



Rapid Ecological Assessment for the Northwest Barrens Planning Group

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 Property Master Plan

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Wisconsin's Natural Heritage Inventory Program

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Cover Photo: Douglas County Wildlife Area Barrens. Photo by: Ryan O'Connor

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Purpose and Objectives

This report is intended to be used as a source of information for developing a new master plan for the Lake Superior Area – Northwest Barrens Planning Group (NWBPG) properties consisting of:

- Douglas County Wildlife Area
- Namekagon Barrens Wildlife Area

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

Survey efforts for NWBPG 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 it is a scaled down version in terms of both the time and effort expended when compared to similar projects conducted on much larger properties, such as state forests. The information collected was the result of survey work primarily in 2009. There will, undoubtedly, be gaps in our knowledge of the biota of this property, especially for certain taxa groups; these groups have been identified by the DNR or others as representing either an opportunity or a need for future work.

Methods

The Wisconsin Natural Heritage Inventory (NHI) program resides in the Wisconsin DNR’s Bureau of Endangered Resources and is part of an international network of NHI programs. The defining and unifying characteristic of this network 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 plant and animal species, natural communities, and other natural features, referred to as *elements* of biodiversity. Elements tracked by the Wisconsin NHI Program are listed on the Wisconsin NHI Working List. The Working List is the list of Endangered, Threatened, and Special Concern plants and animals and all natural communities maintained by the Wisconsin DNR. This list changes over time as the populations of species change (both up and down) and as knowledge about species and natural community status and distribution increases. The most recent Working List for the State of Wisconsin is available through the WDNR Bureau of Endangered Resources (dnr.wi.gov/org/land/er/wlist/).

The Wisconsin NHI program uses a standard approach for biotic inventory work that supports master planning (Appendix A). Generally, the approach involves data collection and development, data analysis, and dissemination of the results & analysis. Details of standardized NHI methodology can be found on the NatureServe Web site: www.natureserve.org.

Existing NHI data are often the starting point for conducting a biotic inventory to support master planning. Prior to this project, NHI data for the NWBPG were limited to: the Statewide Natural Area Inventory, a county-by-county effort conducted by WDNR’s Bureaus of Research and Endangered

Resources between 1969 and 1984 that focused on natural communities but included some surveys for rare plants and animals. Previous taxa specific surveys including various inventory efforts focusing on birds, small mammals, Lepidoptera, and herptiles of northwestern Wisconsin Pine Barrens communities. Research has also occurred on Sharp-tailed Grouse, passerine birds, and reptiles and amphibians.

Field surveys for the current project areas were conducted during 2009. Surveys were limited in scope and focused on documenting high quality natural communities, locations and habitat for rare plants, breeding birds, reptiles, amphibians, aquatic invertebrates, and Lepidoptera. The collective results from all of these surveys were used to identify ecologically important areas on the NWBPG.

Survey locations were identified or guided by using recent aerial photos, USGS 7.5' topographic maps, various GIS sources, information from past survey efforts, discussions with property managers, and the expertise of several biologists familiar with the properties or with similar habitats in the region. Based on the location and ecological setting of properties within the NWBPG, key inventory considerations included inventory of the Pine and Oak Barrens natural communities, assessment of important wetland components vital to amphibians and reptiles as well as aquatic invertebrates and Lepidoptera, and surveys of grassland and shrubland bird assemblages. Private lands surrounding the NWBPG were not surveyed.

General Background Information

The NWBPG encompasses ca. 9,055 acres in the Northwest Sands Ecological Landscape in Burnett and Douglas counties (Figure 1). The properties occur along two regionally significant waterways: the upper St. Croix and the Namekagon Rivers, portions of which together make-up the St. Croix National Scenic Riverway. The National Wild and Scenic Rivers system was created by Congress in 1968 to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for present and future generations (National Park Service 2009). Both rivers are classified as Outstanding Resource Waterways (ORW) by WDNR (<http://dnr.wi.gov/org/water/wm/wqs/orwerw/>). The ORW classification designates surface waters which warrant additional protection from the effects of pollution because they support valuable fisheries and wildlife habitat, provide outstanding recreational opportunities, are not significantly impacted by human activities, and recognizes these as the highest quality waters in the state. Beaver and Clemens Creeks originate from springs on the north unit of Namekagon Barrens and both are classified as Exceptional Resource Waterways (ERW) with Clemens Creek also being designated a Class 1 Trout Stream. Leo Creek, a class 2 trout stream, flows through the northern portion of Douglas County Wildlife Area. The Northwest Sands Ecological Landscape provides significant opportunities for Pine Barrens, Oak Barrens, and Northern Dry Forest protection and restoration in a landscape context. Pine and Oak Barrens community types are rare and imperiled globally (WDNR in prep.).

Properties included in the NWBPG are:

- Douglas County Wildlife Area (4,005 acres- 994 DNR owned & 3,011 leased from Douglas Co) is located in southeast Douglas County between Solon Springs and Gordon and along STH 53 and CTH M. The land leased from Douglas County by the WDNR is Douglas County Forest Special Use lands. Solon Springs Sharptail Barrens State Natural Area is within the property.
- Namekagon Barrens Wildlife Area (5,048 acres, all leased from Burnett County) is located in the northeast corner of Burnett County and is made up of two units. The south unit is located along Springbrook Trail and the north unit is along St. Croix Trail. They are located approximately 7 miles east of STH 35 and 11 miles west of Minong.

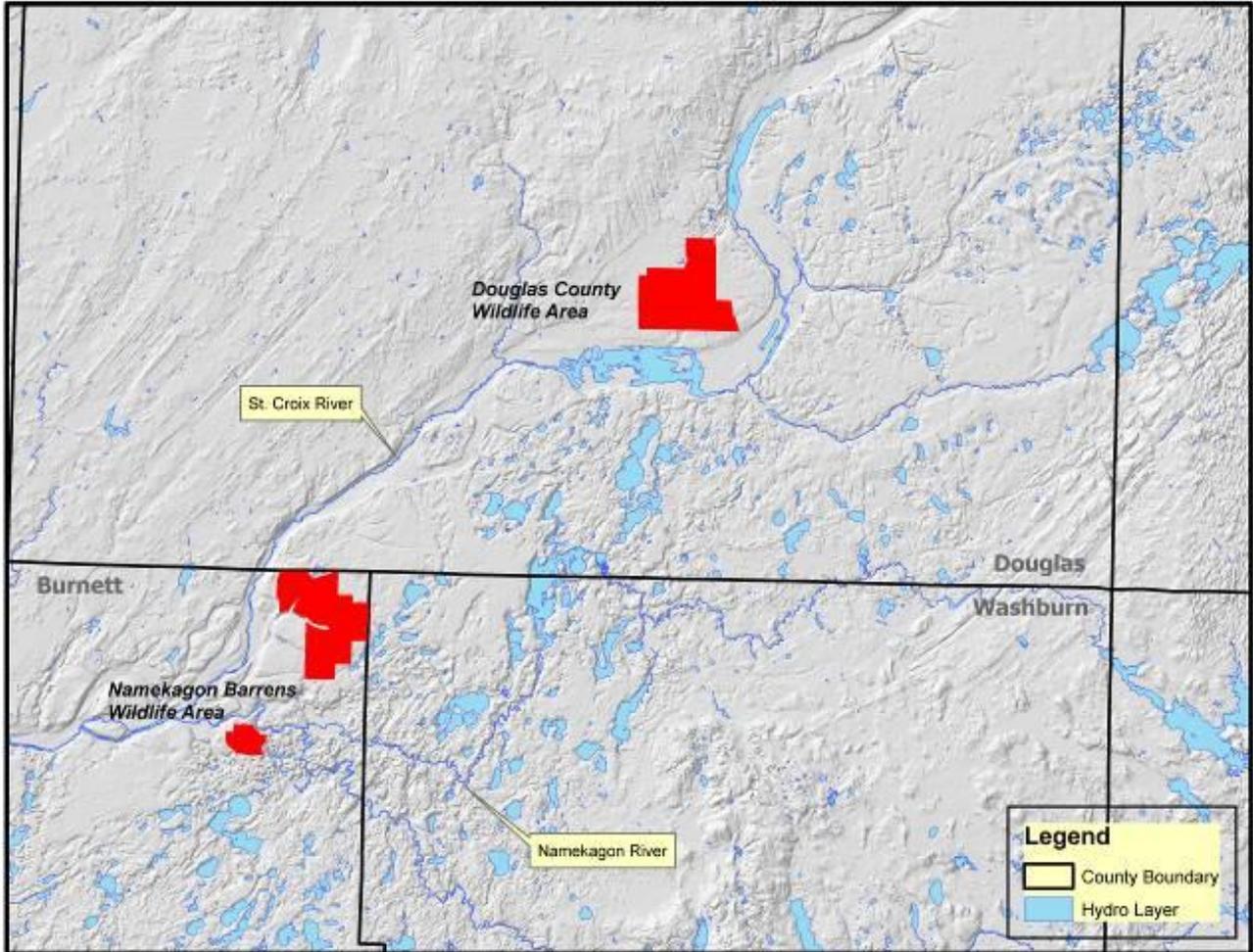


Figure 1: Location of Properties within the Northwest Barrens Planning Group

Previous Efforts

Wisconsin Land Legacy Report was designed to identify the most important conservation and recreation needs for the next 50 years (WDNR 2006a). The report identifies the Northwest Sands Ecological Landscape as one of the two best opportunities in North America to restore the globally rare Pine and Oak Barrens natural communities (WDNR 2006a). One such barrens opportunity area is the Namekagon – Brule Barrens legacy site which encompasses both the Namekagon Barrens Wildlife Area and Douglas County Wildlife Area, along with Crex Meadows Wildlife Area and Brule River State Forest.

