



Rapid Ecological Assessment for the White River 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: Bibon Swamp State Natural Area. Photo by: R.E. Dreis

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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 – White River Planning Group (WRPG) properties consisting of:

- Bibon Swamp State Natural Area (SNA)
- White River Fishery Area
- White River Wildlife Area

The primary objectives of this project were to collect biological inventory information relevant to the development of new master plans for the WRPG properties and to analyze, synthesize and interpret this information for use by the master planning team. The inventory effort focused on identifying rare and representative species, assessing areas of potential habitat for rare species, locating excellent or good-quality natural communities, and identifying High Conservation Value Forests.

Survey efforts for WRPG 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. There will, undoubtedly, be gaps in our knowledge of the biota of these properties, especially for certain taxonomic 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 is part of the Wisconsin DNR’s Bureau of Endangered Resources and a member of an international network of natural heritage programs representing all 50 states, as well as portions of Canada, Latin America, and the Caribbean. These programs share certain standardized methods for collecting, processing, and managing data for rare species and natural communities. NatureServe, an international non-profit organization (see www.NatureServe.org for more information), coordinates the network.

Natural heritage programs track certain *elements* of biological diversity: rare plants, rare animals, high-quality examples of natural communities, and other selected natural features. The NHI Working List contains the elements tracked in Wisconsin; they include Endangered, Threatened, and Special Concern plants and animals, as well as the natural community types recognized by NHI. The NHI Working List is periodically updated to reflect new information about the rarity and distribution of the state’s plants, animals, and natural communities. The most recent Working List is available from the Wisconsin DNR Web site (<http://www.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.

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 WRPG 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. Other efforts include 1997's Wisconsin's Lake Superior Coastal Wetlands Evaluation report on the biota and natural communities of the Lake Superior basin. Taxa specific surveys at Bibon Swamp included various inventory efforts from 2004-2007 focusing on rare plants, birds, small mammals, and herptiles of peatland natural communities. Anderson et al (2008) also delineated natural communities at Bibon Swamp as part of a supporting study.

Field surveys for the current project areas were conducted during 2008. Surveys were limited in scope and focused on documenting high quality natural communities, locations and habitat for rare plants, breeding birds, and forest raptors. Various other atlas databases are reviewed for rare species information. The collective results from all of these surveys were used to identify ecologically important areas on the WRPG.

Survey locations were identified or guided by using recent aerial photos, USGS 7.5' topographic maps, various GIS sources, information from the surveys noted above, 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 WRPG, key inventory considerations included assessment of important peatland natural communities and their associated rare plants and animals, intact upland forest blocks and breeding birds, wetland and aquatic communities associated with the White River, and locating remaining good-quality examples of Boreal Forest. Private and other public lands surrounding the WRPG were not surveyed as part of this effort.

General Background Information

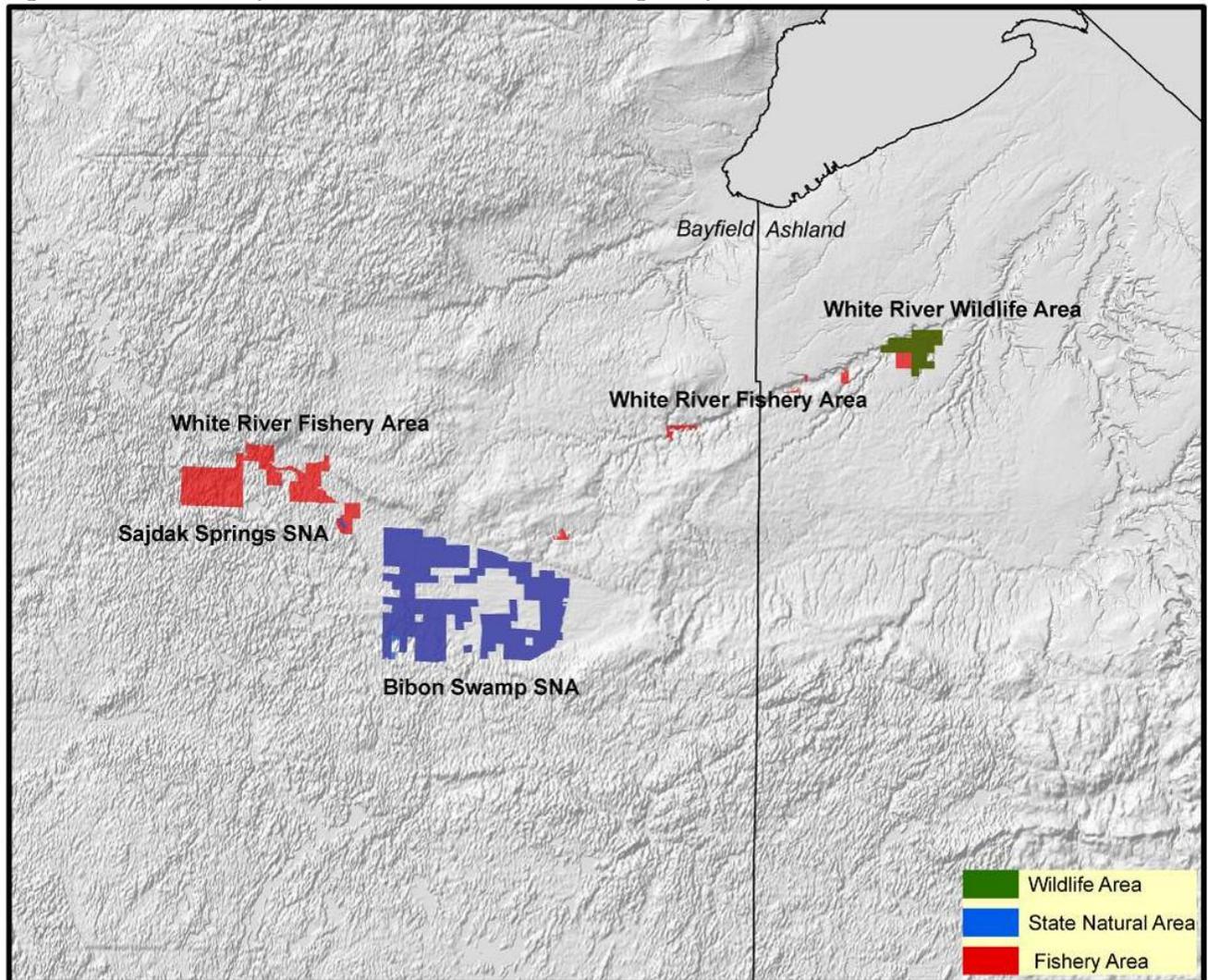
The WRPG encompasses ca. 14,595 acres primarily in the Superior Coastal Plain Ecological Landscape in Bayfield and Ashland counties (Figure 1). The properties occur along and aid in protecting the water quality of the important and scenic White River watershed. The White River is the largest river system in Bayfield County, an important tributary to the Bad River in Ashland County, and has a good warm water and trout fishery, with an annual anadromous run of steelhead from Lake Superior. The White River and many of its tributaries are classified as either Exceptional or Outstanding Resource Waterways by WDNR (<http://dnr.wi.gov/org/water/wm/wqs/orwerw/>). These classifications designate surface waters warranting 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.

According to the Wisconsin Wildlife Action Plan, the Superior Coastal Plain Ecological Landscape provides the most significant opportunity for Boreal Forest protection, management, and restoration in a landscape context in Wisconsin (WDNR 2006b). Other priority management opportunities existing within this and adjacent Ecological Landscapes include protection, management, and restoration of stream corridors, protection and management of sites used for large numbers of breeding and migratory birds, and increasing conifer cover, forest patch size and connectivity, and late successional / old-growth forests (WDNR 2006b). The surrounding landscape includes a large amount of public forest lands in the North Central Forest and Northwest Sands Ecological Landscapes that include county forest lands in Bayfield County and the Washburn and Great Divide Districts of the Chequamegon-Nicolet National Forest (CNNF). The CNNF includes the headwaters for some of the Lake Superior Basin's outstanding streams flowing into the White and Bad Rivers (WDNR 1997a). In addition, the Bad River Reservation is adjacent to White River Wildlife Area. The Reservation encompasses over 125,000 acres of several forests communities, protecting streams, rivers, and lakes in the Superior Coastal Plain Ecological Landscape.

Properties included in the WRPG are:

- Bibon Swamp State Natural Area (9,439 acres) - located in southeast Bayfield County due north of the town of Grandview. State highway 63 runs on the south and east side of the property.
- White River Fishery Area (4,156 acres) - currently includes numerous parcels located along the White River in central Bayfield and northwest Ashland Counties. The largest block of parcels is located northwest of Bibon Swamp and between the towns of Delta and Sutherland. This parcel includes Sajdak Springs State Natural Area (40 acres).
- White River Wildlife Area (1,000 acres) - located in northwest Ashland County, approximately five miles south of the city of Ashland.

