of beach that is flooded during the period of high water is very dynamic with alternating erosion and deposition of sand and apparently does not allow for preservation of a large seed bank as may be found in many other natural communities. Shoreline development reduces the area of similar habitats from which new propagules can be imported and may increase the distance over which propagules would be required to travel. Thus, plant species extirpated during periods of high water levels may have difficulty returning when conditions become more favorable (Fewless 2002a).

### **Forest Fragmentation**

Interpretation of historic vegetation indicates that the landscape surrounding the DPPG contained an extensive area of northern hardwood forest, which included American beech and hemlock as components (WDNR In prep.). The interior of the Door Peninsula, once dominated by forests, has been mostly converted to agricultural or residential uses. Upland forested remnants outside of the DPPG are now mostly woodlots that are often isolated and altered by a variety of uses such as logging and grazing. The largest forest remnants in the interior of the Door Peninsula are mostly wet, consisting of conifer swamps or hardwood swamps.

The result of the fragmentation of the forests in the DPPG landscape is an increase in forest edge and a lack of habitat for forest interior species. The forest edge can be an “ecological trap” for ground-nesting bird species. Flaspohler, et al. (1999) showed that the zone around a cleared area in a forest can extend up to 300 meters into the intact forest. Within this zone, ground-nesting bird nest density increases, but the nest success decreases. The decrease in nest success could be due to the increase in edge-abundant predators such as raccoons, skunks, and crows; nest parasitizing cowbirds; and competition from edge-adapted species.



Aerial photo of Eagle Bluff, an outcrop of the Niagara Escarpment, along Green Bay. Peninsula State Park, Door County. Photo by Eric Epstein.

# Management Considerations and Opportunities for Biodiversity Conservation for the Door County State Parks Planning Group

## Niagara Escarpment

The Niagara Escarpment is a globally important feature that provides habitat to rare species that have specialized habitat requirements. Research has shown that although natural communities associated with the Niagara Escarpment are impacted by numerous natural disturbance events, many aspects of them have essentially remained unchanged for thousands of years. The talus slope, an area of large boulders at the base of the cliff face of the Niagara Escarpment, is believed to have been formed in the immediate post-glacial environment (Larson et al. 2000). This area of talus often supports lush herbaceous growth and, due in part to the lack of deer browse relative to other areas, contains the most abundant cover of shrubs and saplings. It is in these areas that birds such as Winter Wren (*Troglodytes troglodytes*) and Canada Warbler (special concern) are found.

Surveys along the Niagara Escarpment in Southern Ontario discovered the oldest known forest ecosystem in eastern North America, with northern white-cedar trees up to 1032 years old growing in dolostone crevices (Larson and Kelly 1991). A northern white-cedar was aged in Peninsula State Park to be 507 years old. Kelly and Larson (1997) showed that widespread disturbance events are rare in these forests and that the current uneven-aged forest structure is in a steady-state condition. Thus, these forests offer many opportunities to study climate change on a forest that changes very little along the entire Niagara Escarpment.

Because the Niagara Escarpment provides an environment buffered from natural disturbances, unique geology and cool microclimates, it supports numerous rare species. With much of the Niagara Escarpment located on private lands, protection of this unique resource and the important habitat it supports is critical. Impacts from human activities are many and difficult to mitigate. Roads and trails above the escarpment face can cause soil compaction that leads to siltation and erosion. Removal of trees above and below the escarpment can change the moisture levels of the talus and cliff face and cause mortality of species with very small ranges and specialized habitat requirements. Off-trail hiking can trample plants and cause the introduction and spread of invasive plant species.

## Rare snails

Rare terrestrial snails (terrestrial gastropods), some of which occur in few or no other locations in the world and date back to the last Ice Age, are found along the Niagara Escarpment (WDNR 2002). These snails were widespread in the Pleistocene and are now restricted in the Midwest to cool moist microhabitats found primarily along in the Niagara Escarpment and in the Driftless Area. Of the approximately 100 species of land snail in Wisconsin, almost one-third are tracked by NHI and seven are globally rare to globally imperiled (WDNR 2002). About 20% of Wisconsin's land snail fauna are imperiled to critically imperiled in the state and three species are currently protected as state endangered or threatened. Most are species of cliffs with a few instead using woodlands or wetlands. All of these rare snails are very small, with shell diameters of only a few millimeters. Rare terrestrial snails found within the DPPG are listed in Table 4.

Table 4. Rare terrestrial snails of the DPPG

Common Name	Scientific Name	State Rank	Global Rank	State Status
Appalachian Pillar	<i>Cochlicopa morseana</i>	S2	G5	SC/N
Black Striate	<i>Striatura ferrea</i>	S2	G5	SC/N
Boreal Top	<i>Zoogenetes harpa</i>	S1	G5	SC/N
Brilliant Granule	<i>Guppya sterkii</i>	S2S3	G5	SC/N
Cherrystone Drop	<i>Hendersonia occulta</i>	S3	G4	THR
Dentate Supercoil	<i>Paravitrea multidentata</i>	S2S3	G5	SC/N
Iowa Pleistocene Vertigo	<i>Vertigo</i> sp.	S1S2	G3Q	SC/N
Midwest Pleistocene Vertigo	<i>Vertigo hubrichti</i>	S1	G3	END
Mystery Vertigo	<i>Vertigo paradoxa</i>	S1	G4G5Q	SC/N
Sculpted Glyph	<i>Glyphyalinia rhoadsi</i>	S2	G5	SC/N

In general, terrestrial snails have restricted ranges, are limited by their dispersal ability, and their presence is circumscribed by the biotic (e.g., vegetation) and abiotic (e.g., geology) features. Consequently, they are very vulnerable to management activities that alter temperature, moisture, and/or food supplies in populated sites. Impacts from activities that disturb the soil or open the forest canopy can create warmer and drier conditions due to changes in shade, increased interstitial sedimentation, introduction of invasive plant species, and vent compaction. Talus slopes, which are found along the Niagara Escarpment in Door County, contain vents which carry cold air, moisture, and nutrients that some snail species are dependant on. These vents, located throughout the slope and on bedrock outcrops, are vulnerable to compaction and filling-in.

Many of the properties within the study area provide habitat for rare terrestrial snails. The best opportunities for conserving rare terrestrial snails on the DPPG, based on the current level of knowledge of existing populations, are at Rock Island State Park and Newport State Park. Given the habitat suitability of the Niagara Escarpment and its presence on a majority of the study area, management opportunities exist to protect these important species and their habitat.

### Migratory Bird Stopover Site

The Great Lakes shoreline plays a crucial role for millions of migrating birds (Grveles and Matteson 2008). Three sites (Table 5) within the DPPG were determined to be important Migratory Bird Stopover Sites by the ongoing Wisconsin DNR's Strategy for Protecting Bird Migration Stopover Habitats in the Western Great Lakes project (Grveles and Matteson 2008).

Table 5. Spring and fall migratory bird use at important sites within the DPPG

<b>Newport State Park / Europe Lake</b>		
	Spring	Fall
Estimated number of waterfowl	1,000-9,999	1,000-9,999
Estimated number of diurnal raptors	51-100	51-100
Estimated number of nocturnal raptors	Unknown	Unknown
Estimated number of shorebirds	101-999	101-999
Estimated number of waterbirds	101-999	101-999
Estimated number of neo-tropical landbirds	1,000-9,999	1,000-9,999

<b>Peninsula State Park</b>		
	Spring	Fall
Estimated number of waterfowl	101-999	101-999
Estimated number of diurnal raptors	101-999	101-999
Estimated number of nocturnal raptors	51-100	51-100
Estimated number of shorebirds	51-100	51-100
Estimated number of waterbirds	51-100	51-100
Estimated number of neo-tropical landbirds	1,000-9,999	1,000-9,999

<b>Potawatomi State Park / Sawyer Harbor</b>		
	Spring	Fall
Estimated number of waterfowl	101-999	101-999
Estimated number of diurnal raptors	20-50	20-50
Estimated number of nocturnal raptors	Unknown	Unknown
Estimated number of shorebirds	51-100	51-100
Estimated number of waterbirds	101-999	101-999
Estimated number of neo-tropical landbirds	1,000-9,999	1,000-9,999

The Newport State Park / Europe Lake and Potawatomi State Park / Sawyer Harbor sites were determined (Grveles and Matteson 2008) to be vital migratory bird stopover sites because they provide habitat where birds can rest and find shelter and water. This type of site is often adjacent to areas that provide little to no stopover habitat (Duncan 2002). Peninsula State Park was determined (Grveles and Matteson 2008) to be an important migratory bird stopover site providing all of the needed resources (food, water, shelter) for birds to gain significant mass during migration (Duncan 2002).

Many factors contribute to the important role Door County and the DPPG play in the migration of landbirds. Door County, being an isolated geographic feature, provides some of the first available habitat to landbirds crossing Lake Michigan. Habitats of the Door County shoreline, such as Alder Thickets and

mature forests on stabilized dunes and beach ridges, are also very important stopover sites for migrating landbirds (Grveles and Matteson 2008).

Threats to Migratory Bird Stopover Sites and migratory birds include habitat destruction and habitat alteration (Duncan 2002). Habitat alteration includes the simplification of forest structure or the alteration of forest composition, including invasive species that may change the kinds, quantity, and quality of food resources (Duncan 2002).