Wisconsin Biodiversity as a Management Tool recognized both Namekagon Barrens and Douglas County Wildlife Areas as having good opportunities to continue barrens restoration efforts, maintain the current extensive barrens, and expand this management regime to surrounding publicly owned lands (WDNR 1995).

Important Bird Areas are critical sites for the conservation and management of Wisconsin's birds. Namekagon/Solon Springs Barrens were recognized as an Important Bird Area (IBA; WDNR 2007) due to its importance for Pine Barrens habitat that supports uncommon breeding birds such as Sharp-tailed Grouse, Northern Harrier, Brown Thrasher, Connecticut Warbler, and Upland Sandpiper.

Managing Habitat for Grassland Birds: A Guide for Wisconsin listed Namekagon/Douglas County Barrens as one of the highest ranking priority landscape for grassland bird management. Mechanical thinning and prescribed burning are also noted as a tool to expand barrens habitat (Sample and Mossman 1997).

Wisconsin Wildlife Action Plan (WDNR 2006b) identified Namekagon Barrens and Douglas County Wildlife Areas as comprising a significant portion of the Pine – Oak Barrens Conservation Opportunity Areas (COA; Appendix B). Conservation Opportunity Areas are places in Wisconsin that contain ecological features, natural communities, or Species of Greatest Conservation Need (SGCN) habitat for which Wisconsin has a unique responsibility for protection when viewed from the global, continental, upper Midwest, or state perspective (WDNR 2006b).

- Pine – Oak Barrens COA is of global significance because few examples of this type remain outside of Wisconsin and Michigan. Large-scale barrens management opportunities exist in this landscape due to the relatively large amount of public lands owned by state and county government (WDNR 2005).

DNR Land Certification efforts recently recognized the certification of one million acres of state-owned lands that include state parks, wildlife areas, and natural areas 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.

The Northwest Sands Landscape Level Management Plan (NWRPC & WDNR 2000), prepared by the Northwest Regional Planning Commission and Wisconsin Department of Natural Resources, includes the NWBPG. Many of the strengths within this landscape are linked to the large public land base, including state and county owned properties and the numerous options for habitat management of the rare Pine and Oak Barrens. These include:

- connectivity of properties to enhance landscape scale management opportunities benefitting numerous rare species
- creating a greater diversity of common and game species
- enabling a high concentration of State Natural areas
- providing large wildlife habitat areas attracting wildlife viewers
- increased potential for ecological research sites

Ecological Context

The NWBPG study area is located in the *Northwest Sands* Ecological Landscape (Figure 2). The Northwest Sands is a large glacial outwash system consisting primarily of two major landforms: flat plains or terraces along glacial meltwater channels and pitted or "collapsed" outwash plains containing kettle lakes (WDNR in prep.). Soils are predominantly deep sands, low in organic material and nutrients.

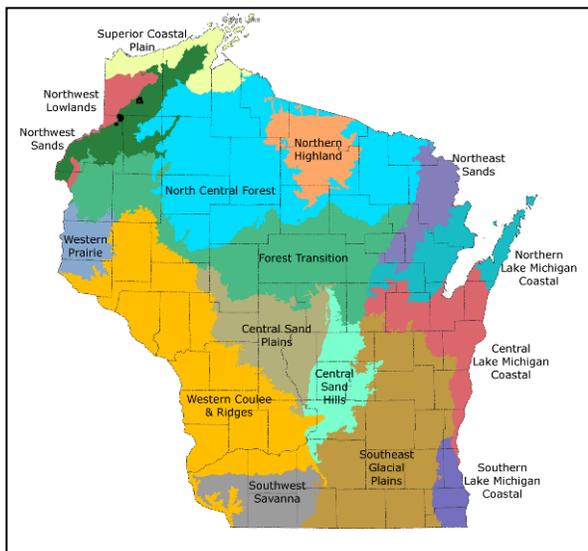


Figure 2: Location of the NWBPG sites within the Northwest Sands Ecological Landscape

Data from the original Public Land Surveys are often used to infer vegetation cover types for Wisconsin prior to European Settlement. Public Land Surveys for the area comprising NWBPG were completed between 1851 and 1860. Finley's (1976) Presettlement Vegetation map identifies these areas as predominantly jack pine (*Pinus banksiana*) and scrub oak (*Quercus* spp.) forest and barrens. Eastern white pine (*Pinus strobus*) and red pine (*Pinus resinosa*) forests also made up a sizable component of this Ecological Landscape (WDNR 2005). Numerous barrens occurred in the southwest half and a few large barrens within the northeast half of the Ecological Landscape. Most of the trees in the barrens were jack pine, but red pine savannas were present and oak savannas occurred in the south central section (WDNR 2005).

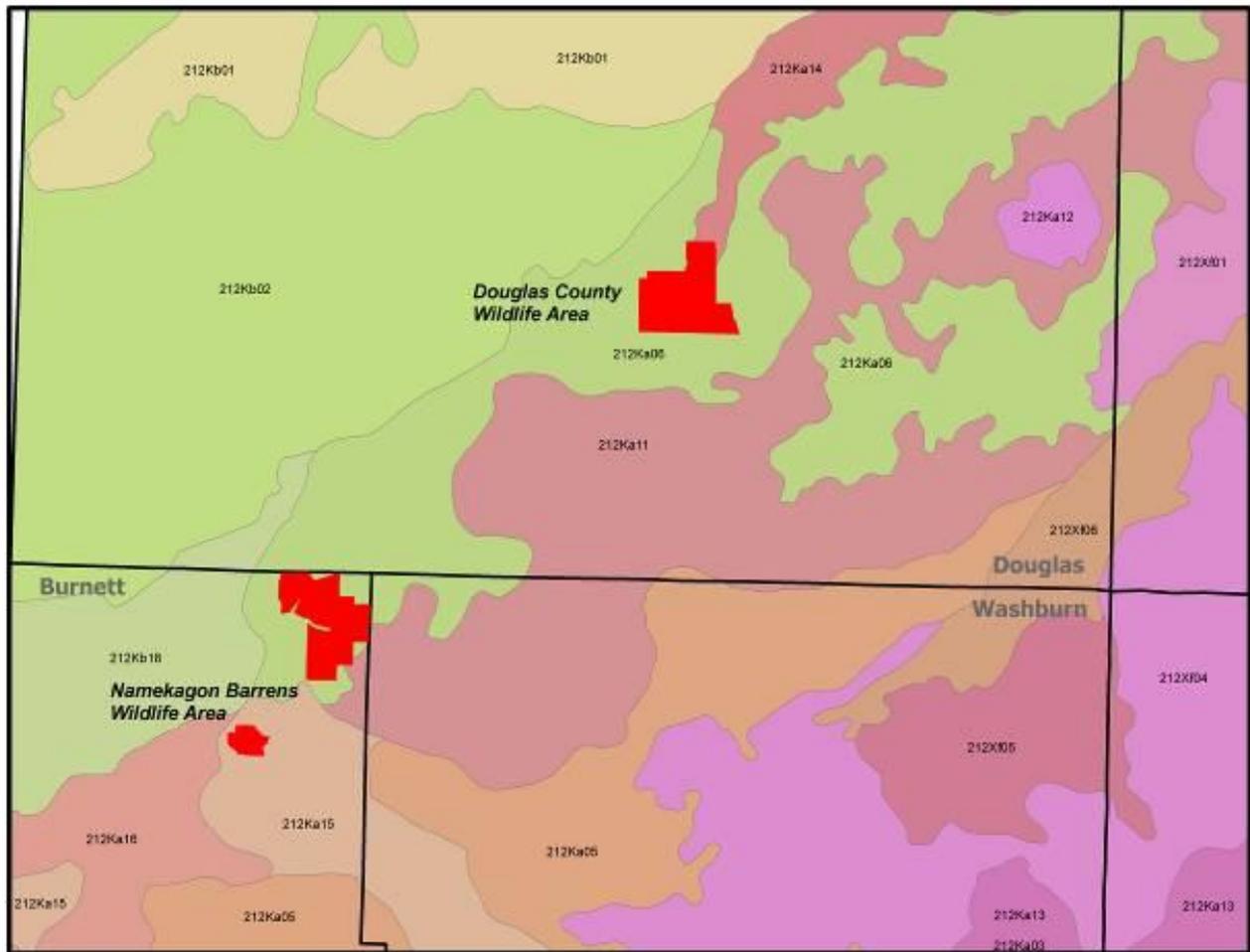


Figure 3: Landtype Associations of the Northwest Barrens Planning Group

The NWBPG sites fall within three Landtype Associations (LTA): Bayfield Level Barrens (212Ka06), Upper Brule – St. Croix Valley (212Ka14), and Lower Namekagon Rolling Barrens (212Ka15). The majority of the NWBPG sites fall within the Bayfield Level Barrens LTA which has a characteristic landform pattern of a nearly level outwash plain with excessively drained sand over outwash. A portion of the Douglas County Wildlife Area falls within the Upper Brule – St. Croix Valley LTA which has representative landform patterns of sloping outwash valleys with stream terraces and floodplains common. The soils are predominately excessively drained sand over acid sand outwash. The south unit of Namekagon Barrens falls within the Lower Namekagon Rolling Barrens LTA which has characteristic landform pattern of rolling outwash plain with soils excessively drained sand over acid sand outwash (WDNR 2005).