Figure 1: Location of Properties within the White River Planning Group



Previous Efforts

Wisconsin Land Legacy Report (WDNR 2006a) was designed to identify the most important conservation and recreation needs for the next 50 years. The report identifies the Superior Coastal Plain Ecological Landscape as the only area in the state to support sizable tracts of Boreal Forest (WDNR 2006a). This forest type was once a dominant community type in this Ecological Landscape, but today only a few scattered remnants remain, with none larger than 300 acres. A remnant patch of Boreal Forest is located at White River Wildlife Area. The report also highlights the White River and its tributaries as supporting a very productive cold water fishery, drawing anglers from throughout the Midwest (WDNR 2006a).

Natural Heritage Inventory Peatlands Project (Anderson *et al.* 2008) was a four field season statewide study conducted by the Bureau of Endangered Resources. The primary goals of the project were 1) to obtain baseline data on the presence/absence, abundance, and distribution of species in multiple taxon groups associated with peatland communities in Wisconsin, and 2) to document selected biotic and abiotic variables that could potentially influence the organisms being studied. Taxonomic groups surveyed were breeding passerine birds, amphibians, small mammals, selected groups of terrestrial and aquatic invertebrates, selected secretive marsh birds, and rare plants. Bryophyte surveys were also done at selected sites. The surveys were designed to be replicated in 5-10 years and used to detect changes in biota related to climate change. The project included Bibon Swamp State Natural Area.

Wisconsin's Lake Superior Coastal Wetlands Evaluation (WDNR 1997a) identified Bibon Swamp as a priority wetland site and the White River as a priority aquatic site of Wisconsin's Lake Superior Basin. The primary objectives of the evaluation were to identify important wetland habitats that should be protected and / or restored, identify suitable areas for restoration, and provide a prototype on how to identify areas for protection and restoration.

The Nature Conservancy (TNC): Superior Mixed Forest Ecoregional Plan (TNC 2002) identified a portfolio of terrestrial and aquatic "Conservation Areas" representing viable natural community types, globally rare native species, and other selected features. The WRPG comprises a portion of a terrestrial TNC Conservation Area called the Chequamegon Bay Watershed Conservation Area, a 1,494,341-acre site that includes the WRPG sites, nearby county and Native American reservation lands and a portion of the CNNF. The White River also makes up a portion of the TNC Great Lakes Ecoregion Aquatic Sites Conservation Area.

Wisconsin Wildlife Action Plan (WDNR 2006b) recognized the WRPG as having four 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).

- Bad River COA, of global significance because of its importance within the Great Lakes and their shorelines and the opportunities for protection of Boreal Forest, Northern Dry-mesic Forest, and Northern Mesic Forest communities, includes White River Wildlife Area.
- Gogebic-Penokee Ranges COA is of continental significance because it features large blocks of older forest providing an opportunity to manage for the mature to older age classes, includes White River Fishery Area.
- Bibon Swamp COA is of state significance because it contains large, diverse, and high quality wetland communities, includes Bibon Swamp State Natural Area and White River Fishery Area.

- White River COA, of state significance because it contains diverse aquatic communities, includes White River Fishery Area.

Important Bird Areas (IBA) are critical sites for the conservation and management of Wisconsin's birds. Bibon Swamp was recognized as an Important Bird Area, due to its diverse wetland habitat types and their associated birds, including at least five rare species (WDNR 2007).

Lake Superior Basin Water Quality Management Plan recognized WRPG as critical habitat for large natural ecosystem diversity and integrity, as well as for protecting forest, fish, wildlife, and recreational resources associated with the White River watershed (WDNR 1999).

White River Watershed Management Plan (TU and Friends of White River 2004) was developed with the stated goal being "to protect and preserve the White River between State Highways 63 (Bayfield County) and 13 (Ashland County) as a natural corridor for future generations to enjoy." A compilation of maps, surveys and inventories, funded by Wisconsin DNR, provide background for numerous proposed actions intended to support four objectives: water quality, maintaining/improving a high quality fishery, providing public access, and ecological preservation and restoration of the river corridor.

Biological and Social Dynamics of the White River Brown Trout Fishery (WDNR 2008) looked at the perceived decline in brown trout populations within the Bibon Swamp section of the White River.

Wisconsin Wetland Association Wetland Gems (WWA 2009) program recognized Bibon Swamp as a "wetland gem" due to its roadlessness, large size, quality and diversity of its natural communities, and for providing habitat for numerous rare species.

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.

Ecological Context

The WRPG study area is primarily located in the *Superior Coastal Plain* Ecological Landscape with a portion of the White River Fishery Area located in the *Northwest Sands* Ecological Landscape and a very small inclusion (<.005%) in the *North Central Forest* Ecological Landscapes (Figure 2). The Superior Coastal Plain is Wisconsin's northernmost Ecological Landscape, bordered on the north by southwestern Lake Superior and strongly influencing the local climate, resulting in cooler summers, warmer winters, and greater precipitation compared to more inland locations (WDNR in prep.). The major landform in this Ecological Landscape is a nearly level plain of lacustrine clays that slopes northward toward Lake Superior (WDNR in prep.). Historically this Ecological Landscape was almost entirely forested with a mixture of white pine (*Pinus strobus*), white spruce (*Picea glauca*), balsam fir (*Abies balsamea*), paper birch (*Betula papyrifera*), balsam poplar (*Populus balsamifera*), trembling aspen (*Populus tremuloides*), and white cedar (*Thuja occidentalis*) (WDNR in prep.). The present clay plain forest has been fragmented by agricultural use, and today approximately one-third of this landscape is non-forested. Aspen and birch forests occupy about 40% of the total land area, having increased in prominence over the boreal conifers (WDNR in prep.).

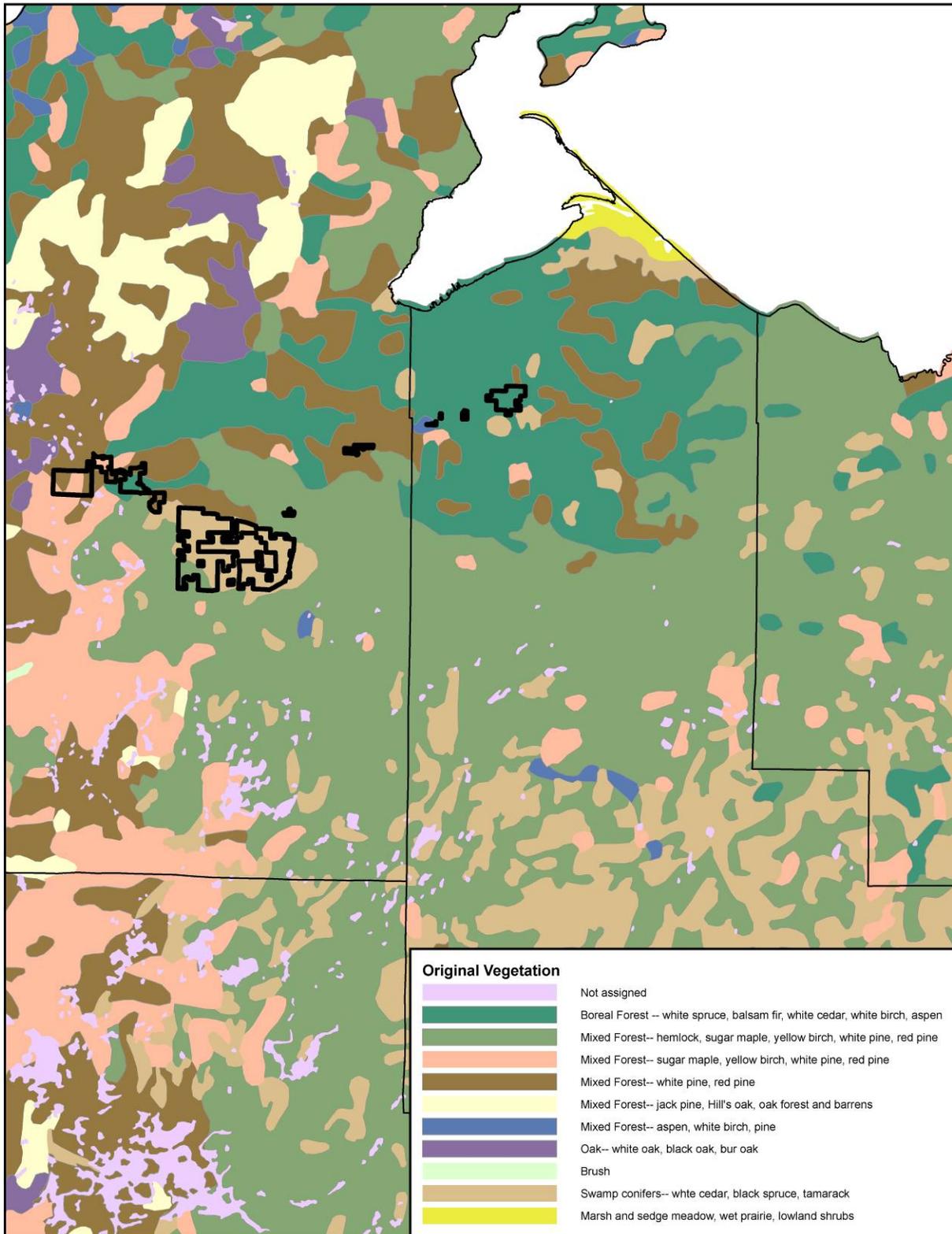


Figure 2: Location of the WRPG sites within the Ecological Landscapes of Wisconsin

The Northwest Sands Ecological Landscape 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. The North Central Forest Ecological Landscape covers 6.1 million acres of the northern one-third of the state. Forested land and wetlands are abundant throughout the North Central Forest. Major soils in the landscape include sand loams, sands, and silts, as well as peats in some of the acid wetlands.