### **Critical Habitat for Hine's Emerald Dragonfly**

The Hine's emerald dragonfly (*Somatochlora hineana*) is a federal and state endangered dragonfly that has been found in small, cool, calcareous marshy streams. Although a breeding population of the Hine's emerald dragonfly has not yet been located in the DPPG, Door County plays an important role in the conservation of this species with a majority of the known populations occurring there. Critical Habitat for Hine's emerald dragonfly has been designated within a small area of Newport State Park (USFWS unk. date). Critical Habitat is a tool within the Endangered Species Act that identifies areas that are important to the conservation and recovery of a listed species. Critical Habitat is defined by the US Fish and Wildlife Service as a specific geographic area(s) that contains features essential for the conservation of a threatened and endangered species and that may require special management and protection.

### **Great Lakes Natural Communities and Rare Plants**

Great Lakes Alkaline Rockshore, geographically limited in Wisconsin to Door County, supports rare plants of restricted distribution. These include beach specialists such as elk sedge, the Great Lakes endemic dwarf lake iris, disjunct species such as birds-eye primrose, and a group of species that also occur in the calcareous fens and alkaline prairies of southeastern Wisconsin such as lesser fringed gentian and Ohio goldenrod (*Solidago ohioensis*).

Great Lakes Beaches and Dunes and the Great Lakes Ridge and Swale natural community complex provide critical habitat for a number of rare species, including plants endemic to Great Lakes shorelines such as dune thistle and dune goldenrod. The state endangered Lake Huron tansy, an inhabitant of open dunes and open rocky bluffs, was once found at Rock Island State Park but has not been seen since 1979. Until this plant was located at another site in 2007, it was believed to be extirpated from the state. The state threatened species sand reedgrass inhabits dunes, beach ridges, and sometimes the upper beach, along with seaside spurge, thickspike, and American sea rocket.

Boreal Forests support populations of western fescue. Western fescue, a state threatened plant, is restricted in Wisconsin to the northern half of the Door Peninsula. Also found under conifer-dominated forests located on dolostone are the state special concern species rock whitlow-grass and climbing fumitory. Forested habitats of the DPPG also support the state endangered giant pine-drops, the state threatened species handsome sedge, and the state special concern species broad-leaf sedge, Chilean sweet cicely, and long-spur violet. In 1997, an addition to Wisconsin's flora, striped maple, was discovered in a forested area in the DPPG. This is still the only occurrence for this species in the state. Newport State Park, Peninsula State Park, and Rock Island State Park offer the best opportunities to conserve Boreal Forests and associated rare species.

### **Old Growth / Older Forests**

The WDNR has identified a need to conserve, protect, and manage old-growth forests (WDNR 2004, WDNR 1995), and old-growth management is a component of Forest Certification. Old-growth forests can support high densities of certain forest herbs, as well as certain assemblages of birds and other animals that are scarce in the state. Old-growth forest management is one important facet of providing the diverse range of habitats needed for sustainable forest management (WDNR In Prep. b).

Old growth northern hardwood forests, including sugar maple, American beech, and basswood forests were abundant in the DPPG landscape historically. Many of these forests have been converted to other uses, including agriculture and residential, or altered by grazing and logging. Within the remaining forests in the landscape, upland older forests with structural attributes such as the presence of trees with a range of diameter sizes including very large sizes, large diameter coarse woody debris, abundant large dead snags and den trees, and pit-and-mound micro-topography are rare.

Many of the forests, although in younger age classes than historically, retain similar canopy composition to pre-European-settlement times. The DPPG has the opportunity to promote old-growth characteristics that maintain the structure, composition, and functional values needed for the unique assemblage of species characteristic of older forests. The DPPG represents some of the very few opportunities for developing and maintaining old growth forests in the Northern Lake Michigan Coastal Ecological Landscape. In addition to opportunities for old growth forests being extremely scarce in this landscape, the combination of a representation of conifers (e.g., white pine, hemlock, northern white-cedar, and others) and an environmental setting that includes the Lake Michigan shoreline and the Niagara Escarpment makes this opportunity unique.

### **Bat Conservation**

The caves and forests of the Niagara Escarpment and the DPPG provide critical migrating and breeding habitat for bats. Neda Mine, at the southern end of the Niagara Escarpment, is the largest known bat hibernacula in the Midwest. Small caves within the DPPG are also used as breeding sites and hibernacula for both over-wintering bats and migrating bats. Very limited surveys have been done on the bat populations of the DPPG. Previous surveys have indicated that little brown myotis (*Myotis lucifugus*) and northern long-eared myotis (*Myotis septentrionalis*) are in the DPPG. These limited surveys were conducted during the fall movement period, where mating and preparation for the upcoming winter occurs. During this time, bats leave their summering grounds to find suitable hibernacula or migrate to warmer regions of the country. The overlap of surveys with fall migration could explain why six of the eight bat species found in Wisconsin were not detected.

Both little brown myotis and northern long-eared myotis have been known to roost in man-made structures, although they prefer old growth forests because of the roosting opportunities that mature trees provide in loose bark and crevices. Northern long-eared myotis have been found foraging within the forest and below canopy, but have also been found foraging along paths, ponds, streams and forest edges. Whereas little brown myotis are usually found foraging close to water. It is recommended that management techniques to promote old growth characteristics be employed to offer roosting, foraging, and commuting habitat for these species.

Hibernacula disturbance, habitat degradation, and wind-turbine mortality are threats that affect all bat species found in Wisconsin. An emerging threat to Wisconsin's bats, White-Nose Syndrome, has been called the "most precipitous wildlife decline in the past century in North America" by Bat Conservation International and has devastated bat populations in the eastern United States in the last four years. As of the writing of this report, how the fungus causing White-Nose Syndrome, *Geomyces destructans*, kills the

bats is unknown, however several hypotheses have been proposed. Due to the emerging threats that face the bat population in Wisconsin and with limited availability of data from this region, more data in the form of surveys (acoustic and roost) are needed to accurately describe the bats that use Door county.

### **Ecological Priorities**

Ecological Priorities identify the natural communities in each Ecological Landscape that are most important to the Species of Greatest Conservation Need. Numerous SGCN are known from the DPPG and they, along with the natural communities they inhabit, represent Ecological Priorities for the Northern Lake Michigan Coastal Ecological Landscape (for more information see <http://dnr.wi.gov/org/land/er/wwap/explore/tool.asp>) (WDNR 2006b).

Appendix B highlights the Ecological Priorities for the DPPG by giving a matrix with the vertebrate SGCN and their associated natural communities for the Northern Lake Michigan Coastal Ecological Landscape. Note that these Ecological Priorities include all of the natural communities that we have determined to provide the best opportunities for management on the DPPG from an ecological / biodiversity perspective.

### **Natural Community Management Opportunities**

The Wisconsin Wildlife Action Plan (WAP) (WDNR 2006b) identifies 33 natural communities for which there are “Major” or “Important” opportunities for restoration or protection in the Northern Lake Michigan Coastal Ecological Landscape. The following seventeen natural communities are present on the DPPG (natural communities with an asterisk are not in the NHI database because they don’t meet element occurrence mapping criteria or more information is needed):

- Boreal Forest
- Dry Cliff\*
- Emergent Marsh\*
- Great Lakes Beach
- Great Lakes Dune
- Great Lakes Ridge and Swale\*
- Interdunal Wetland\*
- Moist Cliff
- Northern Dry-mesic Forest
- Northern Hardwood Swamp\*
- Northern Mesic Forest
- Northern Sedge Meadow
- Northern Wet Forest\*
- Northern Wet-mesic Forest
- Southern Sedge Meadow
- Surrogate Grasslands\*
- Southern Mesic Forest

### **Priority Conservation Actions**

Priority Conservation Actions identified in the Wisconsin Wildlife Action Plan (WDNR 2006b) for the DPPG include:

- Protection of key stretches of the Niagara Escarpment that are important for rare species.
- Protection and management of coastal ridge and swale forest, and the beaches, dunes, and boreal forest in Door County, which are unique to the Great Lakes shoreline.

- Reforestation of marginal lands on the Door Peninsula is desirable to reduce adverse edge effects and accommodate rare area-sensitive animals.
- Forest interior species management is possible in the northern part of the Ecological Landscape.
- Within the interior of this Ecological Landscape there are opportunities for management of large conifer and hardwood swamps.
- Lake Michigan shoreline endemic species require protection of alkaline rock shores, coastal estuaries, boreal forests, and alvar, beach, and dune communities.
- Most of the coastline in this Ecological Landscape is important for migratory birds.
- Protection of islands off the coast of this Ecological Landscape, which are important for colonial nesting birds and are not significantly impacted by deer or human development.
- Colonial waterbird island rookeries occur along the Lake Michigan coast in Green Bay and the Grand Traverse Islands. These rookeries will need protection, monitoring, and management.
- Improving the water quality in lower Green Bay will reduce the negative impacts of pollutants.
- Maintenance of migratory corridors, resting, and feeding areas for migratory birds, including raptors, songbirds, and waterfowl is important throughout the Ecological Landscape.

### **High Conservation Value Forests**

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

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

Based on the current draft criteria for defining HCVFs (Forest Stewardship Council 2009) the best HCVF candidates on the DPPG are represented by the "Primary Sites" described below.