Current Vegetation

Namekagon Barrens and Douglas County Wildlife Areas are located within a pitted, sand plain landscape dominated by open grasslands, barrens or shrublands, dry forests of oaks and pines, a small but significant amount of emergent/wet meadow and open water, and small amounts of agriculture (WDNR 2005). Both wildlife areas are very similar ecologically and managed for Pine and Oak Barrens and open grasslands for Sharp-tailed Grouse. The barrens plant community occurs on infertile droughty soils and is dominated by grasses, forbs, low shrubs, and scattered trees (WDNR 2005). Pits and depressions were formed by melting blocks of ice left embedded in the sand and gravel drift, many of the depressions are occupied by lakes and marshes while others are dry (Evrard 2000). Douglas County Wildlife Area contains an Inland Beach community and both properties have scattered lakes and depressions classified as Open Bog with components of Poor Fen, Northern Sedge Meadow, and Northern Wet Forest. The characteristic vegetation is described in detail for each natural community type found on these properties.

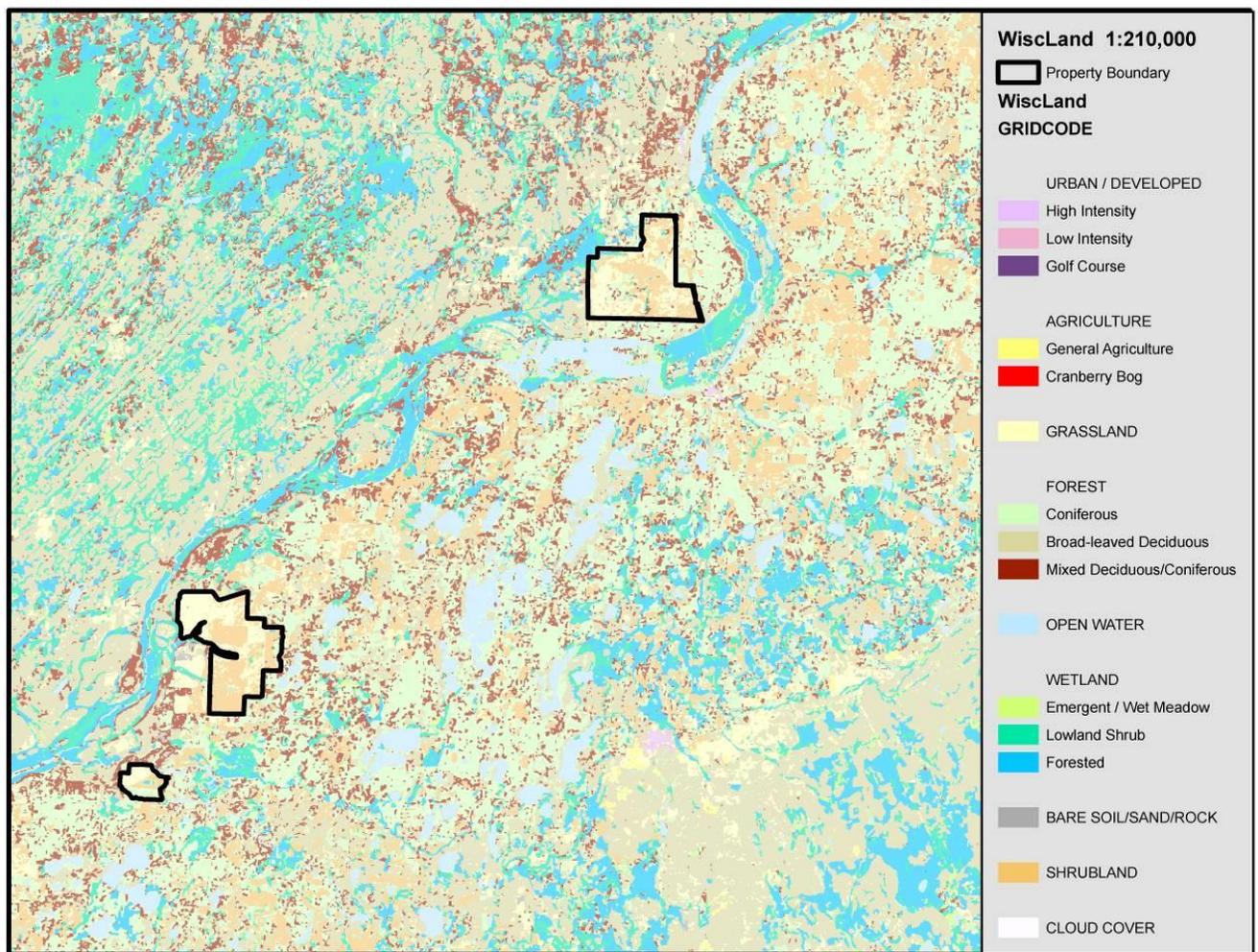


Figure 4: Generalized 1993 WISCLAND Landcover for the NWBPG

Moderate to good quality **Pine and Oak Barrens** are present providing excellent opportunities to manage for these globally rare systems. They exist in this landscape of nutrient-poor and drought-prone soils with frost pockets, inhibiting the growth of mature canopy trees and favoring conifer species such as jack pine and red pine. Both properties are farther north from the closely related prairie region, exhibit variable climatic tolerances of individual species and topographic differences, and therefore are less diverse and contain fewer prairie species compared to barrens south of the tension zone.

Current management is aimed at keeping the barrens in an early successional state for Sharp-tailed Grouse and grassland birds. The early successional barrens management unit has grasses, sedges, forbs, patches of oak grubs and hazelnut, and scattered red pine as dominants. Good quality early successional barrens habitats in Wisconsin are maintained with prescribed fire (Hoffman pers. comm.). Additional management may include small amounts of herbicide treatment for invasive species and mechanical means for scattered large diameter trees. Prescribed burns are scheduled when the oak and pine reaches a density where it begins to diminish the diversity of the understory of grasses and forbs.

More diverse barrens would include a mosaic from late succession stages of dry forest or savanna with a scattered overstory of larger diameter trees to early succession barrens and grasslands (WDNR 2006b). Historically, the Northwest Sands Ecological Landscape supported barrens that favored scattered large diameter trees spaced about 150 to 1500 feet apart, mostly jack pine, but some oak savanna likely existed in the south central part of this landscape (WDNR in prep.). A comparison of relative dominance (basal area) of tree species within this Ecological Landscape shows eastern white pine, red pine, and jack pines have decreased in dominance while aspen (*Populus sp.*), oaks (*Quercus spp.*), and red maple (*Acer rubrum*) have increased (WDNR in prep.). This conversion along with the early succession management resulting in a lack of scattered large diameter pines on these properties has essentially created a pine-oak barrens or scrub barrens type that is not currently recognized in the Wisconsin Natural Heritage Inventory Natural Community classification system (Epstein et al 2002).

The early successional barrens in the NWBPG are currently dominated by graminoids such as little bluestem (*Schizachyrium scoparium*), big blue-stem (*Andropogon gerardii*), poverty oat grass (*Danthonia spicata*), June grass (*Koeleria macrantha*), Pennsylvania sedge (*Carex pensylvanica*), and panic grasses (*Panicum spp.*). Forbs are generally patchily distributed and dominated by hairy puccoon (*Lithospermum carolinense.*), hoary puccoon (*L. canescens*), wood lily (*Lilium philadelphicum*), prairie phlox (*Phlox pilosa*), gray goldenrod (*Solidago nemoralis*), prairie goldenrod (*S. ptarmicoides*), smooth aster (*Aster laevis*), rough blazing-star (*Liatris aspera*), showy blazing-star (*L. ligulistylis*), and western sunflower (*Helianthus occidentalis*). Low shrubs are variable, but can be very abundant and are dominated by blueberries (*Vaccinium angustifolium* and *V. myrtilloides*) and bearberry (*Arctostaphylos uva-ursi*) along with New Jersey tea (*Ceanothus americanus*). The tall shrub layer includes oak grubs, American hazelnut (*Corylus americana*), sweet-fern (*Comptonia peregrina*), quaking aspen (*Populus tremuloides*), and prairie willow (*Salix humilis*). Young, stunted, and scattered trees present include jack pine, red pine with some rare, scattered mature trees, along with Hill's oak (*Quercus ellipsoidalis*), bur oak (*Q. macrocarpa*), black oak (*Q. velutina*), and copses of quaking aspen (*Populus tremuloides*). Rare plants include the state threatened dwarf milkweed (*Asclepias ovalifolia*), as well as the species of Special Concern clustered broom-rape (*Orobanche fasciculata*) and Richardson's sedge (*Carex richardsonii*) at Namekagon Barrens Wildlife Area.

Two-track roads, firebreaks, trails, old home sites, and former food plots are present and provide sources and corridors for the spread of invasive species. Invasive species present in the barrens include spotted knapweed (*Centaurea biebersteinii*), leafy spurge (*Euphorbia esula*), cypress spurge (*E. cyparissias*),

orange hawkweed (*Hieracium aurantiacum*), and bird's-foot trefoil (*Lotus corniculata*). Invasive species occupy less than 5% of the area.

An **Inland Beach** community is a lakeshore, typically of seepage lakes, that experiences enough water level fluctuation from precipitation and groundwater to prevent the development of a stable shoreline forest or other community and may, instead support a specialized biota adapted to sandy or gravelly littoral habitats (Epstein et al, 2002). An Inland Beach community is located at Douglas County Wildlife Area in association with a large softwater seepage wetland comprised of a sandy-peaty shoreline and strongly zonal vegetation. A small bog dominated by black spruce (*Picea mariana*) occurs on an island in the center of the lake. Dominant species of the beach include steeplebush (*Spiraea tomentosa*), Canada blue-joint grass (*Calamagrostis canadensis*), narrow-leaved woolly sedge (*Carex lasiocarpa*), grass-leaved goldenrod (*Euthamia graminifolia*), brown-fruited rush (*Juncus pelocarpus*), narrow-panicle rush (*J. brevicaudatus*), autumn sedge (*Fimbristylis autumnalis*), northeastern sedge (*Carex cryptolepis*), bog St. John's-wort (*Triadenum fraseri*), Canadian St. John's-wort (*Hypericum canadense*), rattlesnake grass (*Glyceria canadensis*), northern manna grass (*G. borealis*), soft-stem bulrush (*Schoenoplectus tabernaemontani*), three-way sedge (*Dulichium arundinaceum*), American white water-lily (*Nymphaea odorata*), water-shield (*Brasenia schreberi*), and common pondweed (*Potamogeton natans*).