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 WRPG were completed between 1851 and 1860. Finley's (1976) Pre-European Settlement Vegetation map (Figure 3) identifies these areas as being comprised of Boreal Forest dominated by white spruce, balsam fir, white cedar, aspen, and paper birch. A large area of swamp conifers, encompassing what is now known as Bibon Swamp, included white cedar, black spruce (*Picea mariana*), tamarack (*Larix laricina*), and hemlock (*Tsuga canadensis*). Presettlement upland forests at White River Fishery Area were a mix of conifers, including white pine, red pine (*Pinus resinosa*), and hemlock along with deciduous hardwood species like sugar maple (*Acer saccharum*) and yellow birch (*Betula alleghaniensis*).

Figure 3: Pre-European Settlement Vegetation for the White River Planning Group



Current Vegetation

The majority of the WRPG is located in a landscape dominated by lacustrine deposits on clay and slow draining soils (Figure 5). The soils, cooling influences of Lake Superior, and previous disturbances have greatly affected current vegetation.

On the **White River Wildlife Area** in Ashland County, remnant natural communities feature two types unique to areas influenced by the Great Lakes. Boreal Forests occur on narrow ridge-tops and highly-erodible clay slopes and varies from dry to wet. Characteristic canopy species include white spruce, balsam fir, white cedar, white pine, paper birch, and trembling aspen. Characteristic understory herbs include large-leaved aster (*Aster macrophyllus*), blue-bead-lily (*Clintonia borealis*), Canada mayflower (*Maianthemum canadense*), wild sarsaparilla (*Aralia nudicaulis*), and bunchberry (*Cornus canadensis*). Mesic Floodplain Terraces are deciduous forests that have developed on alluvial terraces of infrequently flooding rivers draining into Lake Superior. Due to the Lake Superior dominated mild climate, the streamside terraces support many southern species outside of their expected range. Characteristic species include sugar maple, basswood (*Tilia americana*), green ash (*Fraxinus pennsylvanica*), ostrich fern (*Matteuccia struthiopteris*), cut-leaved toothwort (*Cardamine concatenata*), spring-beauty (*Claytonia virginica*), yellow trout-lily (*Erythronium americanum*), false rue anemone (*Enemion biternatum*), and Dutchman's-breeches (*Dicentra cucullaria*). Also along the White River are small areas of Forested Seeps and Northern Hardwood Swamp.

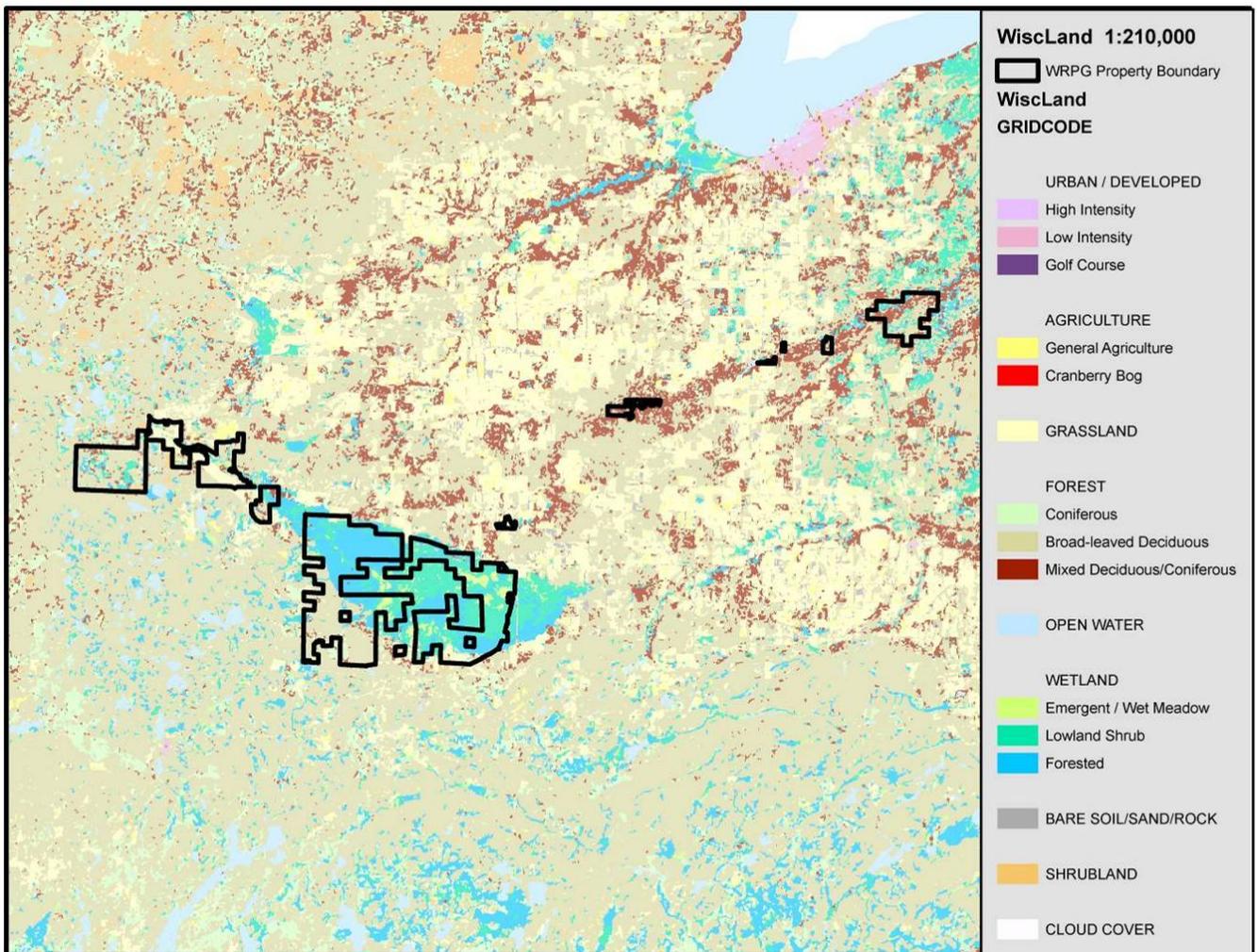
Located on outwash and alluvial plains, the **Bibon Swamp SNA** features a vast wetland complex along the White River. North of the river is a large Black Spruce Swamp, with areas of Muskeg, surrounded by a Tamarack (poor) Swamp, which is almost entirely surrounded by an Alder Thicket. Between the Alder Thicket and Tamarack (poor) Swamp on the northwest side are small areas of Northern Sedge Meadow. To the south of the river is an extensive Northern Wet-mesic Forest dominated by northern white cedar. Along the river, small meadows dominated by narrow-leaved woolly sedge (*Carex lasiocarpa*) & Northern Hardwood Swamps dominated by black ash (*Fraxinus nigra*), are common. Along the Long Lake Branch of the White River and its feeder streams, shrub swamps are common. These large areas of shrub swamp are dominated by willows (*Salix* spp.) and alder (*Alnus* sp.) with scattered black ash, big-tooth aspen (*Populus grandidentata*), and American elm (*Ulmus americana*). Also within the shrub swamps are small areas of Northern Sedge Meadow and Tamarack (poor) Swamp. Many of the uplands have been in timber management and are currently dominated by small (2-6" dbh) hardwoods and balsam fir.