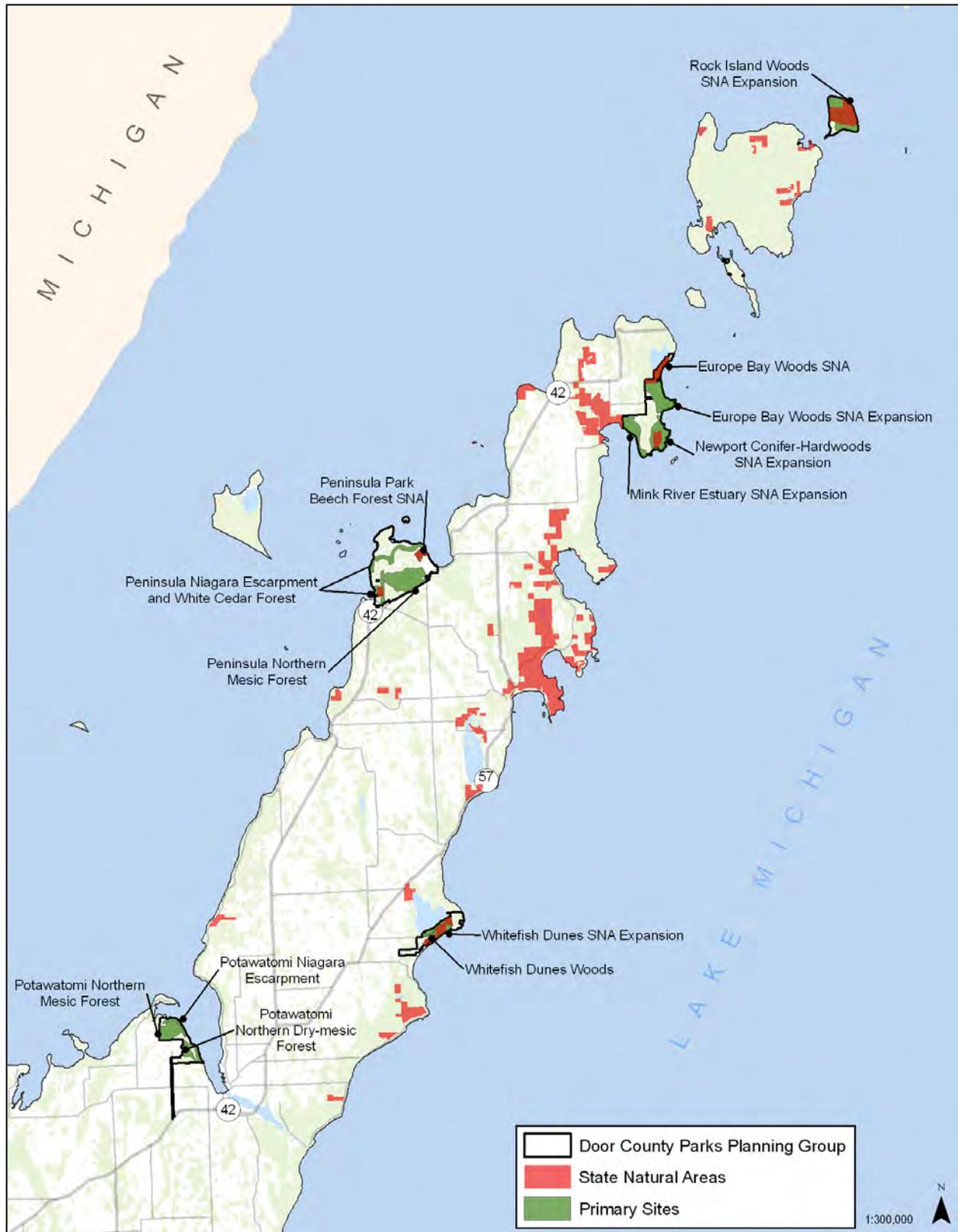
## Primary Sites: Site-specific Opportunities for Biodiversity Conservation

Primary Sites generally encompass the best examples of 1) both rare and representative natural communities and 2) rare species populations that have been documented to date within the DPPG. All Primary Sites of the DPPG (Table 6) can be considered High Conservation Value Forests for the purpose of Forest Certification (WDNR 2009). This report is meant to be considered along with other information when identifying opportunities for various management designations during the master planning process. Descriptions for the State Natural Areas are modified from existing descriptions found on the Wisconsin State Natural Areas Program website (<http://dnr.state.wi.us/org/land/er/sna/>). For detailed descriptions of primary sites, see Appendix E.

Table 6. Primary Sites on the DPPG

Site ID	Site Name
DPPG01	Rock Island Woods
DPPG02	Europe Bay Woods
DPPG03	Newport Woods and Cliffs
DPPG04	Newport Conifer-Hardwoods
DPPG05	Rowley Bay Woods
DPPG06	Peninsula Niagara Escarpment and White Cedar Forest
DPPG07	Peninsula Park Beech Forest
DPPG08	Peninsula Northern Mesic Forest
DPPG09	Whitefish Dunes
DPPG10	Whitefish Dunes Woods
DPPG11	Potawatomi Niagara Escarpment
DPPG12	Potawatomi Northern Mesic Forest
DPPG13	Potawatomi Northern Dry-mesic Forest

**Figure 5**  
 Location of the Door County Parks Planning Group Primary Sites



## Special Management Designations

### State Natural Areas

State Natural Areas are places on the landscape that protect high quality examples of natural communities, rare species populations, significant geological formations, and archeological sites. Designated State Natural Areas within the DPPG consist of Europe Bay Woods, Newport Conifer-Hardwoods, Peninsula Park Beech Forest, Peninsula Park White Cedar Forest, Rock Island Woods, and Whitefish Dunes.

Dedicated State Natural Areas are permanently protected through an Article of Dedication on the property. Within the DPPG, Newport Conifer-Hardwoods SNA is dedicated. Dedicated SNAs differ from designated SNAs because the Article of Dedication can be removed from the property only with the approval of the governor and the legislature. SNAs designated through a designation agreement can be cancelled after a short notice period.

### Wilderness Areas

Newport State Park is Wisconsin's only formally designated wilderness state park.

## Future Needs

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

- The conservation significance of many Escarpment sites as bat roosts and hibernacula is inadequately documented and understood (Anderson et al. 2002).
- Invasive species monitoring and control is essential to managing the biodiversity within the DPPG. Public lands throughout Wisconsin are facing major management problems because of serious infestations of highly invasive species. Some of these species are easily dispersed by humans and vehicles; others are spread by birds, mammals, insects, water, or wind.
- More detailed characterization of Niagara Escarpment associated bedrock communities is needed to better understand the structure, composition, and function of the vegetation. In addition to vascular plants, lichens and mosses will be important groups to study (Anderson et al. 2002).
- Additional breeding and migratory bird surveys are needed at the Important Bird Areas within the DPPG to better document populations of priority species (WDNR 2007).
- Establish permanent Breeding Bird Survey observation points designed to sample all major or otherwise significant habitats on the DPPG and detect population trends over time.
- Surveys are needed to determine if an adult Hine's emerald dragonfly located at Peninsula State Park is part of a local breeding population. Potential Hine's emerald dragonfly habitat has also been located at Whitefish Dunes State Park in a wetland within the ridge and swale complex.
- Rare plant and animal populations should be monitored, along with potential impacts from recreational beach and trail use.
- The discovery of two very rare species within Newport Park in recent years (giant pine-drops and striped maple) suggests that a thorough, systematic botanical survey of Newport State Park would be highly valuable. In addition to broader issues based on knowledge of the flora, it is essential that the existing resources be thoroughly known before any new management is enacted (Fewless 2002a).
- The impacts of climate change on the animals, plants, and natural communities of the DPPG will need to be assessed and adaptation strategies developed.

- Herptile surveys should be conducted on the DPPG.
- An early detection program for invasive species is needed to prevent both common invaders and new threats from becoming established in high quality natural communities and rare species habitat.



Great Lakes Alkaline Rockshore. Photo by Janeen Laatsch.

## Glossary

**baymouth bar lake** – a lake forming behind a bar extending entirely or partially across the mouth of a bay.

**cuesta** - is a ridge formed by gently tilted sedimentary rock strata in which the strata are tilted in the same direction. Cuestas have a steep slope, where the rock layers are exposed on their edges, called an escarpment or, if more steep, a cliff.

**dolostone** – the rock equivalent of the mineral dolomite

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

**element 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.

**escarpment** - a transition zone between different physiogeographic provinces that involves a sharp, steep elevation differential, characterized by a cliff or steep slope. Most commonly, an escarpment is a transition from one series of sedimentary rocks to another series of a different age and composition. When sedimentary beds are tilted and exposed to the surface, erosion and weathering may occur differentially based on the composition. Less resistant rocks will erode faster, retreating until the point they are overlain by more resistant rock. When the dip of the bedding is gentle, a cuesta is formed. Steeper dips (greater than 30-40°) form hogbacks.

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

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

**mapping precision** – the locational accuracy to which an element occurrence is known.

**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.

**Niagara Escarpment** – commonly known as “the Ledge” in Wisconsin is a sickle-shaped ridge with a steep face on one side (an escarpment) and a gentle slope on the other (a cuesta) that begins in south-central Wisconsin, arches east through Michigan and southern Ontario and ends in western New York State.