The alternation of high and low water periods maintains populations of beach specialists over time, including rare species of unusual geographic affinity, such as Fassett's locoweed (*Oxytropis campestris* var. *chartactea*) known from the northern portion of the Northwest Sands Ecological Landscape. This plant is endemic to Wisconsin and found in only two geographic areas; Portage and Waushara Counties and Bayfield County.

There are scattered examples of **Open Bogs** throughout the pitted outwash landscape of the NWBPG. Open Bogs are acidic, low nutrient, northern Wisconsin peatlands dominated by *Sphagnum* species mosses that occur in deep layers, often with pronounced hummocks and hollows (Epstein et al 2002). Although typically characterized by low floristic diversity, the Open Bogs of the NWBPG are diverse due to the close proximity of other wetland communities.

Representative Open Bog species found at these sites include leather-leaf (*Chamaedaphne calyculata*), small cranberry (*Vaccinium oxycoccos*), large cranberry (*V. macrocarpon*), and early low blueberry (*V. angustifolium*), and cotton-grass (*Eriophorum angustifolium*). Many of the Open Bogs inter-grade with Northern Wet Forest areas which include canopy trees like tamarack (*Larix laricina*) and black spruce along with other representative species including Labrador-tea (*Ledum groenlandicum*) and three-fruited sedge (*Carex trisperma*). Poor Fen and Northern Sedge Meadow elements are also present; these are typically more open wetland communities dominated by sedges like narrow-leaved woolly sedge, three-fruited sedge, common yellow lake sedge (*C. utriculata*), and tussock sedge (*C. stricta*), grasses including Canada blue-joint grass, and scattered shrubs including bog birch (*Betula pumila*) and steeplebush. Some depressions include tiny pockets of open water in the center with bull-head pond-lily (*Nuphar variegata*), soft-stem bulrush, three-way sedge, wool-grass (*Scirpus cyperinus*), marsh cinquefoil (*Comarum palustre*), and bog St. John's-wort. These depressions vary in amounts of moisture seasonally and annually with several of these wetlands being dry in 2009 due to ongoing drought conditions.

The Wisconsin Wildlife Action Plan (WDNR 2006b) and the Ecological Landscapes of Wisconsin Handbook (WDNR in prep.) identifies the best landscapes in the state for sustaining various natural communities and includes a table with opportunity ranks for each Ecological Landscape / Natural Community combination. There are 21 natural communities for which there are "Major" or "Important"

opportunities in the Northwest Sands Ecological Landscape; of these, the following ten natural communities are present on NWBPG:

- Coldwater Streams
- Coolwater Streams
- Inland Beach
- Inland Lake
- Northern Dry Forest
- Northern Sedge Meadow
- Northern Wet Forest
- Oak Barrens
- Open Bog
- Pine Barrens

Rare Species and High Quality Natural Communities of the NWBPG

Numerous rare species and high-quality examples of native communities have been documented within Townships 42N14W and 44N12W (Table 1). See Appendix C for summary descriptions for the species and natural communities that occur in these townships.

Table 1. Documented rare species and high-quality natural communities within Townships 42N14W 44N12W are listed in alphabetical order by common name. There may be more than one element occurrence of the species or natural community per property. For an explanation of state and global ranks, as well as state status, see Appendix E.

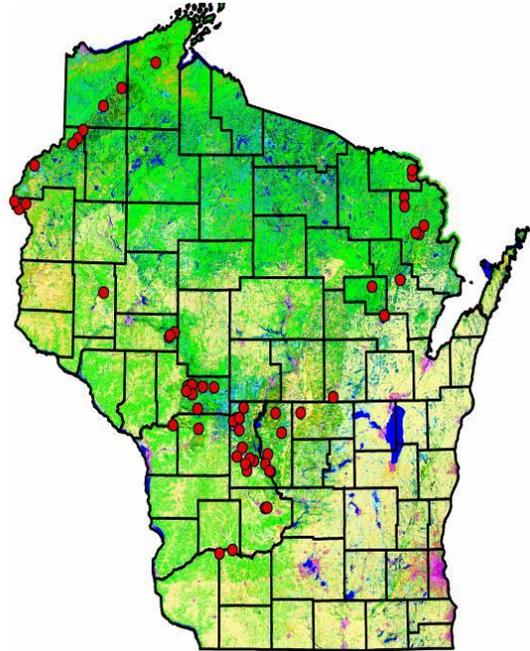
Common Name	Scientific Name	Last Obs Date	State Rank	Global Rank	State Status
Animals					
American Bullfrog	<i>Lithobates catesbeianus</i>	1997	S3	G5	SC/H
American Woodcock	<i>Scolopax minor</i>	2009	S3S4B	G5	SC/M
Black Tern	<i>Chlidonias niger</i>	2009	S2B	G4	END
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	2009	S3S4B	G5	SC/M
Blanding's Turtle	<i>Emydoidea blandingii</i>	1989	S3	G4	THR
Brown Thrasher	<i>Toxostoma rufum</i>	2009	S3S4B	G5	SC/M
Canada Warbler	<i>Wilsonia canadensis</i>	2009	S3B	G5	SC/M
Chryxus Arctic	<i>Oeneis chryxus</i>	1996	S2?	G5	SC/N
Clear-winged Grasshopper	<i>Camnula pellucida</i>	2009	S3?	G5	SC/N
Club-horned Grasshopper	<i>Aeropedellus clavatus</i>	2009	S2	G5	SC/N
Cobweb Skipper	<i>Hesperia metea</i>	1996	S2	G4G5	SC/N
Connecticut Warbler	<i>Oporornis agilis</i>	2006	S2S3B	G4	SC/M
Dickcissel	<i>Spiza americana</i>	1991	S3B	G5	SC/M
Dusted Skipper	<i>Atrytonopsis hianna</i>	1977	S3	G4G5	SC/N
Eastern Hog-nosed Snake	<i>Heterodon platirhinos</i>	2009	S3?	G5	SC/H
Elktoe	<i>Alasmidonta marginata</i>	1997	S3	G4	SC/P
Extra-striped Snaketail	<i>Ophiogomphus anomalus</i>	1994	S2S3	G4	END
Field Sparrow	<i>Spizella fusilla</i>	2009	S3S4B	G5	SC/M
Gilt Darter	<i>Percina evides</i>	2009	S2S3	G4	THR
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	2009	S3S4B	G4	SC/M
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	2009	S3B	G5	SC/M
Gray Wolf	<i>Canis lupus</i>	2008	S2	G4	SC/P
Henry's Elfin	<i>Callophrys henrici</i>	1989	S1S2	G5	SC/N
Least Bittern	<i>Ixobrychus exilis</i>	1989	S2S3B	G5	SC/M
Least Flycatcher	<i>Empidonax minimus</i>	2009	S4B	G5	SC/M
Leonard's Skipper	<i>Hesperia leonardus</i>	1999	S3	G4	SC/N
Midwestern Fen					
Buckmoth	<i>Hemileuca sp. 3</i>	1980	S3	G5T3T4	SC/N
Mink Frog	<i>Lithobates septentrionalis</i>	1997	S3S4	G5	SC/H
Mottled Dusky Wing	<i>Erynnis martialis</i>	2009	S2	G3	SC/N
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	1992	S3	G5	SC/P
Northern Harrier	<i>Circus cyaneus</i>	2009	S3B,S2N	G5	SC/M
Prairie Skink	<i>Plestiodon septentrionalis</i>	2009	S3	G5	SC/H
Pronghorned Clubtail	<i>Gomphus graslinellus</i>	1994	S2S3	G5	SC/N
Purple Wartyback	<i>Cyclonaias tuberculata</i>	2009	S2	G5	END
Pygmy Shrew	<i>Sorex hoyi</i>	1997	S3S4	G5	SC/N
Red Crossbill	<i>Loxia curvirostra</i>	1991	S2?B	G5	SC/M
River Redhorse	<i>Moxostoma carinatum</i>	2009	S2	G4	THR
Rocky Mountain					
Sprinkled Locust	<i>Chloealtis abdominalis</i>	2009	S2?	G5	SC/N
Sharp-tailed Grouse	<i>Tympanuchus phasianellus</i>	2009	S1B,S2N	G4	SC/M
Speckled Rangeland					
Grasshopper	<i>Arphia conspersa</i>	2009	S2	G5	SC/N
Trumpeter Swan	<i>Cygnus buccinator</i>	2009	S4B	G4	SC/M