The **White River Fishery Area** in Bayfield County is different from the other properties in that it is found within a landscape of rolling moraines with loamy sands typical of the Bayfield Rolling Outwash and Washed Till LTA. The current vegetation on many of the uplands has been influenced by timber management, resulting in some areas being dominated by hardwoods. Some mature Northern Dry-mesic Forests are present with a mixed canopy of white and red pine, sugar and red maple, and paper birch. Pines are 15-20" dbh and hardwoods are 8-12" dbh. Currently, all designated canopy species have reached the subcanopy layer, while hardwoods are occupying the sapling layer. Shrub and ground flora include beaked hazelnut (*Corylus cornuta*), early low blueberry (*Vaccinium angustifolium*), wintergreen (*Gaultheria procumbens*), wild sarsaparilla, Canada mayflower, rough-leaved rice grass (*Oryzopsis asperifolia*), hairy sweet cicely (*Osmorhiza claytonii*), and Pennsylvania sedge (*Carex pennsylvanica*). Wetlands on the property are a mix of Northern Sedge Meadows; small Muskegs and acid wetlands; Spring Ponds and Spring Runs; and Northern Wet-mesic Forest. The Northern Sedge Meadows contain tussock sedge (*Carex stricta*) and Canadian blue-joint grass (*Calamagrostis canadensis*) with patches of meadow-fern (*Myrica gale*). Towards the center of the meadows, where deeper water of the streams influences vegetation, common lake sedge (*Carex lacustris*) and broad-leaved cat-tail (*Typha latifolia*) dominate the sedge meadows. The Muskegs and other acid wetlands are small and generally have stunted

black spruce and tamarack growing over abundant leather-leaf (*Chamaedaphne calyculata*) and sphagnum mosses (*Sphagnum* spp.). Other species include Labrador-tea (*Ledum groenlandicum*), bog-laurel (*Kalmia polifolia*), false mayflower (*Smilacina trifolia*), tussock cotton-grass (*Eriophorum vaginatum*), and small cranberry (*Vaccinium oxycoccos*). Northern Wet-mesic Forests are scattered, small, and dominated by white cedar and balsam fir.

The White River flows from its wooded headwaters, through open sedge meadows, Shrub-carr and Alder Thicket, forested swamps and areas of steep forested clay banks until its confluence with the Bad River near Odanah, before draining into Lake Superior. This slow, hard, coldwater, meandering wild river with mostly clay and unstable sand bottom is characterized by clear, fluctuating water levels with an average width of 44 feet and depth of 3.3 feet while flowing through the WRPG sites (SWR 1970). Numerous coldwater tributaries, springs, and outflows of several glacial lakes feed the river.

Figure 5: Generalized 1993 WISCLAND Landcover for the WRPG



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. Using this methodology, there are 28 natural communities for which there are “Major” or “Important” opportunities in the Superior Coastal Plain Ecological Landscape; of these, the following nine natural communities are present on WRPG:

- Alder Thicket
- Boreal Forest
- Coldwater Streams
- Coolwater Streams
- Hardwood Swamp*
- Northern Sedge Meadow
- Northern Wet Forest [Black Spruce Swamp and Tamarack (poor) Swamp]
- Northern Wet-mesic Forest
- Shrub-carr*

There are 21 natural communities for which there are “Major” or “Important” opportunities in the Northwest Sands Ecological Landscape; of these, the following two natural communities are present on WRPG:

- Northern Dry-mesic Forest
- Northern Sedge Meadow

There are 25 natural communities for which there are “Major” or “Important” opportunities in the North Central Forest Ecological Landscape. Due to the very small amount of project area within this landscape, no “Major” or “Important” natural community opportunities are present.

* Natural communities for which element occurrences will not be mapped into the NHI Database due to not meeting standard mapping methodology (too small, too degraded, etc), but for which habitat on the property exists.

Rare Species and High Quality Natural Communities of the WRPG

Numerous rare species and high-quality examples of native communities have been documented within the WRPG. Table 1 shows the rare species and high-quality natural communities that are currently mapped in the NHI Database on the WRPG listed with the property name. See Appendix C for summary descriptions for the species and natural communities that occur on the WRPG.

Table 1. Documented rare species and high-quality natural communities on the WRPG 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					
A Flat-headed Mayfly	<i>Heptagenia pulla</i>	1996	SNR	GNR	SGCN
A Flat-headed Mayfly	<i>Rhithrogena impersonata</i>	1996	SNR	GNR	SGCN
A Periodid Stonefly	<i>Isoperia bilineata</i>	1996	S2S3	G5	SC/N
A Water Scavenger Beetle	<i>Sperchopsis tessellates</i>	1996	S2S3	GNR	SGCN
American Bittern	<i>Botaurus lentiginosus</i>	2005	S3B	G4	SC/M
American Woodcock	<i>Scolopax minor</i>	2008	S4B	G5	SGCN
Arctic Shrew	<i>Sorex arcticus</i>	2005	S3S4	G5	SC/N
Bald Eagle	<i>Haliaeetus leucocephalus</i>	2008	S4B,S2N	G5	SC/P
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	2008	S4B	G5	SGCN
Bobolink	<i>Dolichonyx oryzivorus</i>	2005	S4B	G5	SGCN
Bog Fritillary	<i>Boloria eunomia</i>	1996	S3	G5	SC/N
Boreal Chickadee	<i>Poecile hudsonicus</i>	1996	S2S3B	G5	SC/M
Canada Warbler	<i>Wilsonia canadensis</i>	2008	S3B	G5	SC/M
Cape May Warbler	<i>Dendroica tigrina</i>	2008	S3B	G5	SC/M
Eastern Meadowlark	<i>Sturnella magna</i>	2005	S4B	G5	SGCN
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	2008	S4B	G4	SGCN
Gray Wolf	<i>Canis lupus</i>	2008	S2	G4	SC/P
Least Flycatcher	<i>Empidonax minimus</i>	2008	S4B	G5	SGCN
Le Conte's Sparrow	<i>Ammodramus leconteii</i>	2006	S2S3B	G4	SC/M
Mink Frog	<i>Lithobates septentrionalis</i>	2005	S3S4	G5	SC/H
Northern Goshawk	<i>Accipiter gentilis</i>	2000	S2B,S2N	G5	SC/M
Northern Harrier	<i>Circus cyaneus</i>	2005	S3B,S2N	G5	SGCN
Olive-sided Flycatcher	<i>Contopus cooperi</i>	2008	S2B	G4	SC/M
Pygmy Shrew	<i>Sorex hoyi</i>	2005	S3S4	G5	SC/N
Red Crossbill	<i>Loxia curvirostra</i>	2008	S2?B	G5	SGCN
Swainson's Thrush	<i>Catharus ustulatus</i>	2008	S2B	G5	SC/M
Veery	<i>Catharus fuscescens</i>	2008	S4B	G5	SGCN
Water Shrew	<i>Sorex palustris</i>	1979	S2S3	G5	SC/N
Wood Thrush	<i>Hylocichla mustelina</i>	2008	S4B	G5	SGCN
Wood Turtle	<i>Glyptemys insculpta</i>	2007	S2	G4	THR
Woodland Jumping Mouse	<i>Napeozapus insignis</i>	1979	S2S3	G5	SC/N
Plants					
Arrow-leaved Sweet-coltsfoot	<i>Petasites sagittatus</i>	2007	S3	G5	THR
Assiniboine Sedge	<i>Carex assiniboinensis</i>	1931*	S3	G4G5	SC
Climbing Fumitory	<i>Adlumia fungosa</i>	1896*	S2	G4	SC
Large-flowered Ground-cherry	<i>Leucophysalis grandiflora</i>	1923*	S1	G4?	SC
Large Roundleaf Orchid	<i>Platanthera orbiculata</i>	1917*	S3	G5	SC
Large Toothwort	<i>Cardamine maxima</i>	1996	S1	G5	SC
Marsh grass-of-Parnassus	<i>Parnassia palustris</i>	1996	S2	G5	THR
Marsh Horsetail	<i>Equisetum palustre</i>	1970*	S3	G5	SC
Marsh Ragwort	<i>Senecio congestus</i>	1896*	S1	G5	SC
Northern Black Currant	<i>Ribes hudsonianum</i>	1917*	S3	G5	SC
Northern Yellow Lady's-slipper	<i>Cypripedium parviflorum</i> var. <i>makasin</i>	2008	S3	G5T4Q	SC