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

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

**talus** - or scree, is loose rock created by physical weathering that typically lies on steep mountainsides or the base of cliffs.

## Species List

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

Common Name	Scientific Name
<b>Animals</b>	
Canada Warbler	<i>Wilsonia canadensis</i>
dentate supercoil	<i>Paravitrea multidentata</i>
emerald ash borer	<i>Agrilus planipennis</i>
Hine's emerald dragonfly	<i>Somatochlora hineana</i>
Iowa Pleistocene vertigo	<i>Vertigo sp. 2</i>
Least Flycatcher	<i>Empidonax minimus</i>
Midwest Pleistocene vertigo	<i>Vertigo hubrichti</i>
Northern Goshawks	<i>Accipiter gentilis</i>
Red-shouldered Hawks	<i>Buteo lineatus</i>
Veery	<i>Catharus fuscescens</i>
white-tailed deer	<i>Odocoileus virginianus</i>
Winter Wren	<i>Troglodytes troglodytes</i>
<b>Plants</b>	
bearberry	<i>Arctostaphylos uva-ursi</i>
Bell's honeysuckle	<i>Lonicera X bella</i>
big-tooth aspen	<i>Populus grandidentata</i>
bird's-eye primrose	<i>Primula mistassinica</i>
bittersweet nightshade	<i>Solanum dulcamara</i>
black ash	<i>Fraxinus nigra</i>
black spruce	<i>Picea mariana</i>
bladder campion	<i>Silene latifolia</i>
blue cohosh	<i>Caulophyllum thalictroides</i>
blue-bead-lily	<i>Clintonia borealis</i>
blue-joint grass	<i>Calamagrostis canadensis</i>
bottlebrush sedge	<i>Carex hystericina</i>
bracken fern	<i>Pteridium aquilinum</i>
bristle-leaf sedge	<i>Carex eburnea</i>
broad-leaf sedge	<i>Carex platyphylla</i>
bulblet fern	<i>Cystopteris bulbifera</i>
bushy knotweed	<i>Polygonum ramosissimum</i>
butter-and-eggs	<i>Linaria vulgaris</i>
Canada bluegrass	<i>Poa compressa</i>
Canada mayflower	<i>Maianthemum canadense</i>
Canada wild-rye	<i>Elymus canadensis</i>
Canadian yew	<i>Taxus canadensis</i>
Chilean sweet cicely	<i>Osmorhiza chilensis</i>
climbing fumitory	<i>Adlumia fungosa</i>
common boneset	<i>Eupatorium perfoliatum</i>

Common Name	Scientific Name
<b>Plants</b>	
common buckthorn	<i>Rhamnus cathartica</i>
common chickweed	<i>Cerastium fontanum</i>
common daisy	<i>Leucanthemum vulgare</i>
common dandelion	<i>Taraxacum officinale</i>
common hound's-tongue	<i>Cynoglossum officinale</i>
common juniper	<i>Juniperus communis</i>
common milkweed	<i>Asclepias syriaca</i>
common mullein	<i>Verbascum thapsus</i>
common reed grass	<i>Phragmites australis</i>
common scouring rush	<i>Equisetum hyemale</i>
common speedwell	<i>Veronica officinalis</i>
common St. John's-wort	<i>Hypericum perforatum</i>
common yarrow	<i>Achillea millefolium</i>
common yellow-cress	<i>Rorippa palustris</i>
Crawe sedge	<i>Carex crawei</i>
creeping juniper	<i>Juniperus horizontalis</i>
creeping thyme	<i>Thymus praecox subsp. Arcticus</i>
creeping-Charlie	<i>Glechoma hederacea</i>
curly-top knotweed	<i>Polygonum lapathifolium</i>
Dewey's sedge	<i>Carex deweyana</i>
drooping sedge	<i>Carex prasina</i>
dune goldenrod	<i>Solidago simplex var. gillmanii</i>
dwarf lake iris	<i>Iris lacustris</i>
elk sedge	<i>Carex garberi</i>
false melic grass	<i>Schizachne purpurascens</i>
few-flowered spikerush	<i>Eleocharis quinqueflora</i>
field sage-wort	<i>Artemisia campestris</i>
fox sedge	<i>Carex vulpinoidea</i>
fragile fern	<i>Cystopteris fragilis</i>
fringed bindweed	<i>Polygonum cilinode</i>
garden forget-me-not	<i>Myosotis sylvatica</i>
garden valerian	<i>Valeriana officinalis</i>
garlic mustard	<i>Alliaria petiolata</i>
giant pine-drops	<i>Pterospora andromedea</i>
glossy buckthorn	<i>Rhamnus frangula</i>
gout-weed	<i>Aegopodium podagraria</i>
hairy rock-cress	<i>Arabis hirsuta</i>
hairy sedge	<i>Carex hirtifolia</i>
handsome sedge	<i>Carex formosa</i>
helleborine orchid	<i>Epipactis helleborine</i>
hemlock	<i>Tsuga canadensis</i>
Hooker's orchid	<i>Platanthera hookeri</i>

Common Name	Scientific Name
<b>Plants</b>	
ironwood	<i>Ostrya virginiana</i>
Jack-in-the-pulpit	<i>Arisaema triphyllum</i>
Japanese barberry	<i>Berberis thunbergii</i>
Japanese knotweed	<i>Polygonum cuspidatum</i>
jointed rush	<i>Juncus nodosus</i>
Kentucky bluegrass	<i>Poa pratensis</i>
lady fern	<i>Athyrium filix-femina</i>
large-flowered trillium	<i>Trillium grandiflorum</i>
lesser fringed gentian	<i>Gentianopsis procera</i>
long-spur violet	<i>Viola rostrata</i>
low calamint	<i>Calamintha arkansana</i>
marginal wood fern	<i>Dryopteris marginalis</i>
moneywort	<i>Lysimachia nummularia</i>
mountain maple	<i>Acer spicatum</i>
northern white-cedar	<i>Thuja occidentalis</i>
Ohio goldenrod	<i>Solidago ohioensis</i>
orange hawkweed	<i>Hieracium aurantiacum</i>
orchard grass	<i>Dactylis glomerata</i>
ostrich fern	<i>Matteuccia struthiopteris</i>
poison-ivy	<i>Toxicodendron radicans</i>
polypody	<i>Polypodium virginianum</i>
prickly currant	<i>Ribes lacustre</i>
quackgrass	<i>Elytrigia repens</i>
quaking aspen	<i>Populus tremuloides</i>
rabbit-berry	<i>Shepherdia canadensis</i>
rattlesnake fern	<i>Botrychium virginianum</i>
red baneberry	<i>Actaea rubra</i>
red clover	<i>Trifolium pratense</i>
red maple	<i>Acer rubrum</i>
red oak	<i>Quercus rubra</i>
red pine	<i>Pinus resinosa</i>
red-berried elder	<i>Sambucus racemosa</i>
rock whitlow-grass	<i>Draba arabisans</i>
rough-leaved rice grass	<i>Oryzopsis asperifolia</i>
round-leaved dogwood	<i>Cornus rugosa</i>
sand cherry	<i>Prunus pumila</i>
sand cress	<i>Arabis lyrata</i>
sand reedgrass	<i>Calamovilfa longifolia</i> var. <i>magna</i>
saxifrage pink	<i>Petrorhagia saxifraga</i>
seaside spurge	<i>Euphorbia polygonifolia</i>
silver-weed	<i>Argentina anserina</i>
slender cliff brake	<i>Cryptogramma stelleri</i>

Common Name	Scientific Name
<b>Plants</b>	
smooth brome	<i>Bromus inermis</i>
snowberry	<i>Symphoricarpos albus</i>
snow-in-summer	<i>Cerastium tomentosum</i>
spotted knapweed	<i>Centaurea biebersteinii</i>
spreading woodfern	<i>Dryopteris expansa</i>
spring whitlow-grass	<i>Draba verna</i>
spring-beauty	<i>Claytonia virginica</i>
squirrel-corn	<i>Dicentra canadensis</i>
striped maple	<i>Acer pensylvanicum</i>
sugar maple	<i>Acer saccharum</i>
sweet-scented bedstraw	<i>Galium triflorum</i>
tamarack	<i>Larix laricina</i>
thickspike	<i>Elymus lanceolatus</i> ssp. <i>psammophilus</i>
thick-spike wheat grass	<i>Elytrigia dasystachya</i>
tufted hairgrass	<i>Deschampsia cespitosa</i>
twinflower	<i>Linnaea borealis</i>
variegated horsetail	<i>Equisetum variegatum</i>
walking fern	<i>Asplenium rhizophyllum</i>
water speedwell	<i>Veronica anagallis-aquatica</i>
wayfaring-tree	<i>Viburnum lantana</i>
western fescue	<i>Festuca occidentalis</i>
white birch	<i>Betula papyrifera</i>
white camas	<i>Zigadenus elegans</i> var. <i>glaucus</i>
white clover	<i>Trifolium repens</i>
white pine	<i>Pinus strobus</i>
white spruce	<i>Picea glauca</i>
wild columbine	<i>Aquilegia canadensis</i>
wild leek	<i>Allium tricoccum</i>
wild rose	<i>Rosa blanda</i>
wild sarsaparilla	<i>Aralia nudicaulis</i>
willow	<i>Salix</i> sp.
wintergreen	<i>Gaultheria procumbens</i>
yellow birch	<i>Betula alleghaniensis</i>
yellow sedum	<i>Sedum acre</i>
yellow trout-lily	<i>Erythronium americanum</i>

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# Appendix A. Natural Heritage Inventory Overview and General Methodology

The Door County State Parks Planning Group Rapid Ecological Assessment 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 is 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/wlist/](http://dnr.wi.gov/org/land/er/wlist/)).