Common Name	Scientific Name	Last Obs Date	State Rank	Global Rank	State Status
Upland Sandpiper	<i>Bartramia longicauda</i>	2009	S2B	G5	SC/M
Veery	<i>Cathartes fuscescens</i>	2009	S3S4B	G5	SC/M
Vesper Sparrow	<i>Pooecetes gramineus</i>	2009	S3S4B	G5	SC/M
Weed Shiner	<i>Notropis texanus</i>	1908	S3	G5	SC/N
Western Meadowlark	<i>Sturnella neglecta</i>	1991	S2B	G5	SC/M
Whip-poor-will	<i>Caprimulgus vociferus</i>	2009	S3B	G5	SC/M
Wood Thrush	<i>Hylocichla mustelina</i>	1991	S4B	G5	SC/M
Wood Turtle	<i>Glyptemys insculpta</i>	1993	S3	G3	THR
Woodland Jumping Mouse	<i>Napeozapus insignis</i>	1997	S2S3	G5	SC/N
Plants					
Arrow-leaved Sweet-coltsoot	<i>Petasites sagittatus</i>	1929	S3	G5	THR
Dwarf Milkweed	<i>Asclepias ovalifolia</i>	2009	S3	G5?	THR
Hooker's Orchid	<i>Platanthera hookeri</i>	2001	S2	G4	SC
Marsh Grass-of-Parnassus	<i>Parnassia palustris</i>	1929	S1S2	G5	THR
Marsh Horsetail	<i>Equisetum palustre</i>	2001	S2	G5	SC
One-flowered Broomrape	<i>Orobanche uniflora</i>	2009	S3	G5	SC
Richardson Sedge	<i>Carex richardsonii</i>	1994	S2	G4	SC
Robbins' Spike-rush	<i>Eleocharis robbinsii</i>	2009	S3	G4G5	SC
Rugulose Grape-fern	<i>Botrychium rugulosum</i>	1929	S2	G3	SC
Communities					
Inland Beach		2009	S3	G4G5	
Lake--Shallow, Soft, Seepage		1979	S4	GNR	
Northern Dry Forest		1979	S3	G3?	
Northern Sedge Meadow		1981	S3	G4	
Pine Barrens		2009	S2	G2	
Spring Pond		1979	S3	GNR	

Management Considerations and Opportunities for Biodiversity Conservation for the Northwest Barrens Planning Group

Pine and Oak Barrens

Pine and Oak Barrens were historically common (covering a combined 4.1 million acres) in Wisconsin but are now rare throughout the entire state with only an estimated 50,000 acres remaining (WDNR in prep.). Wisconsin has a unique responsibility for preserving and restoring this community, because the highest percentage of barrens worldwide is found in the state. Major opportunities for sustaining these barrens communities exist within the Northwest Sands Ecological Landscape (WDNR in prep.). Historically, barrens sites occurred on sandy glacial outwash plains, extinct glacial lake beds, and outwash terraces along large rivers (WDNR 1995). Regardless of location or land type, this is a community dependant upon disturbance and fire has been consistently important in maintaining barrens. The lack of regular burning continues to be the most limiting factor in barrens restoration and maintenance (WDNR 1995).



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Figure 5: Pine Barrens element occurrences in Wisconsin

The combination of habitat loss and landscape fragmentation poses a great threat to biodiversity conservation leading to an increase in numbers of rare or endangered species and limitations to the necessary barrens fire management regime. Most barrens sites throughout this ecological landscape are small, isolated, and are in a mosaic of public and private ownerships. One priority conservation objective is to connect these smaller units to facilitate conservation of viable populations of rare plants and animals. Douglas County Wildlife Area and Namekagon Barrens are two of the best examples of Pine and Oak Barrens found in this ecological landscape and both hold potential for expansion. Considerations for connecting these sites and other barrens areas found at nearby Crex Meadows Wildlife Area, Fish Lake Wildlife Area, and Moquah Barrens should be explored.

Active management, including the use of prescribed fire, commercial timber harvests, and mechanical cutting of woody vegetation, is already occurring and plays an important role in preventing the succession of the NWBPG properties to closed canopy forests. Larger, unfragmented, landscape scale preserves afford more options for delineating prescribed burn units, securing permanent and safe burn breaks, and managing for wildlife species that require greater patch size such as the Sharp-tailed Grouse. In addition, larger units can buffer and protect core areas from invasive species like spotted knapweed and spurge species. Climate change could exacerbate the negative cumulative impacts of habitat loss and fragmentation. Local climate disturbances likely will further alter long-term ecological cycles like fire, drought, and floods as well as seasonal temperature and precipitation patterns. Because these changes may shift the distribution and abundance of plant and animal communities, landscape fragmentation will

impede the ability of many species to respond, move, and/or adapt to climate-related impacts (Tabor and Meiklejohn 2009).

Additional threats to barrens communities include their conversion to monotypic pine stands which can cause conflicts with barrens or grassland wildlife management objectives and can eliminate ground layer plants (WDNR 2006b). Off-road and all-terrain vehicle use is popular on sandy soils, but can destroy vegetation, disturb animals, and aid in spread of invasive plant species. The uncertainty associated with the lack of permanent state ownership for the entirety of both of these wildlife areas is reason for concern.

This landscape supports good populations of two declining suites of birds: grassland birds and shrub or scrub loving birds. Numerous uncommon bird species utilize the more open sandy grassland aspect of Pine and Oak Barrens of these Townships such as Sharp-tailed Grouse (SC), Upland Sandpiper (SC), Dickcissel (SC), Western Meadowlark (SC), Northern Harrier, Vesper Sparrow, Whip-poor-will, and Common Nighthawk. Many of the scrubland birds are Species of Greatest Conservation Need and include Brown Thrasher, Black-billed Cuckoo, Veery, and Field Sparrow. Sharp-tailed Grouse are considered a signature species for barrens habitats. Wisconsin DNR (2008) estimates for this species found this landscape as having one of the two best populations in the state. Sharp-tailed Grouse are area-sensitive and research suggests that limited hunting and a 10,000 acre minimum parcel is needed for long-term stability (WDNR 1995).

There is a need for good-quality Pine and Oak Barrens to serve as reference areas for determining restoration potential, demonstrate most effective management techniques, and maintain associated plants and animals. In addition, barrens provide numerous recreational opportunities for blueberry picking, hunting, bird-watching, hiking, botanizing, horse riding, and dog trialing. Despite the neglect and abuse that most barrens have undergone since settlement, this is one of our most resilient natural communities and it will respond to careful management by controlled burns and cutting (Mossman et al 1991). Significant opportunities exist to restore these ecosystems, increase connectivity between remnant sites, and improve habitat for many barrens plants and animal specialists.

Herptiles of the Northwest Barrens Group

Pitted wetland areas are intermingled amongst the dry, sandy barrens of these two sites, representing remnants of past glacial activity and serving as important water sources and habitat for numerous reptiles and amphibians. Evrard and Hoffman's studies (Evrard 2000; Evrard and Hoffman 2000) of the associated taxa groups utilizing the Pine Barrens of northwest Wisconsin included reptile and amphibian trapping and frog and toad calling surveys at both properties. They found blue-spotted salamander, eastern tiger salamander, American toad, northern spring peeper, and northern red-bellied snake to be common at both sites. Uncommon species found in these Townships include the prairie skink (SC), eastern hog-nosed snake (SC), bullfrogs (SC) and mink frogs (SC).

Water and wetland resources, along with sandy soils associated with the Northwest Sands Ecological Landscape, provide excellent nesting, foraging, and hibernation opportunities for numerous turtle species including state threatened Blanding's & wood turtles. Douglas County is near the northern extent of the Blanding's turtles range. They are still somewhat common in sedge meadows and wet marshes in this area but likely become much less common north of this region. Wood turtles are an increasingly uncommon species both in Wisconsin and across their entire range due to road mortality, high rates of

nest predation, and over-collection. Protecting turtle nesting areas would be helped by limiting disturbances including minimization of recreational activities in the vicinity of these locations and limiting road-building near rivers, streams, and wetlands.

Terrestrial Insects

A number of uncommon terrestrial invertebrate species, primarily several Lepidopterans, are present or have the potential to occur throughout these two barrens properties. The small remaining acreage and isolation of Pine and Oak Barrens throughout its historic range in Wisconsin, has threatened the population viability of many invertebrates. Managing fire-dependant communities with their associated rare Lepidoptera can be a challenge. Martin and Hoffman (1990) addressed this subject in *Managing Lepidoptera on State Natural Area Prairies*. Even though the guidance is for prairies, many of the concepts are applicable to barrens. The excerpt below is an example of methods used on State Natural Areas and is intended solely to underscore the delicate balance of trying to avoid losing a population through lack of management or through overly aggressive management:

The extensive fires that occurred in this landscape prior to European settlement killed billions of insects each and every time they occurred. However, these fires rarely burned the entire landscape. Patches of habitat were often left unburned and patterns of burn intensity varied enough to reduce the impacts on insects. Following these fires, the incredible fecundity (ability to reproduce) of most insects would permit rapid recolonization of their habitat.

In today's landscape, though, prairies are fragmented into smaller remnants, which often are separated by miles of unacceptable habitat for certain Lepidoptera (butterflies, skippers, and moths). Could our prescribed burning or other management eliminate a rare butterfly population?

Lepidoptera management is a subject area with much speculation and strongly held views. Endangered Resources staff have talked to butterfly experts and attended workshops on Lepidoptera management and have learned that prescribed burning must be done with care to avoid inadvertently stressing a species beyond recovery. Some Lepidoptera species are clearly sensitive to fire. For many, recolonization accelerates population recovery. Since it is difficult to say with certainty how a species will recover when burning an entire site, it is important that we take precautions to protect populations of these species when conducting burns. One way to preserve prairie insects is to divide the area to be burned into units and burn some, but not all, of those units in any one year. We incorporate this technique into the management plans for all of our State Natural Areas. First, we determine management goals for the entire natural area. In the case of prairie communities, a major goal usually includes improving the quality and size of the prairies through burning. Then we determine what species of concern are found on a particular area and which of these will be affected by our management. Larger prairie areas increase the likelihood that the affected species can be retained. The area is divided into burn units, and we devise a burning schedule that will allow those rare species to seek shelter in the unburned areas or build up a population large enough to recolonize the burned area, in case such backup is needed.