Common Name	Scientific Name	Last Obs Date	State Rank	Global Rank	State Status
Purple Clematis	<i>Clematis occidentalis</i>	2008	S3	G5	SC
Showy Lady's-slipper	<i>Cypripedium reginae</i>	2008	S3	G4	SC
Slim-stem Small-reedgrass	<i>Calamagrostis stricta</i>	2008	S3	G5	SC
Small Yellow Water Crowfoot	<i>Ranunculus gmelinii</i>	1917*	S2	G5	END
Sparse-flowered Sedge	<i>Carex tenuiflora</i>	2006	S3	G5	SC
Variegated Horsetail	<i>Equisetum variegatum</i>	1896*	S3	G5	SC
Natural Communities					
Alder Thicket	Alder Thicket	2007	S4	G4	
Black Spruce Swamp	Black Spruce Swamp	2007	S3?	G5	
Boreal Forest	Boreal Forest	2007	S2	G3?	
Forested Seep	Forested Seep	2008	S2	GNR	
Mesic Floodplain Terrace	Mesic Floodplain Terrace	2008	S2	GNR	
Muskeg	Muskeg	2008	S4	G4G5	
Northern Dry-mesic Forest	Northern Dry-mesic Forest	2008	S3	G4	
Northern Sedge Meadow	Northern Sedge Meadow	2008	S3	G4	
Northern Wet-mesic Forest	Northern Wet-mesic Forest	2007	S3S4	G3?	
Spring Pond	Spring Pond	1990	S3	GNR	
Springs and spring runs, soft	Springs and spring runs, soft	1990	SU	GNR	
Stream—slow, hard, cold	Stream—slow, hard, cold	1983	SU	GNR	
Tamarack (poor) Swamp	Tamarack (poor) Swamp	2007	S3	G4	

*Historical plant records, most based on herbarium collections with only general location information noted. Suitable habitat is still present within the WRPG but the species were not seen during the recent survey.

Management Considerations and Opportunities for Biodiversity Conservation for the White River Planning Group

Landscape Level Priorities

Forest Patch Size and Ecological Connections

The WRPG presents opportunities to maintain or re-establish connectivity between ecologically significant sites (as identified in this inventory) and adjacent forested tracts within this landscape. It is important to recognize forest patterns and processes, as well as the context of ecologically important areas and how forest stands function within the regional landscape. For example, the WRPG contains a rich mosaic of wetlands, streams and rivers in a mostly remote, forested context. These areas offer opportunities to connect with other wetland features to provide habitat for a diverse group of species. Opportunities to provide travel corridors may exist or be enhanced by protecting and expanding shoreline vegetation along streams and lakes.

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

Older Forests / Old-growth Forests

The WDNR has identified a need to conserve, protect, and manage old-growth forests (WDNR 2006b, WDNR 2004, WDNR 1995). Old-growth forests can support high densities of certain forest herbs, as well as certain unique 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 2006c).

Older forests, for example those with trees older than 120 years, are rare in the state, especially upland forests with structural attributes such as the presence of trees with a range of diameter sizes (especially very large), large diameter coarse woody debris, abundant large dead snags and cavity trees, and pit-and-mound micro-topography (WDNR 2005). Currently, much of the Superior Coastal Plain Ecological Landscape surrounding the WRPG is represented by young and medium-aged stands; these stands are often dominated by early successional species such as aspen within a mosaic of relatively small patches of older forests. In contrast, larger areas of older, less disturbed Northern Dry-mesic and Boreal Forests are not well represented in this landscape. The WRPG offers opportunities to manage for large tracts of older forests within a context of outstanding aquatic features, intact and relatively undisturbed wetlands, and vast public landholdings.

Community Level Priorities

Boreal Forest

Before Euro-American settlement, white pine, white spruce, and paper birch were the dominant trees on uplands in the Superior Glacial Plain Ecological Landscape and this was the only area in the state to support sizable tracts of Boreal Forest (WDNR 2006a). This natural community, always geographically restricted in the state, is currently rare with limited suitable locations in Wisconsin. High-quality examples of this type were found at White River Wildlife Area on the highly-erodible slopes above the White River. Numerous animal species of greatest conservation need utilize this habitat.

Forested and Non-forested Wetlands

Wetlands are abundant throughout the WRPB and include several forested and non-forested types. These include Northern Wet Forest, Northern Wet-mesic Forest, Muskeg, Alder Thicket, and Northern Sedge Meadow, with many of them in good to excellent condition. Coniferous wetlands support a high percentage of the rare species observed within the study area. The WRPB offers several opportunities to manage forested wetlands and fens as part of a vegetation mosaic that includes other open wetland communities, shrub swamp, and swamp conifer forest (WDNR 2006b).

Forested Seeps and Springs

Within the WRPB, many springs and seeps were found along the White River usually near the bases of steep slopes, where they often support a canopy of hardwoods or mixed conifer-hardwoods. Seepage areas, with active discharges of groundwater, sometimes host uncommon or rare plant and animal species. They also contribute to high water quality of the streams they feed. These features are highly susceptible to damage by land use practices that lead to soil or hydrological disturbance. Recharge areas are critical to the continued function and quality of the springs and seeps.

White River and Tributaries

The free-flowing stretches of the White River provide important habitat for many rare animal species, and management of lands adjacent to the river will have important effects on water quality. Many of the areas along the river slopes contain mature forests, as well as forested seeps that can harbor rare plant assemblages. A river “buffer” that accounts for steepness of slope, soil type, vegetative cover, and the habitat needs of sensitive species would be most effective for protecting species associated with the river.

Two tributaries of the White River of high ecological importance are Eighteen Mile Creek and Long Lake Branch. Eighteen Mile Creek, a high gradient cold water stream, originates within the Great Divide District of the CNNF and the headwaters were designated as Eighteen Mile Creek State Natural Area in 2007 to protect the high-quality, old-growth hemlock hardwood stand on its banks. Wisconsin DNR (1999) noted Eighteen Mile Creek as having moderate aquatic taxa richness and two rare macroinvertebrate species present. Long Lake Branch originates at Lake Owen in the CNNF before flowing through rugged moraines and forested terrain near Drummond, eventually reaching the marshy areas of Bibon Swamp SNA where Eighteen Mile Creek joins it. Long Lake Branch was noted as having exceptionally high diversity of aquatic macroinvertebrates and high taxa richness during 1996 aquatic inventories (WDNR 1999).

Invasive Plants

Five invasive species are established within the WRPG and pose a significant threat to the natural communities here. Reed canary grass (*Phalaris arundinacea*) is fairly common in open meadows, Shrub-carr / Alder Thickets, and forested areas along the White River at all three sites. It is primarily mixed with native grasses and sedges, and is not dominating these areas currently. Glossy buckthorn (*Rhamnus frangula*) was found in the open meadows, Poor Fen, Shrub-carr / Alder Thickets, and wet coniferous forests at White River Fishery Area. Glossy buckthorn removal efforts are currently underway within the Fishery Area and are important to maintain the integrity of the site. Common reed grass (*Phragmites australis*) has been noted in low densities near Bibon Swamp along highway 63, as well as along Eighteenmile Creek near Taylor Lane within Bibon Swamp. Canada thistle (*Cirsium arvense*) is found in low densities at White River Fishery Area and Bibon Swamp and appears to be restricted to the open fen, sedge meadow, and surrogate grassland areas at both sites. Helleborine orchid (*Epipactis helleborine*) is found in low numbers at White River Wildlife Area in the upland Northern Mesic Forest areas.

The locations, extent, and approximate densities of these five species should be mapped so that effective strategies for their control may be developed. A number of invasive species are, in fact, new or are not yet widespread in the WRPG, while others are known in the vicinity; monitoring for these species and rapid response to small infestations represent high-impact actions. For example, purple loosestrife (*Lythrum salicaria*) was not noted within the WRPG but is abundant in open wetlands nearby and should be monitored closely. Early detection and rapid control of new and/or small infestations, may be considered for higher prioritization in an invasive species management strategy (Boos et al. 2010). 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 (WDNR 1997b).

Additional introduced or invasive species noted but not dominant in the WRPG include white sweet-clover (*Melilotus albus*), orange hawkweed (*Hieracium aurantiacum*), reedtop (*Agrostis gigantea*), quackgrass (*Elytrigia repens*), bird's-foot trefoil (*Lotus corniculatus*), alsike clover (*Trifolium hybridum*), spotted knapweed (*Centaurea biebersteinii*), and smooth brome (*Bromus inermis*). Since these invasive species of grasslands do not affect the priority natural communities targeted in this document, they pose a lesser threat to the site, though their spread should be limited if at all possible.

For recommendations on controlling specific invasive species consult with DNR staff, refer to websites on invasive species, such as that maintained by the DNR (<http://dnr.wi.gov/invasives>) and by the Invasive Plants Association of Wisconsin (<http://www.ipaw.org>). Also refer to invasive species Best Management Practices (BMPs) for forestry, recreation, urban forestry, and rights-of-way, which were developed by the Wisconsin Council on Forestry (<http://council.wisconsinforestry.org/>).

Wisconsin Wildlife Action Plan

Numerous vertebrate SGCN known from WRPG along with the natural communities they inhabit represent Ecological Priorities for the Superior Coastal Plain and 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.