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 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 Biotics, is a sophisticated relational database management application with both tabular and spatial components.

## Methods of Inventory

The following is a description of standard NHI methods for conducting 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 Biotics. 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.

## Appendix B

### Door County Parks Planning Group Species of Greatest Conservation Need

The following are vertebrate Species of Greatest Conservation Need (SGCN) associated with natural community types that are present on the Door County Parks Planning Group in the Northern Lake Michigan Coastal Ecological Landscape. Only SGCN with a high or moderate probability of occurring in the Northern Lake Michigan Coastal Ecological Landscape are shown. Communities shown here are those that were identified as management opportunities in the Wisconsin Wildlife Action Plan. Letters indicate the degree to which each species is associated with a particular habitat type (S=significant association, M=moderate association, and L=low association). Animal-community combinations shown here that are assigned as either “S” or “M” are also Ecological Priorities, as defined by the Wisconsin Wildlife Action Plan (see [dnr.wi.gov/org/land/er/WWAP/](http://dnr.wi.gov/org/land/er/WWAP/) for more information about these data). Shaded species have been documented on the Door County Parks Planning Group.

Natural communities listed below with an asterisk are not represented by element occurrences in the NHI database because they don’t meet standard criteria or more information is needed.

#### Northern Lake Michigan Coastal Ecological Landscape

	Major									Important						Present		
	Dry Cliff	Emergent Marsh	Great Lakes Beach	Great Lakes Dune	Great Lakes Ridge and Swale	Lake Michigan	Northern Mesic Forest	Northern Sedge Meadow	Northern Wet-mesic Forest	Boreal Forest	Interdunal Wetland	Moist Cliff	Northern Dry-mesic Forest	Northern Hardwood Swamp	Northern Wet Forest	Southern Sedge Meadow	Surrogate Grasslands	Southern Mesic Forest
<b>Species that are Significantly Associated with the Northern Lake Michigan Coastal Landscape</b>																		
American Golden Plover		2	1					1								1	2	
American Woodcock						2	1	1	1			1	2	1		1		
Bald Eagle					1	2												
Banded Killifish						3												
Black Tern		3				1	2								1			
Black-billed Cuckoo					2	2	1		1			1	1	1				
Black-throated Blue Warbler						3			1			2						
Blue-winged Teal		3	1		1	1	2								2	2		
Bobolink							3								2	3		
Brown Thrasher					2												2	
Canada Warbler					3	2		3	3			2	3	2				
Canvasback		1				1												
Caspian Tern			3			3												
Common Tern		2	3			3												
Dunlin		2	3							1								
Eastern Meadowlark															2	3		
Field Sparrow																2		
Forster's Tern		3				1									1			

Major										Important							Present
Dry Cliff	Emergent Marsh	Great Lakes Beach	Great Lakes Dune	Great Lakes Ridge and Swale	Lake Michigan	Northern Mesic Forest	Northern Sedge Meadow	Northern Wet-mesic Forest	Boreal Forest	Interdunal Wetland	Moist Cliff	Northern Dry-mesic Forest	Northern Hardwood Swamp	Northern Wet Forest	Southern Sedge Meadow	Surrogate Grasslands	Southern Mesic Forest

**Species that are Significantly Associated with the Northern Lake Michigan Coastal Landscape**

Great Egret	3				1													
Horned Grebe					3													
Hudsonian Godwit	3	1																
Lake Sturgeon					3													
Least Flycatcher				2		3		1	2			2	2					1
Lesser Scaup	1				1													
Mink Frog	3					1	3	1	1			1	1					
Mudpuppy					3													
Northern Flying Squirrel				2		3		3	3			3	2	3				1
Northern Goshawk						3		1	2			2	1					
Northern Harrier	1						3								2	3		
Olive-sided Flycatcher				2				2	2			1		3				
Osprey					1													
Peregrine Falcon	3																	
Red-headed Woodpecker												1						
Red-shouldered Hawk				1		2		1				2	1					2
Shoal Chub (Speckled Chub)																		
Short-billed Dowitcher	3	1																
Upland Sandpiper							1								1	3		
Veery				2		2		1	3			2	3	2				2
Vesper Sparrow																1		
Water Shrew						2	1	3	3			3	3					2
Whimbrel	2	3																
Whip-poor-will						1						2						1
Willow Flycatcher				1											2	2		
Wood Thrush				2		2		1				1	1	1				3
Wood Turtle						3	2	2					2	2	2			2

**Species that are Moderately Associated with the Northern Lake Michigan Coastal Landscape**

American Bittern	3						3								2	1		
Blanding's Turtle	3						2								2			2
Blue-winged Warbler																		2
Buff-breasted Sandpiper	2	1														2		
Dickcissel																3		
Eastern Red Bat	2					2	2	2	2			2	2	2	2			2
Four-toed Salamander	3			3		3	2	3	2		1		2	2	2			3

Major									Important							Present	
Dry Cliff	Emergent Marsh	Great Lakes Beach	Great Lakes Dune	Great Lakes Ridge and Swale	Lake Michigan	Northern Mesic Forest	Northern Sedge Meadow	Northern Wet-mesic Forest	Boreal Forest	Interdunal Wetland	Moist Cliff	Northern Dry-mesic Forest	Northern Hardwood Swamp	Northern Wet Forest	Southern Sedge Meadow	Surrogate Grasslands	Southern Mesic Forest

Species that are Moderately Associated with the Northern Lake Michigan Coastal Landscape																		
Hoary Bat	2					2	2	2	2			2	2	2	2			1
Loggerhead Shrike																	3	
Longear Sunfish																		
Marbled Godwit	3	1															2	
Northern Long-eared Bat	2					2	2	1	1			2	2	1	2			2
Pickereel Frog	3					2	3	2						2	3			2
Piping Plover		3	3							1								
Pugnose Shiner																		
Redfin Shiner																		
Rusty Blackbird	2			2														
Silver-haired Bat	2					2	2	2	2			2	2	2	2			1
Snowy Egret	3				1													
Solitary Sandpiper	3	1		2			1			2					1			
Western Meadowlark																	3	
Western Sand Darter																		
Woodland Jumping Mouse				1		3	1	2	2			1	2	2				2
Yellow Rail							3											
Yellow-billed Cuckoo				1		1												2

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## Appendix C

### Summary Descriptions for Species and Natural Communities Documented on the Door County State Parks Planning Group

The following paragraphs give brief summary descriptions for each of the species and natural communities documented on the DPPG and mapped within the NHI Database. More information can be found on the Endangered Resources Web site ([www.dnr.wi.gov/org/land/er/](http://www.dnr.wi.gov/org/land/er/)) for several of these species and natural communities.

#### Rare Animals

##### **American Bittern**

American Bittern (*Botaurus lentiginosus*) preferred breeding habitat is thick marsh grass, sometimes adjacent to stands of willow and tamarack, and usually within 6 meters of water. Habitat degradation is the greatest threat to its survival. The most urgent management need is the preservation of grasslands and large, shallow, freshwater wetlands with dense emergent growth.

##### **Appalachian Pillar**

Appalachian Pillar (*Cochlicopa morseana*), a terrestrial snail, has a 5-7.5mm long shell and is often found in moist upland woods. During winter or dry periods, it may be found deep under leaves.

##### **Bald Eagle**

Bald Eagle (*Haliaeetus leucocephalus*) prefers large trees in isolated areas in proximity to large areas of surface water, large complexes of deciduous forest, coniferous forest, wetland, and shrub communities. Large lakes and rivers with nearby tall pine trees are preferred for nesting. The breeding season extends from February through August. Favored wintering and roosting habitat includes wooded valleys near open water and major rivers from December through March.

##### **Beach-dune Tiger Beetle**

PARAGRAPH NEEDED

##### **Black Striate**

Black Striate, (*Striatura ferrea*), a terrestrial snail, has a dull gray to translucent shell, which ranges from 2.5-3.4mm in width. It prefers undisturbed forests with moderate winter temperatures and more constant precipitation as its habitat.

##### **Black-crowned Night Heron**

Black-crowned Night-heron (*Nycticorax nycticorax*) prefers freshwater wetlands dominated by bulrush and cattail with small groves of alder, willow, or other brush. Their breeding season occurs from mid-April through mid-September.

##### **Black-throated Blue Warbler**

Black-throated blue warbler (*Dendroica caerulescens*) is found in dense hardwood or coniferous undergrowth of mesic deciduous forests of mature sugar maple, basswood and aspen. The breeding season extends from June through August.