Although this type of management requires additional time and expense, it is a necessary precaution to ensure that the entire insect component of our natural communities is preserved while maintaining the natural fire regime under which the community has

evolved. Prairie plants and insects depend on each other; protecting these interrelationships is well worth the extra effort.

Wisconsin Wildlife Action Plan

Numerous vertebrate SGCN known from NWBPG along with the natural communities they inhabit represent Ecological Priorities for the Northwest Sands Ecological Landscape (WDNR 2006b). The priorities were developed based on the probability that a species occurs in an Ecological Landscape, their degree of association with Natural Communities, and the opportunities in a given Ecological Landscape for sustaining the Natural Community (see dnr.wi.gov/org/land/er/wwap/explore/tool.asp for more information) (Figure 6). Appendix D contains a matrix with the vertebrate SGCN and associated ecological opportunities (native communities) for this landscape.

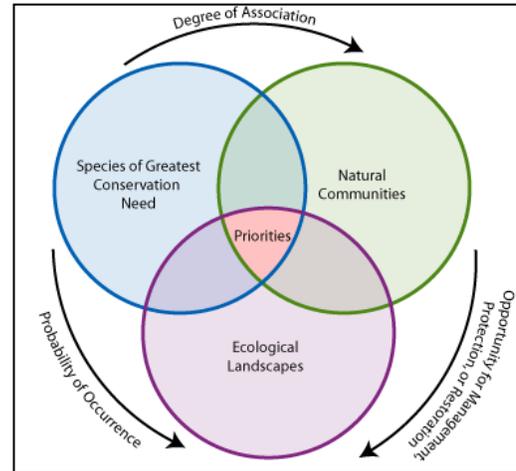


Figure 6: Graphic Illustrating the Process used for Identifying Ecological Priorities in the Wisconsin Wildlife Action Plan

Invasive Plants

Several invasive species are well-established at Namekagon Barrens and Douglas County Wildlife Areas. Leafy spurge is quite common in the southwest portion of Douglas County Wildlife Area. Spotted knapweed is found at both sites but currently seems to be more restricted to the trail areas found at Douglas County Wildlife Area, which include horse and hiking trails. There are also small manageable populations of cypress spurge that are primarily associated with historical home site locations at both properties. Bird's-foot trefoil is found at Namekagon Barrens mainly in what appears to be old food plots and poses a threat to native plant diversity here by forming dense mats which can choke out native plants. Two small populations of bird's-foot trefoil were also found at Douglas County Wildlife Area along a two-track and a hiking trail. Additional invasive species noted, but not dominant in the NWBPG and of lesser concern at these sites, include orange hawkweed, reed canary grass (*Phalaris arundinacea*), bull thistle (*Cirsium vulgare*), common mullein (*Verbascum thapsus*), and butter-and-eggs (*Linaria vulgaris*). For those species that are still in manageable populations, such as cypress spurge and spotted knapweed, control measures should begin before the spread becomes too extensive to reasonably manage. Where large, extensive infestations are present, priority should be given to high quality areas and control efforts could be expanded once these areas are no longer infested. It should be noted that bio-control management was initiated in 2008 on Douglas County Wildlife Area for leafy spurge and spotted knapweed.

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 (e.g., endemism, endangered species, refugia), 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); or,
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) it is clear that the NWBPG has areas that should be considered High Conservation Value Forests. Based on our results, the best HCVF candidates on the NWBPG are represented by the "Primary Sites" described below.

Primary Sites: Opportunities for Biodiversity Conservation

The following Primary Sites were delineated because they 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 NWBPG. These sites warrant high protection and/or restoration consideration during the development of the new property master plan. Site boundaries and acreages provided are first approximations. All Primary Sites can be considered High Conservation Value Forests for the purpose of Forest Certification. This report is meant to be considered along with other information when identifying opportunities for various management designations during the master planning process. The site boundaries are illustrated on Figures 7 and 8.

Douglas County Wildlife Area Primary Site – (DCWA01) Pine Barrens Management Area -- 4287 acres

Site Description: This Pine and Oak Barrens community occurs on rolling pitted outwash terrain in the Northwest Sands Ecological Landscape. This site includes the Solon Springs Sharptail Barrens SNA. Management for Sharp-tailed Grouse and grassland birds at this site has resulted in a very sparse canopy cover (1% or less) dominated by jack pine, red pine, Hill's and black oak. The tall shrub layer is moderate, but short shrubs such as blueberries, bearberry, and New Jersey tea are very abundant. Groundcover is dominated by graminoids with forbs being generally sparse or patchy in distribution. The community also includes numerous moist depressions with elements of Open Bog, Poor Fen, Northern Sedge Meadow, and Northern Wet Forest and occasional pockets of open water. There is also an Inland Beach community present that is associated with a large softwater seepage wetland with fluctuating water levels and comprised of a sandy-peaty shoreline and strongly zonal vegetation. A small bog dominated by black spruce occurs on an island in the center of the lake. Much of the site is owned by Douglas County with the remainder being owned by Wisconsin DNR.

Significance of Site: The globally rare Pine and Oak Barrens communities are better represented in the Northwest Sands than in any other Ecological Landscape and offers the best opportunities in the state for managing this type (WDNR 2006b). A good quality example of the globally rare barrens community types makes up the vast majority of the site and this habitat type supports numerous rare species. Douglas County Wildlife Area has been recognized as a priority landscape for grassland and brush prairie bird management (Mossman and Sample 1997) and as an Important Bird Area (WDNR 2007).

Management Considerations: Barrens and bracken grasslands are globally rare ecosystems that require collaborative and multiagency planning. Effective barrens management crosses ownership boundaries and needs many partners to be successful. Managing many thousands of acres in a mosaic of barrens, grasslands, wetlands, and forests may be the best way to protect many uncommon species. Small barrens sites can be managed to keep remnants of barrens flora and fauna on private land. The best of the barrens communities should be considered as HCVF. Management options should be considered on a landscape basis with timber harvest and fire applied in a shifting mosaic across the landscape enabling for the full spectrum of barrens successional stages. Adherence to the Bureau of Endangered Resources Grassland and Savanna Protocols for avoidance of take should be part of the management considerations. More information is available at: http://dnr.wi.gov/org/land/er/take/Grassland_Savanna_Protocol.htm .

Control of invasive plants should be a high priority as several problem species were noted along roads and firebreaks, as well as in former food plots. Invasive species present include spotted knapweed, leafy spurge, cypress spurge, orange hawkweed, and bird's-foot trefoil.



Spotted knapweed along trail at Douglas County Wildlife Area (O'Connor, 2009)

Namekagon Barrens Wildlife Area Primary Sites - Pine Barrens Management Areas – North Unit (NBNU01) --- 4326 acres & South Unit (NBSU02) --- 722 acres

Site Description: The Pine and Oak Barrens communities making up these two primary sites cover both the north and south units and occur on rolling pitted outwash terrain in the Northwest Sands Ecological Landscape. The two units are separated by the Namekagon River. The south unit of Namekagon Barrens falls within the Lower Namekagon Rolling Barrens LTA and occurs on a more rolling landform than the north unit although both units have characteristic soils of excessively drained sand over outwash. The north unit is in Bayfield Level Barrens LTA and is drained by two headwater streams which flow into the St. Croix River. The surrounding landscape has large amounts of Northern Dry Forest affording options for barrens expansion. Both sites are managed for Sharp-tailed Grouse and grassland birds resulting in a very sparse canopy cover (1% or less) and occasionally dense shrub layer consisting of oak grubs, American hazelnut, sweet-fern, New Jersey tea, and blueberries. The groundlayer is dominated by various sand prairie species of graminoides such as big blue-stem, little blue-stem, and June grass, as well as forbs like rough blazing star, bird's-foot violet (*Viola pedata*), prairie smoke (*Geum triflorum*), and wild bergamot (*Monarda fistulosa*). Each unit also includes numerous moist depressions typed as Open Bog with elements of Poor Fen, Northern Sedge Meadow, and Northern Wet Forest and occasional pockets of open water. The site is entirely owned by Burnett County and is leased to Wisconsin DNR.

Significance of Site: The globally rare Pine and Oak Barrens communities are better represented in the Northwest Sands than in any other Ecological Landscape, and offer the best opportunities in the State for managing these types (WDNR 2006b). A good quality example of these rare community types make up the vast majority of both sites. There are numerous rare species documented on these primary sites including birds, mammals, herptiles, invertebrates, and plants. This site has been recognized as a priority landscape for grassland and brush prairie bird management (Mossman and Sample 1997) and as an Important Bird Area (WDNR 2007).