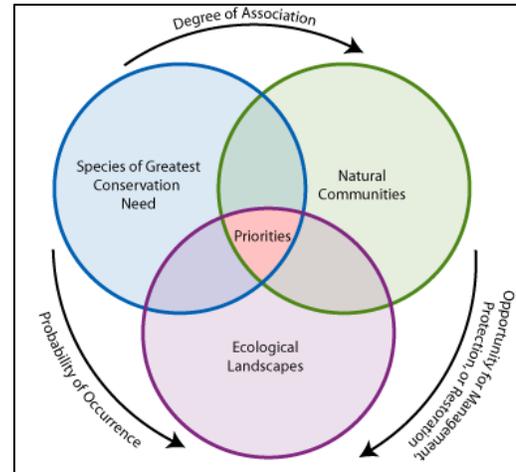


Figure 6: Graphic Illustrating the Process used for Identifying Ecological Priorities in the Wisconsin Wildlife Action Plan

High Conservation Value Forests

The Wisconsin DNR manages 1.5 million acres that are certified by the Forest Stewardship Council (FSC) and the Sustainable Forest Initiative. Forest certification requires forests to be managed following specific 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 WRPG has areas that could be considered High Conservation Value Forests. Based on our results, the best HCVF candidates on the WRPG 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 the WRPG. 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 and can be modified as new information becomes available. 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.

WRPG01. White River Boreal Forest Primary Site – 491 acres

Site Description: The primary features of this site are the good-quality Boreal Forest and Mesic Floodplain Terrace community; these types are largely restricted to the Superior Coastal Plain Ecological Landscape. The Boreal Forest occurs on steep clay slopes and ravines with numerous seeps and an unnamed creek running to the White River. Boreal Forests, from dry to wet, are represented and potential exists for old-growth characteristics in some areas of the forest. Pockets of Northern Wet Forest, Mesic Floodplain Terrace, and Hardwood Swamp areas along the river terraces add diversity to the site. Much of the uplands surrounding the steep slopes have been managed for early successional species, primarily aspen. The majority of the site is contained within the White River Wildlife Area with a small portion in the southwest corner occurring within a parcel of the White River Fishery Area.

Significance of Site: This primary site maintains a critical connection between Bibon Swamp and Bad River Reservation and provides the opportunity for development of old-growth forest conditions. Boreal Forest and Mesic Floodplain Terrace present at the site are both considered rare or imperiled in the state with few good-quality examples known. The Boreal Forest occurring on narrow ridge-tops and slopes here constitutes one of the finest examples outside of the immediate Lake Superior area, supporting numerous rare and special concern plants, birds, mammals, and herptiles.



Canada Warbler. Photo by Brian Collins.

Management Considerations: A portion of the site in the center of section 25 is recovering from past logging and would be important to allow to mature providing connectivity between the two slopes having high-quality examples of Boreal Forest. Additional reforestation efforts or allowing existing upland forest areas outside of primary site to mature would provide a buffer to older-growth forest on slopes and terraces. These actions would favor area-sensitive species requiring large tracts of interior forest. The small area of red pine on points of slopes, could be managed to develop old-growth characteristics. Although this area is mostly undisturbed, helleborine orchid was located at the site and other non-native invasive plants have been observed at nearby locations throughout WRPG, including glossy buckthorn and reed canary grass. These species pose significant threats to wetlands and forests in many other parts of the region and the state.

WRPG02. Sajdak Springs SNA Expansion Primary Site – 129 acres

Site Description: Expanding the 40 acre Sajdak Springs SNA into the surrounding 89 acres, provides a Primary Site that is characterized by a series of springs feeding a small trout stream flowing into the White River. A Spring Run with emergent aquatics borders the sandy, firm-bottomed rivulets. Northern Wet-mesic Forest dominated by mature white cedar grows along the edges of a shallow Spring Run with patches of alder separating the mature forest from the stream bank. Forested Seeps are present at the base of the steep north-facing moraine with white and red pine, black ash, paper birch, and tamarack. Surrounding forest includes low-quality sugar maple and aspen with many logging roads / trails, and several open fields to the north and east.

Significance of Site: An excellent quality example of softwater springs, Spring Run, and Spring Pond is protected as a State Natural Area. The SNA boundary is very narrow, thus areas outside of the natural area can provide important buffers to high quality natural communities and rare species habitats within the SNA. Several rare species have been noted at the site including several endangered and special concern birds and mammals. The site also has the potential to support rare plants.

Management Considerations: Consideration should be given during development of the new master plan for the expansion of the existing natural area boundary to include the surrounding upland forest to protect the water-quality and temperature of the springs and Spring Runs. Special care may also be needed when conducting management activities in the nearby uplands to limit the threats of erosion and siltation to these aquatic systems. Glossy buckthorn and reed canary grass are present within the White River Fishery Area and pose a major threat to the integrity of this site. Ongoing eradication efforts should be continued. Expanding forest cover on adjacent private lands could be beneficial to forest interior species and water-quality of the springs.

WRPG03. Lake Two Conifer Forest Primary Site – 379 acres

Site Description: The primary site includes a diverse mix of good-quality upland forest, active springs and both open and forested wetland communities. Lake Two, a wilderness lake, is present within the boundaries of the site. A good-quality, mature Northern Dry-mesic Forest on a rolling moraine of loamy sands with a mixed canopy of conifers and hardwoods comprises a large portion of the northern half of the site surrounding Lake Two. Large diameter red and white pine dominates the canopy with sugar and red maple and paper birch. Areas of Northern Sedge Meadow exist along the springs and Spring Runs. A Muskeg in the southern portion of the site surrounds a small bog lake with a fringe of Poor Fen. Outflow from the Muskeg, flows into a small area of Northern Wet-mesic Forest dominated by white cedar.

Significance of Site: Wilderness lakes throughout Wisconsin are becoming rare due to development pressure. The Northern Dry-mesic Forest, Northern Sedge Meadow, and Muskeg present at the site are fairly common community types in Wisconsin, but good-quality examples existing within a larger mosaic of diverse vegetation types is a priority conservation opportunity in the Superior Coastal Plain (WDNR 2006b). It is important to maintain existing large blocks of forest, and where appropriate, restore a substantial native conifer component in order to provide habitat for various rare or uncommon birds, mammals, and plants.



Golden-winged Warbler. Photo by Brian Collins.

Management Considerations: Mature stands of older-aged Northern Dry-mesic Forest with an intact conifer component should be considered for special management. Glossy buckthorn is found within the primary site and is common in other wetlands in the White River Fishery Area. Hydrological manipulation may lead to slowing down or pooling of water potentially creating habitat for invasion of reed canary grass and spread of glossy buckthorn. Eradication and monitoring of these invasives should be a priority.