##### **Boreal Top**

Boreal Top, (*Zoogenetes harpa*), a terrestrial snail, has an olive-green shell that is approximately 2.5mm wide. It is typically found in low, wet places such as leaf litter and moss near the edges of lakes and swamps.

##### **Brilliant Granule**

Brilliant Granule, (*Guppya sterkii*), a terrestrial snail, has a yellowish, translucent shell, which measures between 1.2-1.3mm wide. It prefers moist leaf litter on wooded hillsides and in ravines as its habitat.

### **Canada Warbler**

Canada Warblers (*Wilsonia canadensis*) are typically most abundant in moist, mixed coniferous-deciduous forests with a well-developed understory. In Wisconsin they occur in conifer forests dominated by white pine or white cedar, as well as black ash swamps, sugar maple-hemlock-yellow birch forests, and alder thickets. Important components of breeding habitat include conifers, tall shrubs, a lush herb layer, and often creeks and streams. The Canada Warbler nests in dense vegetation, often in areas with mosses, ferns, and coarse woody debris. The breeding season occurs from early June to early July.

### **Cape May Warbler**

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

### **Cherrystone Drop**

Cherrystone Drop (*Hendersonia occulta*), a terrestrial snail, has a thick 6-8mm wide shell that is wider than it is high, usually reddish or yellowish in color, and lacks an opening in the center of the base of the shell. This species inhabits small areas of algific habitat or the similar cool, moist, shaded sites of cliffs where algific conditions occur without substantial talus or ice. The species is most often found on wooded alluvial-soil banks and bluffs.

### **Clear-winged Grasshopper**

Clear-winged grasshopper (*Cambula pellucida*) is yellow to brown, with mottled forewings and clear hind wings with no banding. Habitat includes sandy openings across northern Wisconsin and is collected in wet sandy ditches and Lake Superior sand dunes. The species is widely collected across the northern half of the state.

### **Dentate Supercoil**

Dentate Supercoil (*Paravitrea multidentata*), a very small land snail (less than 5 mm), occurs primarily in deciduous forests in proximity to Lake Michigan and on cliffs along the Niagara Escarpment in eastern Wisconsin.

### **Eastern Ribbonsnake**

Northern ribbonsnakes (*Thamnophis sauritus*) are semi-aquatic and primarily found in bog relics near or south of the Tension Zone. Records from Peninsula State Park in Door County are from atypical Wisconsin habitat, although they appear to be persisting in this location. Northern ribbonsnakes emerge in April and remain active into October. They breed in spring shortly after emerging and give live birth from mid July through August.

### **Iowa Pleistocene Vertigo**

Iowa Pleistocene Vertigo (*Vertigo sp. 2*), a terrestrial snail, prefers cold-air slopes.

### **Lake Huron Locust**

Lake Huron Locust (*Trimerotropis huroniana*) is silvery gray to pale brown, yellow ochre or brick red with mottling, males more heavily than females. The long forewings usually have faint cross-bands; the hind wings are pale yellow with a smoky band. Males measure 19-21mm and females 26-28mm. This species inhabits exposed, high quality open dunes as well as upper beach areas with very sparse grasses, forbs, and beach shrubs on the northern shores of the Great Lakes.

### **Least Bittern**

Least Bittern (*Ixobrychus exilis*) prefers freshwater marshes where cat-tails and reeds predominate in swamps and marshes and dense emergent vegetation. Breeding occurs from mid May to mid July.

### **Midwest Pleistocene Vertigo**

Midwest Pleistocene Vertigo (*Vertigo hubrichti Pilsbry*), a terrestrial snail, has pupa-shaped shells that are tan, brown, or orange with an indentation in the outer lip and distinctive folds within the aperture, and are 2.1mm long. This species inhabits cold, undisturbed, and well-forested algific sites occurring characteristically in small patches of decaying deciduous tree leaves (most often paper birch or mountain maple) on or in front of open vents in areas otherwise dominated by bryophytes. Primary habitat is the soil and fern covered ledges of limestone cliffs along the upper Great Lakes.

### **Mudpuppy**

Mudpuppies (*Necturus maculosus*) prefer medium to large rivers and lakes. They have a preference for completely aquatic microhabitats such as riprap, talus, boulder/rock piles, beneath flat rocks, under large sunken woody debris, dense mats of submergents in the deep littoral zone, or eroded pockets of clay lenses in riverbanks. Mudpuppies are active year-round, breed in late fall and spawn in June. Eggs hatch in July or August. This amphibian species is the only host of the state-threatened salamander mussel.

### **Mystery Vertigo**

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

### **Northern Cricket Frog**

Northern cricket frog (*Acris crepitans*) prefers ponds, lakes, and a variety of habitats along and adjacent to streams and rivers including, marshes, fens, sedge meadows, low prairies, and exposed mud flats. The species tends to breed in quite water (no or low flow) and may also move from streams and rivers to adjacent wetlands and ponds. Cricket frogs cannot tolerate freezing or complete inundation for more than 24 hours during the winter and seek a variety of microhabitats that provide suitable overwintering conditions, including crayfish burrows, small mammal burrows, rotted-out root channels, seepage areas where groundwater flow prevents freezing at the surface or spaces created by sloughing streambanks. Cricket frogs are active from late-March through November. Breeding occurs from mid-May through mid-August, with some larvae not transforming until late September.

### **Northern Goshawk**

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

### **Northern Ring-necked Snake**

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

### **Osprey**

Osprey (*Pandion haliaetus*) breeds mainly in forested lake regions of northwest and north central Wisconsin. A few nest along the Wisconsin River, in swamps and inland lakes in the central part of the state. Areas are usually forested with second growth pine (*Pinus sp*), aspen (*Populus sp*), and hardwood forests. Most frequent nest sites are supercanopy snags

and dead-topped pines located along lake and stream shoreline, in recent clearcut areas near water, in swamp conifer stands, and on snags in marshes and bogs. The breeding season extends from late April through August.

#### **Phyllira Tiger Moth**

Phyllira Tiger Moth (*Grammia phyllira*) are black with thick pinkish-white or cream-colored lines. The hindwings are pink with black patches toward the outer margin.

#### **Red-shouldered Hawk**

Red-shouldered Hawk (*Buteo lineatus*) breeding habitat includes bottomland hardwoods, mesic deciduous or mixed deciduous-conifer forests, and wooded margins of marshes. Cooperation between private land owners and public land managers is necessary to ensure protection of large blocks of forest habitat. Breeding occurs from mid-March through early August.

#### **Sculpted Glyph**

Sculpted Glyph, (*Glyphyalinia rhoadsi*), a terrestrial snail listed, has a 4.5-5.3mm wide shell and prefers leaf litter in upland woods as its habitat.

#### **Yellow-billed Cuckoo**

Yellow-billed Cuckoo (*Coccyzus americanus*) breeding cover includes a wide range of vegetation types, including natural lowland shrub savanna, southern lowland forest, and upland oak forest.

#### **Rare Plants**

##### **American Sea-rocket**

American Sea-rocket (*Cakile lacustris*) is found on Lake Michigan beaches or, less commonly, on dunes. Blooming occurs early July through early September; fruiting occurs late July through late September. The optimal identification period for this species is early July through late September.

##### **Autumn Coral-root**

Autumn Coral-root (*Corallorhiza odontorhiza*) is found in deciduous forests. Blooming occurs early August through early September; fruiting occurs throughout September. The optimal identification period for this species is early August through late September.

##### **Bird's-eye Primrose**

Bird's-eye Primrose (*Primula mistassinica*) is found in neutral to calcareous rock splash pools and stabilized dunes near the Great Lakes, as well as inland on moist sandstone cliffs. Blooming occurs early May through late June; fruiting occurs early June through late July. The optimal identification period for this species is late May through early June.

##### **Broad-leaf Sedge**

Broad-leaf Sedge (*Carex platyphylla*) is found in rich beech-maple woods with loamy soil. Blooming occurs throughout June; fruiting occurs throughout July. The optimal identification period for this species is late June through early July.

##### **Chilean Sweet Cicely**

Chilean Sweet Cicely (*Osmorhiza chilensis*) is found in mixed conifer-hardwood forests and cedar swamps. Blooming occurs late June through early July; fruiting occurs throughout July. The optimal identification period for this species is late June through late July.

##### **Climbing Fumitory**

Climbing Fumitory (*Adlumia fungosa*) is found in dry to moist hardwood or coniferous woods, often with a history of burning; it is often found on dolomite and, less commonly, on basalt. Blooming occurs late June through late September;

fruiting occurs late July through early October. The optimal identification period for this species is early July through early October.

### **Common Bog Arrow-grass**

Common Bog Arrow-grass (*Triglochin maritima*) is found on fen mats, open neutral to calcareous conifers swamps, and Great Lakes swales. Blooming occurs late June through early August; fruiting occurs late July through early September. The optimal identification period for this species is early July through late August.

### **Crawe Sedge**

Crawe Sedge (*Carex crawei*) is found in calcareous wetlands and dolomitic pavement, often near Lake Michigan, as well as fens and moist calcareous prairies. Blooming occurs late April through late May; fruiting occurs late May through late June. The optimal identification period for this species is throughout May.

### **Crinkled Hairgrass**

Crinkled Hairgrass (*Deschampsia flexuosa*) is found in pine forests and barrens, mostly near the Great Lakes. Blooming occurs throughout June; fruiting occurs throughout July. The optimal identification period for this species is early June through late August.