Sharp-tailed Grouse (photo by Nancy Christel)

Management Considerations: Barrens and bracken grasslands are globally rare ecosystems that require collaborative and multiagency planning. Effective landscape-scale barrens management crosses ownership boundaries and needs many partners to be successful. Managing many thousands of acres in a mosaic of barrens, grasslands, wetlands, and forests may be the best way to protect many uncommon species. Small barrens sites can be managed to keep remnants of barrens flora and fauna on private land. The best of the barrens communities should be considered as HCVF. Management options should be considered on a landscape basis with timber harvest and fire applied in a shifting mosaic across the

landscape enabling for the full spectrum of barrens successional stages. Adherence to the Bureau of Endangered Resources Grassland and Savanna Protocols for avoidance of take should be part of the management considerations. More information is available at:

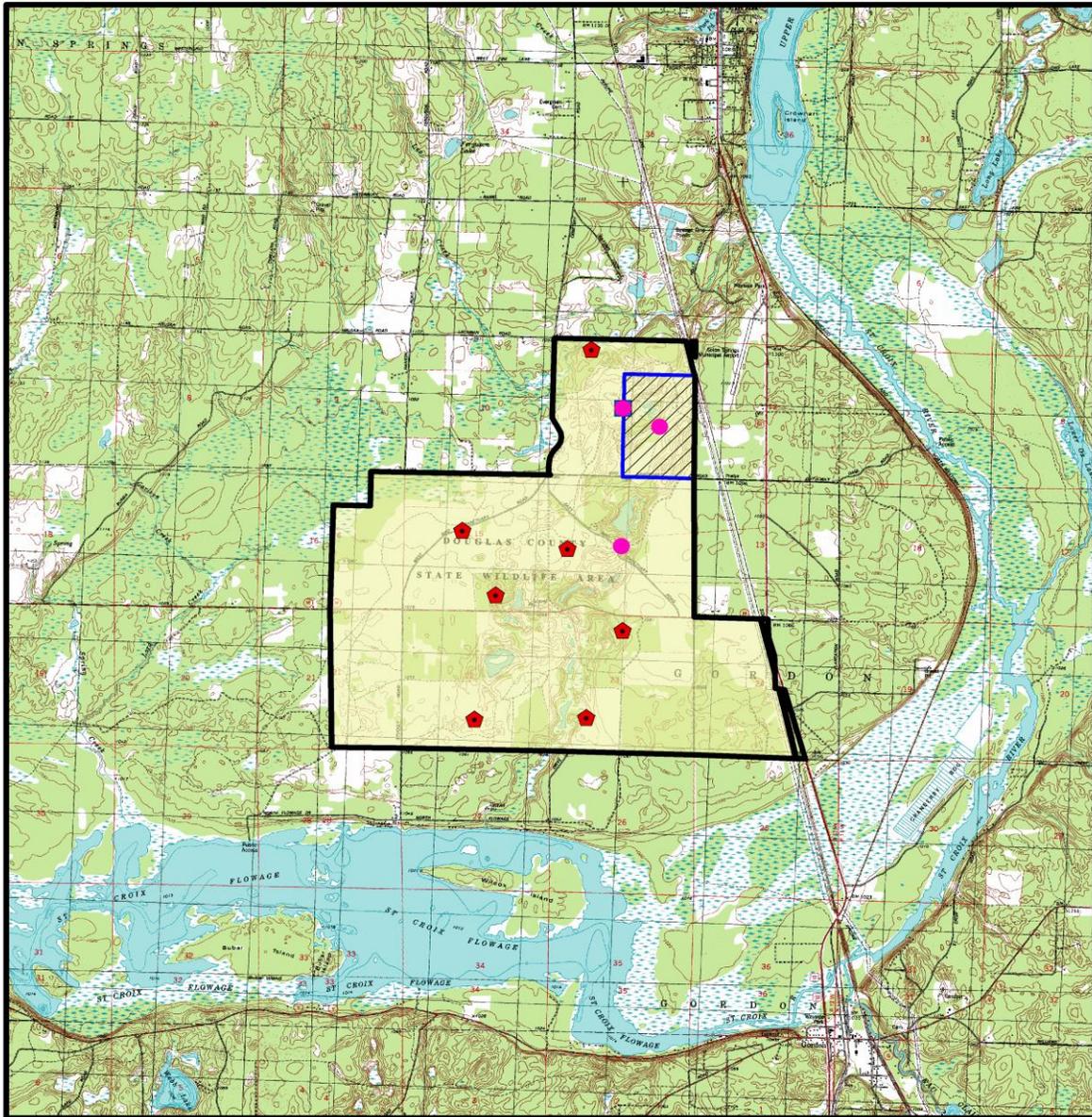
http://dnr.wi.gov/org/land/er/take/Grassland_Savanna_Protocol.htm .

Control of invasive plants should be a high priority as several problem species that have the potential for large infestations were noted along roads and firebreaks. These include spotted knapweed, cypress spurge, orange hawkweed, and bird's-foot trefoil.



2008 Prescribed burn at Namekagon Barrens Wildlife Area (WDNR, 2008)

Figure 7: Douglas County Wildlife Area Primary Site



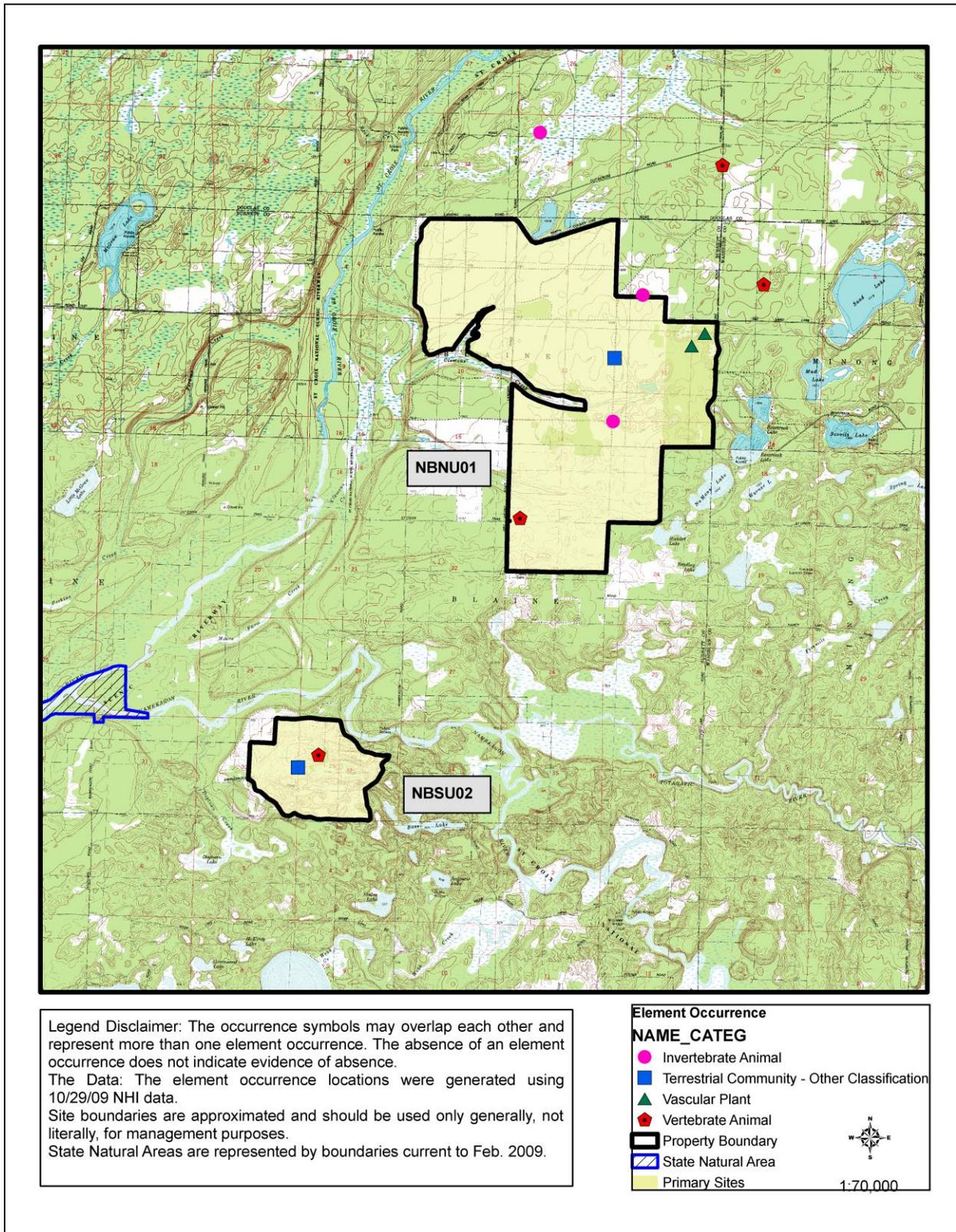
Legend Disclaimer: The occurrence symbols may overlap each other and represent more than one element occurrence. The absence of an element occurrence does not indicate evidence of absence.
 The Data: The element occurrence locations were generated using 10/29/09 NHI data.
 Site boundaries are approximated and should be used only generally, not literally, for management purposes.
 State Natural Areas are represented by boundaries current to Feb. 2009.

Element Occurrence

NAME_CATEG	Description
●	Invertebrate Animal
■	Terrestrial Community - Other Classification
▲	Vascular Plant
⬠	Vertebrate Animal
▬	Property Boundary
▨	State Natural Area
■	Primary Sites


 1:60,000

Figure 8: Namekagon Barrens Wildlife Area Primary Sites



Future Needs

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

- Invasives monitoring and control: Establishing an invasives monitoring protocol will be critical for NWBPG. State wildlife areas and many other public lands throughout Wisconsin are facing major management problems because of serious infestations of highly invasive species such as spotted knapweed, leafy spurge, and cypress spurge. Some of these species are easily dispersed by humans and vehicles; others are spread by birds, mammals, insects, water, or wind. In order to protect the important biodiversity values of the NWBPG, a comprehensive plan will be needed for detecting and rapidly responding to new invasive threats. Citizens, such as trail users or hunters, could be encouraged to report new sightings of invasive plants and, perhaps, cooperate with property managers in control efforts.
- Additional research on barrens restoration techniques is needed. Research should identify the most effective restoration techniques and include procedures for identifying restorable barrens sites.
- Monitoring pre and post-burn should be conducted to better understand the effects of prescribed fire rotations and intensity on sensitive plants and animals, and impacts on soils and nutrients.
- Vegetation plot data should be collected from the Pine and Oak Barrens communities at both sites. The data would enable more refined descriptions of early succession barrens communities in this region and across their state range, as well as aid in monitoring.
- Additional work is needed to identify the presence of mid and late successional stages of this habitat type to understand and assure the full spectrum of values provided by Pine and Oak Barrens habitat.
- Additional bird surveys should be done focusing on adjacent county forest land at the Douglas County Wildlife Area.
- Targeted surveys in the NWBPG to locate turtle nesting sites near the St. Croix and Namekagon Rivers.
- Additional reptile surveys should be done to search for gophersnakes in this landscape. This species is significantly associated with the barrens communities in the Northwest Sands Ecological Landscape.
- Small mammal surveys should be continued in areas that have not been previously inventoried to search for Franklin's ground squirrel. Monitoring of small mammal populations should occur in other areas to assess effects of current management regimes.
- Additional rare plant surveys are desirable.
- Additional surveys on adjacent private lands to determine their current and potential ecological values for use in considering property boundary changes.