Figure 7: White River Planning Group Primary Sites

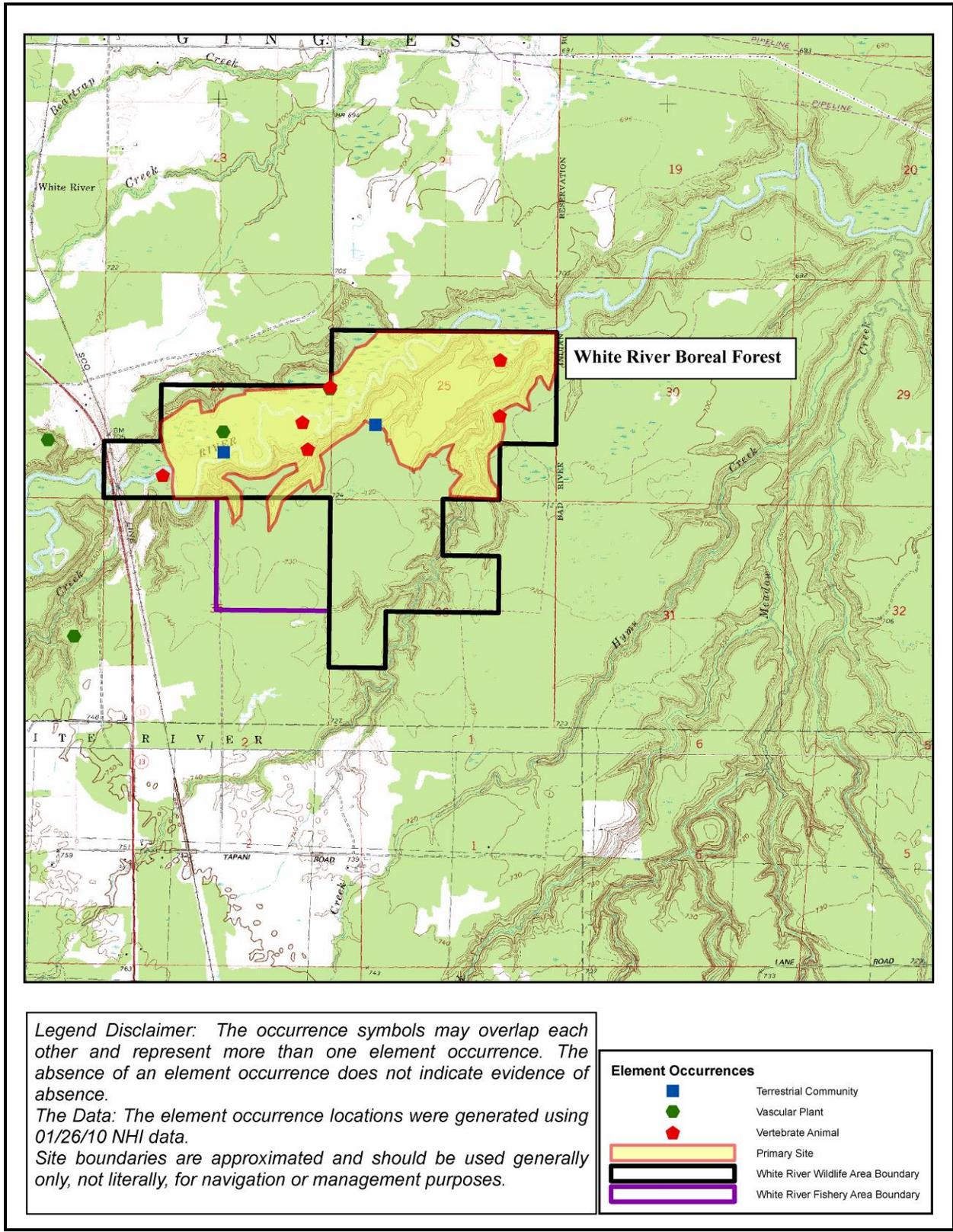
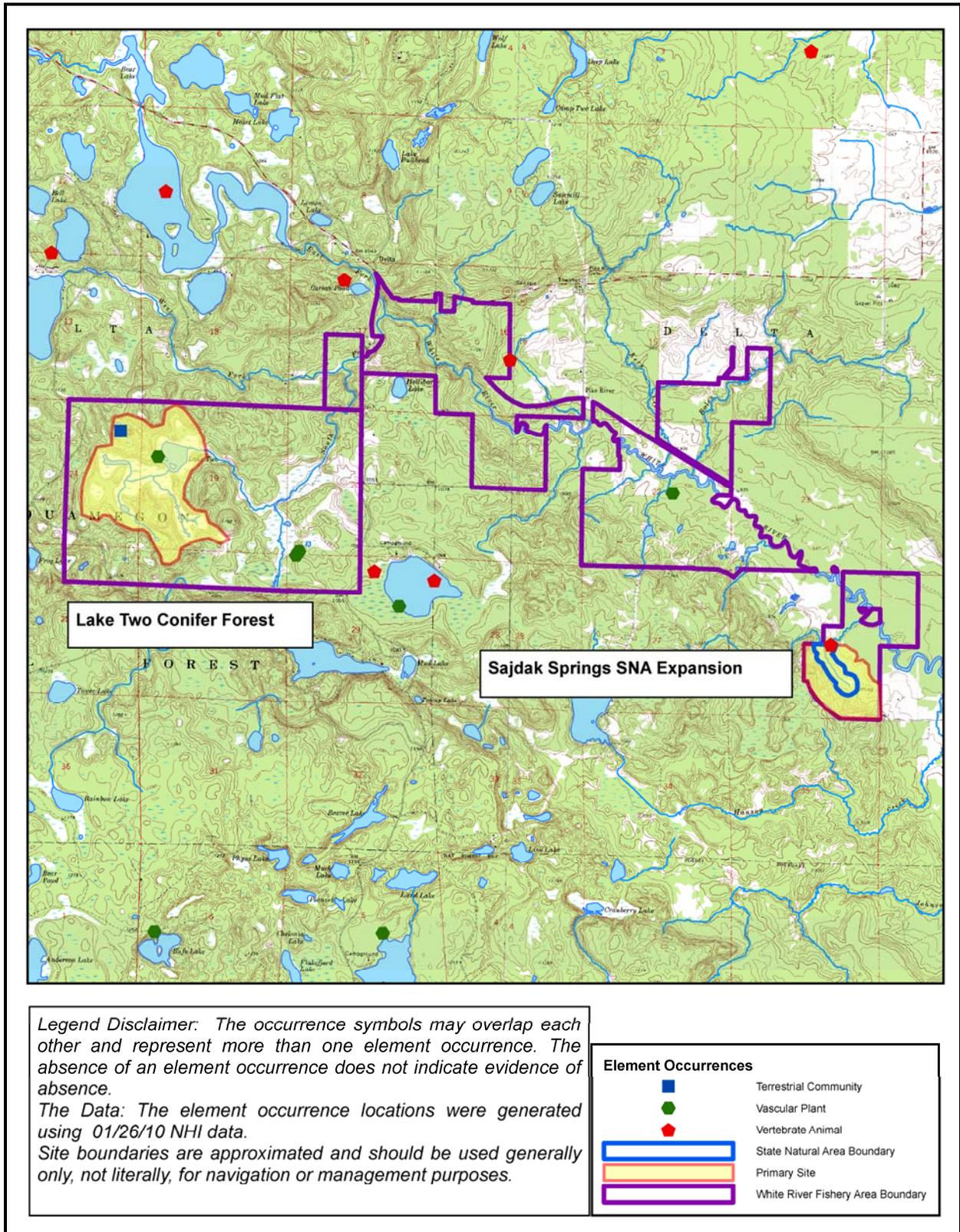


Figure 8: White River Planning Group Primary Sites



Future Needs

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

- Invasives monitoring and control: Establishing an invasives monitoring protocol will be critical for WRPG. State wildlife, fishery, and natural areas and many other public lands throughout Wisconsin are facing major management problems because of serious infestations of highly invasive species such as garlic mustard, reed canary grass, and buckthorn. Some of these species are easily dispersed by humans and vehicles; others are spread by birds, mammals, insects, water, or wind. 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. In addition, the North Woods Cooperative Weed Management Area has been established for this region and more information is available at (www.northwoodscwma.org).
- Establish an Early Detection Project to detect and rapidly respond to new invasive species with the potential for expansion in the WRPG. These plants are either already in Wisconsin, but in localized populations, or not known to be here yet, but are likely to thrive in part or all of the state. Two species of concern for the WRPG are Japanese knotweed (*Polygonum cuspidatum*) and European marsh thistle (*Cirsium palustre*). For information on future invasive species see (www.dnr.wi.gov/invasives/futureplants/).
- Additional baseline inventories should be done on newly acquired Fishery Area parcels including those in the recent project boundary expansion. One current priority site for inventory efforts is a new parcel in 46N 05W Section 09 in the north half of the SE quarter.
- Vegetation plot data could be collected from Boreal Forest and Mesic Floodplain Terrace communities, both uncommon in the state.
- Inventory and monitoring is needed to locate and protect turtle nesting sites near the White River and its tributaries.
- Additional amphibian and reptile surveys could be done focusing on the ephemeral and permanent aquatic resources associated with both the White River Fishery Area and White River Wildlife Area.
- Additional mammal inventory and monitoring efforts could be done within the WRPG focusing primarily on bats and mammals, including a state endangered mammal.
- Additional rare plant surveys could be done focusing on seeps and springs, cedar swamps, and forested areas on clay banks above the White River.
- Inventory of macroinvertebrates of additional headwater streams, spring seeps and spring ponds, could be done. Re-sampling of 1996 aquatic macrophyte surveys could be done to detect any changes in water-quality or taxa assemblages.
- Inventory and monitoring of forest raptor and other rare bird species could be done within the WRPG.

Glossary

anadromous - Relating to fish, such as salmon or shad, that migrate up rivers from lakes or seas to spawn.

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>)

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.

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. See also element occurrence above.

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).