### **Drooping Sedge**

Drooping Sedge (*Carex prasina*) is found in shaded, seeping ravine bottoms in deciduous or mixed woods. Blooming occurs early May through early June; fruiting occurs early June through early September. The optimal identification period for this species is early June through late July.

### **Dune Goldenrod**

Dune Goldenrod (*Solidago simplex* var. *gillmanii*) is found on semi-stabilized dunes along Lake Michigan. Blooming occurs early August through early October; fruiting occurs late September through late October. The optimal identification period for this species is late August through early September.

### **Dune Thistle**

Dune Thistle (*Cirsium pitcheri*) is found on Lake Michigan dunes. Blooming occurs late June through late July; fruiting occurs late July through late August. The optimal identification period for this species is late June through late August.

### **Dwarf Lake Iris**

Dwarf Lake Iris (*Iris lacustris*) is found near Lake Michigan on beach ridges, stabilized dunes, limestone ridges, forest gaps and edges, and ditches. Blooming occurs early May through early July; fruiting occurs late June through late July. The optimal identification period for this species is late May through early July.

### **Elk Sedge**

Elk Sedge (*Carex garberi*) is found in moist to wet sandy, gravelly, or dolomitic beach flats. Blooming occurs late May through late June; fruiting occurs late June through late August. The optimal identification period for this species is late June through late August.

### **Few-flower Spikerush**

Few-flower Spikerush (*Eleocharis quinqueflora*) is found on cold coniferous poor fen mats but in a variety of moist meadows in calcareous areas. Blooming occurs late June through late July; fruiting occurs early July through late September. The optimal identification period for this species is early July through late September.

### **Giant Pinedrops**

Giant Pinedrops (*Pterospora andromedea*) is found only in white pine stands. Blooming occurs early June through late August; fruiting occurs early July through late August. The optimal identification period for this species is early July through late August.

**Handsome Sedge**

Handsome Sedge (*Carex formosa*) is found in rich mesic woods, often on alluvial terraces or where dolomite is near the surface. Blooming occurs throughout June; fruiting occurs throughout July. The optimal identification period for this species is late June through early July.

**Lake Huron Tansy**

Lake Huron Tansy (*Tanacetum huronense*) is found along the Lake Michigan shore, including sandy beaches, dunes, and limestone pavements. Blooming occurs late June through early August; fruiting occurs late July through late August. The optimal identification period for this species is late June through early September.

**Large Roundleaf Orchid**

Large Roundleaf Orchid (*Platanthera orbiculata*) is found in moist hardwood or mixed conifer-hardwood forests. Blooming occurs late June through late July; fruiting occurs early July through late August. The optimal identification period for this species is late June through early August.

**Laurentian Bladder Fern**

Laurentian Bladder Fern (*Cystopteris laurentiana*) is found in moist, mostly wooded slopes and ledges in circumneutral soil. The optimal identification period for this species is late June through early September.

**Lesser Fringed Gentian**

Lesser Fringed Gentian (*Gentianopsis procera*) is found on wet dolomite pavement near Lake Michigan, as well as cold fens, seeps, and meadows in calcareous areas. Blooming occurs late August through early October; fruiting occurs early September through early October. The optimal identification period for this species is late August through early October.

**Long-spur Violet**

Long-spur Violet (*Viola rostrata*) is found in rich hardwoods or mixed pine-hardwoods forests, mostly near Lake Michigan. Blooming occurs late May through late June; fruiting occurs throughout July. The optimal identification period for this species is late May through late June.

**Low Calamint**

Low Calamint (*Calamintha arkansana*) is found most typically on wet dolomite flats on Lake Michigan (Door County), as well as fens and wet prairies. Blooming occurs late June through late September; fruiting occurs late July through late September. The optimal identification period for this species is early July through late August.

**Maidenhair Spleenwort**

Maidenhair Spleenwort (*Asplenium trichomanes*) is found in on cool, shaded cliffs, mostly in hardwood forests; on basalt and related rocks (Penoque Range), sandstone (Wisconsin Dells), and dolomite (Door County). This species can be identified yearround.

**Mingan's Moonwort**

Mingan's Moonwort (*Botrychium minganense*) is found in in cool, mixed conifer-hardwood forests near Lake Superior. The optimal identification period for this species is early June through late July.

**Northern Yellow Lady's-slipper**

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

**Ohio Goldenrod**

Ohio Goldenrod (*Solidago ohioensis*) is found most commonly on wet dolomite lake flats in Door County and in fens and moist calcareous prairies in the southeast portion of the state. Blooming occurs early August through late September;

fruiting occurs throughout September. The optimal identification period for this species is late August through early September.

### **One-flowered Broomrape**

One-flowered Broomrape (*Orobanche uniflora*) is found in sandy prairies, thickets, moist woods, and on streambanks. Blooming occurs from April through June. The optimal identification period for this species is mid April through late June.

### **Rock Whitlow-grass**

Rock Whitlow-grass (*Draba arabisans*) is found on exposed to shaded (often by white cedar) dolomite cliffs. Blooming occurs late June through late July; fruiting occurs early July through early September. The optimal identification period for this species is early July through early September.

### **Rugulose Grape-fern**

Rugulose Grape-fern (*Botrychium rugulosum*) is found in on sandy shorelines of fluctuating lakes and ponds. The optimal identification period for this species is early June through late August.

### **Sand Reedgrass**

Sand Reedgrass (*Calamovilfa longifolia* var. *magna*) is found on Lake Michigan sand dunes. Blooming occurs early July through late September; fruiting occurs early August through late September. The optimal identification period for this species is early July through late September.

### **Seaside Spurge**

Seaside Spurge (*Euphorbia polygonifolia*) is found on sandy beaches and dunes along Lake Michigan. Blooming occurs early July through late August; fruiting occurs early August through early October. The optimal identification period for this species is early July through late September.

### **Showy Lady's-slipper**

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

### **Slim-stem Small-reedgrass**

Slim-stem Small-reedgrass (*Calamagrostis stricta*) is found on dry to moist dunes, barrens, and dolomite or sandstone ledges, mostly near the Great Lakes, as well as calcareous wetlands. Blooming occurs throughout June; fruiting occurs early July through late August. The optimal identification period for this species is early July through late August.

### **Small-flower Grass-of-parnassus**

Small-flower Grass-of-parnassus (*Parnassia parviflora*) is found on the Lake Michigan shoreline in crevices in wet dolomite pavement, or moist, open sandy beaches and dunes. Its appearance is irregular. Blooming occurs throughout July; fruiting occurs throughout August. The optimal identification period for this species is early July through late August.

### **Spreading Woodfern**

Spreading Woodfern (*Dryopteris expansa*) is found in cool coniferous (balsam-fir, white cedar, hemlock) to mixed forests, sometimes in cold canyons. The optimal identification period for this species is late May through late September.

### **Striped Maple**

Striped Maple (*Acer pensylvanicum*) is found in cool deciduous forests. Blooming occurs late May through early June; fruiting occurs late June through late August. This species can be identified year-round.

### **Thickspike**

Thickspike (*Elymus lanceolatus* ssp. *psammophilus*) is found on Lake Michigan dunes and beaches. Blooming occurs throughout June; fruiting occurs early July through late August. The optimal identification period for this species is early June through late August.

### **Tufted Hairgrass**

Tufted Hairgrass (*Deschampsia cespitosa*) is found in fens, sandstone and dolomite splash pools on the Great Lakes; it is also found in springs, marly bog pools, and cedar swamps. Blooming occurs late June through early July; fruiting occurs throughout July. The optimal identification period for this species is late June through late July.

### **Variegated Horsetail**

Variegated Horsetail (*Equisetum variegatum*) is found in most characteristically on wet dolomite flats and gravelly swales near Lake Michigan but also in other wet, open, neutral to calcareous wetlands. The optimal identification period for this species is late May through late September.

### **Western Fescue**

Western Fescue (*Festuca occidentalis*) is found on cobble beaches and wooded coniferous dunes on Lake Michigan. Blooming occurs throughout June; fruiting occurs early July through late August. The optimal identification period for this species is early July through late August.

### **White Camas**

White Camas (*Zigadenus elegans* var. *glaucus*) is found in oak openings, wet-mesic calcareous prairies, limestone-capped sandstone bluffs, cliffs, and outcrops, as well as stabilized dunes along Lake Michigan. Blooming occurs late May through late July; fruiting occurs mid August through early September. The optimal identification period for this species is late May through late July.

## **Natural Communities**

### **Boreal Forest**

Mature stands of this upland forest community are dominated by white spruce and balsam fir, often mixed with white birch, northern white cedar, eastern white pine, eastern hemlock (within its range), balsam-poplar, and quaking aspen. Mountain-ash may also be present. Common understory herbs are large-leaved aster, blue-bead lily, Canada mayflower, wild sarsaparilla, and bunchberry. Most Wisconsin stands are associated with the Great Lakes, especially the clay plain of Lake Superior, and the eastern side of the northern Door Peninsula on Lake Michigan. The boreal forest in Wisconsin is transitional between the mixed deciduous-conifer forests to the south and the spruce-fir dominated forests of Canada, so tree species richness is often greater here. Of potential interest from the perspectives of vegetation classification and restoration, eastern white pine had the highest importance value of any tree in the Lake Superior region, as recorded during the original land survey of the mid-1800's.