Glossary

area-sensitive – species that respond negatively to decreasing habitat patch size. Area-sensitive species exhibit an increase in either population density or probability of occurrence with increasing size of a habitat patch.

connectivity – refers to the actual movement of individual organisms through the landscape and the degree to which each landscape facilitates or impedes this movement.

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

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

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

forb – a general term that usually refers to those native herbaceous plants of prairies and savannas that are not grasses, or grasslike. In broad terms, “wildflowers.”

High Conservation Value Forest (HCVF) -- a term used by Forest Certification organizations. These areas possess exceptional ecological qualities and have been specifically designated as HCVF in property management plans.

Incidental Take – the Wisconsin Endangered Species law allows the Department to authorize the “taking” of a protected species if the “taking” is not for the purpose of, but will be only incidental to, the carrying out of an otherwise lawful activity. Authorization generally occurs through an Incidental Take Permit.

kettle – a depression caused by a block of buried glacier ice that gradually melted, causing the overlying land surface to collapse downward.

Lepidoptera(n) – a large order of insects comprised of butterflies, moths, and skippers. The life cycle of each is marked by four very distinct-looking stages: egg, larva, pupa (or chrysalis), and adult. Together, these four stages constitute a single generation, which may last anywhere from three weeks to two years. The number of generations produced each year varies from species to species and even within species according to the lengths of regional growing seasons. Any of the four life stages may be used to pass the winter, depending upon the species.

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

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

outwash – composed of materials sorted and deposited by glacial meltwaters. The resulting topography can range from a level plain (“uncollapsed”) to very hilly (“collapsed” or “pitted”). Pitted outwash may contain numerous lakes, which originated when blocks of ice stranded by a receding glacier were buried within outwash deposits.

peatland – wetlands characterized by the gradual accumulation of peat, the partially decomposed remains of plants. Open Bog, Northern Wet Forest, and Poor Fen are amongst the peatland communities occurring within the study area.

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

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

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

Species List

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

Common Name	Scientific Name
Animals	
club-horned grasshopper	<i>Aeropedellus clavatus</i>
blue-spotted salamander	<i>Ambystoma laterale</i>
eastern tiger salamander	<i>Ambystoma tigrinum</i>
Grasshopper Sparrow	<i>Ammodramus savannarum</i>
speckled rangeland grasshopper	<i>Arphia conspersa</i>
dusted skipper	<i>Atrytonopsis hianna</i>
Upland Sandpiper	<i>Bartramia longicauda</i>
American toad	<i>Bufo americanus</i>
Henry's elfin	<i>Callophrys henrici</i>
clear-winged grasshopper	<i>Camnula pellucida</i>
gray wolf	<i>Canis lupus</i>
Whip-poor-will	<i>Caprimulgus vociferus</i>
Veery	<i>Catharus fuscescens</i>
rocky mountain sprinkled locust	<i>Chloealtis abdominalis</i>
Common Nighthawk	<i>Chordeilus minor</i>
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>
Northern Harrier	<i>Circus cyaneus</i>
Blanding's turtle	<i>Emydoidea blandingii</i>
mottled dusky wing	<i>Erynnis martialis</i>
wood turtle	<i>Glyptemys insculpta</i>
cobweb skipper	<i>Hesperia metea</i>
Midwestern fen buckmoth	<i>Hemileuca sp. 3</i>
Leonard's skipper	<i>Hesperia leonardus</i>
eastern hog-nosed snake	<i>Heterodon platirhinos</i>
Wood Thrush	<i>Hylocichla mustelina</i>
American bullfrog	<i>Lithobates catesbianus</i>
mink frog	<i>Lithobates septentrionalis</i>
woodland jumping mouse	<i>Napeozapus insignis</i>
chryxus arctic	<i>Oeneis chryxus</i>
Connecticut Warbler	<i>Oporornis agilis</i>
gophersnake	<i>Pituophis catenifer</i>
prairie skink	<i>Plestiodon septentrionalis</i>
Vesper Sparrow	<i>Poocetes gramineus</i>
northern spring peeper	<i>Psuedacris crucifer</i>
Willow Flycatcher	<i>Empidonax traillii</i>
pygmy shrew	<i>Sorex hoyi</i>
Franklin's ground squirrel	<i>Spermophilus franklinii</i>
Dickcissel	<i>Spiza americana</i>
Field Sparrow	<i>Spizella pusilla</i>
northern red-bellied snake	<i>Storeria occipitomaculata occipitomaculata</i>
Western Meadowlark	<i>Sturnella neglecta</i>
Brown Thrasher	<i>Toxostoma rufum</i>

Common Name	Scientific Name
animals continued...	
Sharp-tailed Grouse	Tympanuchus phasianellus
Golden-winged Warbler	Vermivora chrysoptera
Canada Warbler	Wilsonia canadensis
Plants	
aspen	Populus sp
blueberry	Vaccinium sp
oaks	Quercus spp
spurges	Euphorbia sp
panic grasses	Panicum sp
red maple	Acer rubrum
big blue-stem	Andropogon gerardii
bearberry	Arctostaphylos uva-ursi
dwarf milkweed	Asclepias ovalifolia
smooth aster	Aster laevis
bog birch	Betula pumila
water-shield	Brasenia schreberi
Canada blue-joint grass	Calamagrostis canadensis
northeastern sedge	Carex cryptolepis
narrow-leaved woolly sedge	Carex lasiocarpa
Richardson's sedge	Carex richardsonii
tussock sedge	Carex stricta
three-fruited sedge	Carex trisperma
common yellow lake sedge	Carex utriculata
New Jersey tea	Ceanothus americanus
spotted knapweed	Centaurea biebersteinii
leather-leaf	Chamaedaphne calyculata
bull thistle	Cirsium vulgare
marsh cinquefoil	Comarum palustre
sweet-fern	Comptonia peregrina
American hazelnut	Corylus americana
poverty oat grass	Danthonia spicata
three-way sedge	Dulichium arundinaceum
cotton-grass	Eriophorum angustifolium
cypress spurge	Euphorbia cyparissias
leafy spurge	Euphorbia esula
grass-leaved goldenrod	Euthamia graminifolia
autumn sedge	Fimbristylis autumnalis
prairie smoke	Geum triflorum
northern manna grass	Glyceria borealis
rattlesnake grass	Glyceria canadensis
western sunflower	Helianthus occidentalis
orange hawkweed	Hieracium aurantiacum
Canadian St. John's-wort	Hypericum canadense
narrow-panicle rush	Juncus brevicaudatus
brown-fruited rush	Juncus pelocarpus
June grass	Koeleria macrantha
tamarack	Larix laricina
Labrador-tea	Ledum groenlandicum

Common Name	Scientific Name
Plants continued...	
rough blazing-star	<i>Liatrix aspera</i>
showy blazing-star	<i>Liatrix ligulistylis</i>
wood lily	<i>Lilium philadelphicum</i>
butter-and-eggs	<i>Linaria vulgaris</i>
hoary puccoon	<i>Lithospermum canescens</i>
Carolina puccoon	<i>Lithospermum caroliniense</i>
bird's-foot trefoil	<i>Lotus corniculata</i>
wild bergamot	<i>Monarda fistulosa</i>
bull-head pond-lily	<i>Nuphar variegata</i>
American white water-lily	<i>Nymphaea odorata</i>
clustered broom-rape	<i>Orobanche fasciculata</i>
one-flowered broom-rape	<i>Orobanche uniflora</i>
reed canary grass	<i>Phalaris arundinacea</i>
prairie phlox	<i>Phlox pilosa</i>
black spruce	<i>Picea mariana</i>
jack pine	<i>Pinus banksiana</i>
red pine	<i>Pinus resinosa</i>
white pine	<i>Pinus strobus</i>
quaking aspen	<i>Populus tremuloides</i>
common pondweed	<i>Potamogeton natans</i>
Hill's oak	<i>Quercus ellipsoidalis</i>
bur oak	<i>Quercus macrocarpa</i>
black oak	<i>Quercus velutina</i>
prairie willow	<i>Salix humilis</i>
little blue-stem	<i>Schizachyrium scoparium</i>
soft-stem bulrush	<i>Schoenoplectus tabernaemontani</i>
wool-grass	<i>Scirpus cyperinus</i>
gray goldenrod	<i>Solidago nemoralis</i>
prairie goldenrod	<i>Solidago ptarmicoides</i>
steeplebush	<i>Spiraea tomentosa</i>
bog St. John's-wort	<i>Triadenum fraseri</i>
early low blueberry	<i>Vaccinium angustifolium</i>
large cranberry	<i>Vaccinium macrocarpon</i>
Canada blueberry	<i>Vaccinium myrtilloides</i>
small cranberry	<i>Vaccinium oxycoccus</i>
common mullein	<i>Verbascum thapsus</i>
bird's-foot violet	<i>Viola pedata</i>

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Appendix A

Natural Heritage Inventory Overview and General Methodology

The Northwest Barrens 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 (NHI) 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/).

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/compartment 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 E

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).