### **Forested Seep**

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

### **Great Lakes Alkaline Rockshore**

Great Lakes alkaline rockshore is a community that develops on creviced, wave-splashed, horizontal or gently sloping exposures of dolomite bedrock that dip toward Lake Michigan. These occur only along the Lake Michigan shoreline of the northern Door Peninsula, and on the margins of some of the Grand Traverse Islands, to the north. This is the same bedrock that forms the Niagara Escarpment which forms prominent cliffs on the west side of the Peninsula. The extent of the exposed rock is dependent on Lake Michigan water levels; large expanses of this habitat may be either inundated or exposed during a given year. Characteristic members of this community include the shrubs ninebark and shrubby cinquefoil, and the herbs silverweed, Arctic primrose, grass-leaved goldenrod, brook lobelia, gentians (*Gentiana* spp., *Gentianopsis* spp.), grasses-of-Parnassus, Indian paint-brush, low calamint, and many sedges and rushes. Plants endemic to the Great Lakes shores are significant components of some stands.

Because this community type is geographically restricted to those portions of the Lake Michigan coast with dolomite shoreline, it is, and has always been, rare here. Just inland of the exposed dolomite pavement there is often a narrow zone of rank herbs and tall shrubs, sometimes occupying a ridge of cobbles, gravel, or a low ledge. On the more stable habitats beyond this zone of herbs and shrubs, a very distinctive forest sometimes develops. Mature stands are usually composed of mixtures of northern white cedar, white spruce, balsam fir, eastern white pine, and paper birch.

### **Great Lakes Beach**

The Great Lakes Beach community occurs at the interface of land and water along the margins of Lakes Michigan and Superior, often in association with sparsely vegetated, semi-stabilized dune systems. Great Lakes beaches are extremely dynamic features, strongly influenced by water level changes and storm events. The lower beach is continually impacted by waves, the middle beach supports a dynamic plant community affected by wave action only during storms, and the upper beach, affected by wind-blown sand, wave spray, and only the most severe storms, supports a relatively diverse assemblage of plants.

The beach flora is typically sparse due to the scouring action of waves and ice. However, following several years of low water with few major storm events, the vegetation of the upper beach zone can become quite dense. Floristic composition can be an odd mix that includes globally rare endemics, as well as widespread weedy species adapted to quickly colonizing disturbed areas swept bare of competing vegetation. Exposed shorelines may be entirely unvegetated. Plants endemic to the shores of the Great Lakes, such as seaside spurge and American sea-rocket, are characteristic of some of the Lake Michigan beaches, especially during low water periods. Native associates may include silverweed, Baltic rush, and water horehound. The beaches of the Lake Superior region, though they are for the most part unvegetated, are important foraging, resting, and breeding areas for migratory and resident birds.

### **Great Lakes Dune**

Overall, Great Lakes dune flora is an odd mix of geographically restricted habitat specialists and weedy generalists. Among the specialists are a number of endemic plants and animals, some of which occur in no other habitat and in no other region of North America. Others occur wherever dunes occur in eastern North America, including marine environments along the Atlantic Ocean coast.

Among the relatively few plants that are able to successfully colonize active, unvegetated dunes are several drought resistant perennial grasses that produce tough, sand binding rhizomes. Especially important are marram grass, the most prevalent dominant species in Great Lakes dune systems, sand reed, wheatgrass, crinkled hairgrass, and Canada wild rye. Associated vascular plants include beach pea, field sage-wort, common evening-primrose, common milkweed, and a long list of weedy native and exotic species (Curtis 1959).

### **Moist Cliff**

This community (often found on "micro-sites" of very restricted spatial extent) occurs on shaded (by trees or the cliff itself because of aspect), moist to seeping mossy, vertical exposures of various rock types. The most common rock types are sandstone and dolomite. A greater proportion of sandstone cliff sites tend to be moist, compared to limestone cliff sites, due to the potential for capillary action in sandstone to transport water essential for plant survival. Igneous (granite,

basalt) and metamorphic (quartzite) rocks tend to be dry due to their impermeability, but in some situations water moving through the ground above the bedrock cannot go through the rock and moves laterally until it finds a path to take it downward. There it will exit, often over the face of a cliff.

Common vascular plant species include columbine, the fragile ferns (*Cystopteris bulbifera* and *C. fragilis*), wood ferns, rattlesnake-root, and wild sarsaparilla. The rare flora of these cliffs vary markedly in different parts of the state; Driftless Area cliffs might have northern monkshood, those on Lake Superior, butterwort, or those in Door County, green spleenwort. Lichens, mosses, and ferns are important components of cliff habitats. Present knowledge of the distribution and status of many of these plant species is limited. The same is true for many invertebrate species.

### **Northern Dry-mesic Forest**

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

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

### **Northern Mesic Forest**

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

### **Northern Sedge Meadow**

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

### **Northern Wet-mesic Forest**

This forested minerotrophic wetland is dominated by northern white cedar, and occurs on rich, neutral to alkaline peats and mucks throughout much of northern Wisconsin. Balsam fir, black ash, and spruces are among the many potential canopy associates. The understory is rich in mosses, lichens, liverworts, ferns, sedges, orchids, and wildflowers such as goldthread, fringed polygala, and naked miterwort, and trailing sub-shrubs such as twinflower and creeping snowberry. A number of rare plants occur more frequently in the cedar swamps than in any other habitat. Older cedar swamps are often structurally complex, as the easily wind-thrown cedars are able to root from their branch tips. Some of the canopy associates have the potential to reach heights considerably beyond those usually attained by cedar, producing a multi-layered canopy. The tall shrub layer is often well-developed and may include speckled alder, alder-leaved buckthorn, wild currants, and mountain maple. Canada yew was formerly an important tall shrub in cedar swamps but is now rare or local. Seepages, springs, and spring runs contribute to stand complexity and provide critical habitat for additional plants and animals. Cedar swamps are relatively common in depressions that receive mineral-enriched groundwater, and can be associated with both ground moraine and outwash landforms.

### **Southern Mesic Forest**

This upland forest community occurs on rich, well-drained loamy soils, mostly on glacial till plains or loess-capped sites south of the tension zone. The dominant tree species is sugar maple, but basswood, and near Lake Michigan, American beech may be co-dominant. Many other trees are found in these forests, including those of the walnut family, ironwood, red oak, red maple, white ash, and slippery elm. The understory is typically open, or sometimes brushy with species of gooseberry on sites with a history of grazing, and supports fine spring ephemeral displays. Characteristic herbs are spring-beauty, trout-lilies, trilliums, violets, bloodroot, blue cohosh, mayapple, and Virginia waterleaf. Historically, southern mesic forests were quite common throughout southern Wisconsin. For example, forests dominated by sugar maple or beech occupied 41% of the Southern Lake Michigan Coastal, 25% of the Southeast Glacial Plains, and 18% of the Western Coulees and Ridges Ecological Landscapes (Finley 1976). Most of these forests were cleared for agriculture, as the soils are very fertile.

### **Southern Sedge Meadow**

Widespread in southern Wisconsin, this open wetland community is most typically dominated by tussock sedge and blue-joint grass. Common associates of relatively undisturbed sedge meadows are other sedges [e.g., bog panicled sedge (*Carex diandra*) and running marsh sedge (*C. sartwellii*)], marsh bellflower (*Campanula aparinoides*), marsh wild-Timothy (*Muhlenbergia glomerata*), water horehound (*Lycopus sp*), panicled aster (*Aster lanceolatus*), swamp aster (*Aster puniceus*), blue flag (*Iris sp*), spotted Joe-Pye weed (*Eupatorium maculatum*), marsh fern, and swamp milkweed. Reed canary grass (*Phalaris arundinacea*) may be dominant in grazed and/or ditched stands, sometimes to the exclusion of virtually all other species. Sedge meadows are most common in glaciated landscapes, where they often border streams or drainage lakes. The Southern Sedge Meadow community occurred with prairie, savanna, and hardwood forest communities and many of them burned periodically. In the absence of fire, shrubs and trees are able to readily encroach on the open wetlands; encroachment can be exacerbated when wetlands are drained. Many sedge meadows in southeastern Wisconsin are influenced by alkaline groundwater, and occur in complexes with Emergent marsh, Calcareous Fen, Wet Prairie, Wet-mesic Prairie, and Shrub-carr. Differentiating between these communities can be difficult, as they frequently intergrade.

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## Appendix D

### Wisconsin Natural Heritage Working List Explanation

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

#### Key

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

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

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

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

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

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

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

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

## **Global & State Element Rank Definitions**

### **Global Element Ranks:**

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

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

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

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

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

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

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

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

G? = Not ranked.

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

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

### **State Element Ranks**

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

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

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

S4 = Apparently secure in Wisconsin, with many occurrences.

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

SA = Accidental (occurring only once or a few times) or casual (occurring more regularly although not every year); a few of these species (typically long-distance migrants such as some birds and butterflies) may have even bred on one or more of the occasions when they were recorded.

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

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

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

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

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

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

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

SX = Apparently extirpated from the state.

### **State Ranking of Long-Distance Migrant Animals:**

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