Species List

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

Common Name	Scientific Name
Animals	
brown trout	<i>Salmo trutta</i>
Canada Warbler	<i>Wilsonia canadensis</i>
Golden-winged Warbler	<i>Vermivora chrysoptera</i>
LeConte's Sparrow	<i>Ammodramus leconteii</i>
Oliver-sided Flycatcher	<i>Contopus cooperi</i>
Steelhead	<i>Oncorhynchus mykiss</i>
Plants	
balsam fir	<i>Abies balsamea</i>
sugar maple	<i>Acer saccharum</i>
redtop	<i>Agrostis gigantea</i>
wild sarsaparilla	<i>Aralia nudicaulis</i>
large-leaved aster	<i>Aster macrophyllus</i>
yellow birch	<i>Betula alleghaniensis</i>
white birch, paper birch	<i>Betula papyrifera</i>
smooth brome	<i>Bromus inermis</i>
blue-joint grass	<i>Calamagrostis canadensis</i>
cut-leaved toothwort	<i>Cardamine concatenata</i>
common lake sedge	<i>Carex lacustris</i>
narrow-leaved woolly sedge	<i>Carex lasiocarpa</i>
Pennsylvania sedge	<i>Carex pensylvanica</i>
tussock sedge	<i>Carex stricta</i>
spotted knapweed	<i>Centaurea biebersteinii</i>
leather-leaf	<i>Chamaedaphne calyculata</i>
Canada thistle	<i>Cirsium arvense</i>
spring-beauty	<i>Claytonia virginica</i>
blue-bead-lily	<i>Clintonia borealis</i>
bunchberry	<i>Cornus canadensis</i>
beaked hazelnut	<i>Corylus cornuta</i>
yellow lady's slipper	<i>Cypripedium parviflorum</i>
Dutchman's breeches	<i>Dicentra cucullaria</i>
quackgrass	<i>Elytrigia repens</i>
false run anemone	<i>Enemion biternatum</i>
helleborine orchid	<i>Epipactis helleborine</i>
tussock cotton-grass	<i>Eriophorum vaginatum</i>
yellow trout-lily	<i>Erythronium americanum</i>
black ash	<i>Fraxinus nigra</i>
green ash	<i>Fraxinus pennsylvanica</i>
wintergreen	<i>Gaultheria procumbens</i>
orange hawkweed	<i>Hieracium aurantiacum</i>
bog-laurel	<i>Kalmia polifolia</i>
tamarack	<i>Larix laricina</i>
Labrador-tea	<i>Ledum groenlandicum</i>
bird's-foot trefoil	<i>Lotus corniculata</i>

Canada mayflower	<i>Maianthemum canadense</i>
ostrich fern	<i>Matteuccia struthiopteris</i>
white sweet-clover	<i>Melilotus alba</i>
meadow-fern	<i>Myrica gale</i>
rough-leaved rice grass	<i>Oryzopsis asperifolia</i>
hairy sweet cicely	<i>Osmorhiza claytonii</i>
reed canary grass	<i>Phalaris arundinacea</i>
common reed grass	<i>Phragmites australis</i>
white spruce	<i>Picea glauca</i>
black spruce	<i>Picea mariana</i>
red pine	<i>Pinus resinosa</i>
white pine	<i>Pinus strobus</i>
balsam poplar	<i>Populus balsamifera</i>
big-tooth aspen	<i>Populus grandidentata</i>
quaking aspen	<i>Populus tremuloides</i>
glossy buckthorn	<i>Rhamnus frangula</i>
willow	<i>Salix sp</i>
false mayflower	<i>Smilacina trifolia</i>
northern white-cedar	<i>Thuja occidentalis</i>
basswood	<i>Tilia americana</i>
alsike clover	<i>Trifolium hybridum</i>
hemlock	<i>Tsuga canadensis</i>
broad-leaved cat-tail	<i>Typha latifolia</i>
American elm	<i>Ulmus americana</i>
early low blueberry	<i>Vaccinium angustifolium</i>
small cranberry	<i>Vaccinium oxycoccos</i>

References

- Anderson, C., L. Ayers, T. Bergeson, K. Grveles, K. Kirk, W.A. Smith, & S. Zolkowski. 2008. Biodiversity in selected natural communities related to global climate change. Final report to Wisconsin Focus on Energy, Environmental Research Program. Bureau of Endangered Resources, Department of Natural Resources, Madison, WI.
- Anderson, C., E. Epstein, C. Isenring. 2008. Applying the Natural Heritage Inventory Classification System to Characterize the Natural Communities in the Ongoing Peatlands Study. Final report to Wisconsin Focus on Energy, Environmental Research Program. Bureau of Endangered Resources, Department of Natural Resources, Madison, WI.
- Boos, T., K. Kearns, C. LeClair, B. Panke, B. Scriver, and B. Williams. 2010. A Field Guide to Terrestrial Invasive Plants of Wisconsin. Wisconsin DNR, Madison, WI. 124 pp.
- Finley, R.W. 1976. Original Vegetation Cover of Wisconsin. Map compiled from General Land Office.
- Hawbaker, T.J., V.C. Radeloff, C.E. Gonzalez-Abraham, R.B. Hammer, and M.K. Clayton. 2006. Changes in the road network, relationships with housing development, and the effects on landscape pattern in northern Wisconsin: 1937 to 1999. *Ecological Applications* 16: 1222-1237.
- Radeloff, V.C., R.B. Hammer, and S.I. Stewart. 2005. Sprawl and forest fragmentation in the U.S. Midwest from 1940 to 2000. *Conservation Biology* 19: 793-805.
- The Nature Conservancy. 2002. The Superior Mixed Forest Ecoregion: a Conservation Plan. 115pp.
- Trout Unlimited - Wisconsin [TU] and Friends of White River. 2004. White River Watershed Management Plan. 31pp. Available at:
<https://dnrx.wisconsin.gov/swims/public/downloadDocument.do?id=22579928>
- Wisconsin Department of Natural Resources. In Prep. DRAFT Ecological Landscapes of Wisconsin. State of Wisconsin, Dept. of Nat. Resources, Handbook. 1805.1. Madison, WI.
- Wisconsin Department of Natural Resources. 1970. Surface Water Resources of Bayfield County. Department of Natural Resources, Madison, WI 1970.
- Wisconsin Department of Natural Resources. 1993. WISCLAND (Wisconsin Initiative for Statewide Cooperation on Landscape Analysis and Data) Land Cover GIS Layer. Madison, WI: Wisconsin Department of Natural Resources.
- Wisconsin Department of Natural Resources. 1997a. Wisconsin's Lake Superior Coastal Wetlands Evaluation. Bureau of Endangered Resources Madison, WI.
- Wisconsin Department of Natural Resources. 1997b. Wisconsin Manual of Control Recommendations for Ecologically Invasive Plants. Wisconsin Department of Natural Resources, Madison, WI.
www.dnr.wi.gov/invasives
- Wisconsin Department of Natural Resources. 1999. Lake Superior Basin Water Quality Management Plan: A Five-Year Plan to Protect and Enhance our Water Resources. March 1999.

- Wisconsin Department of Natural Resources. 1995. Wisconsin's biodiversity as a management issue: a report to Department of Natural Resources managers. Wisconsin Department of Natural Resources, Madison, WI. RS- 915-95.
- Wisconsin Department of Natural Resources. 2004. Wisconsin's Statewide Forest Plan: Ensuring a Sustainable Future. Available on the WDNR Web site: dnr.wi.gov/forestry/assessment/.
- Wisconsin Department of Natural Resources. 2005. Wisconsin Ecological Landscapes Handbook. Ecosystem Management Planning Team. Madison, WI.
- Wisconsin Department of Natural Resources. 2006a. Wisconsin Land Legacy Report: an inventory of places critical in meeting Wisconsin's future conservation and recreation needs. Madison, WI.
- Wisconsin Department of Natural Resources. 2006b. Wisconsin Wildlife Action Plan. Available at <http://dnr.wi.gov/org/land/er/wwap/plan/>.
- Wisconsin Department of Natural Resources. 2006c. Old-growth and Old Forests Handbook. In preparation. Madison, WI.
- Wisconsin Department of Natural Resources. 2007. Important Bird Areas of Wisconsin: Critical Sites for the Conservation and Management of Wisconsin's Birds. Madison, WI.
- Wisconsin Department of Natural Resources. 2008. Biological and Social Dynamics of the White River Brown Trout Fishery, 2003-2005. Fisheries Management Report No. 153. September 2008. Available at: [Fisheries Management Final Surveys - WDNR](#).
- Wisconsin Department of Natural Resources. 2009. DNR Land Certification. Available at: <http://dnr.wi.gov/forestry/certification/dnrland.html>

Appendix A

Natural Heritage Inventory Overview and General Methodology

The White River 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/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 C

Summary Descriptions for Rare Species and Natural Communities Documented on the White River Planning Group

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

Rare Animals

A Periodid Stonefly

A Perlodid stonefly (*Isoperla bilineata*), a State Special Concern stonefly, has been found in large rivers.

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.

Arctic Shrew

Arctic Shrew (*Sorex arcticus*), a state Special Concern mammal is found in tamarack and spruce swamps. Sometimes in alder or willow marshes, rarely in leatherleaf-sphagnum bogs.

Bald Eagle

Bald Eagle (*Haliaeetus leucocephalus*), a bird listed as Special Concern in Wisconsin and Federally protected by the Bald & Golden Eagle Protection Act, prefers large trees in isolated areas in proximity to large areas of surface water, large complexes of deciduous forest, coniferous forest, wetland, and shrub communities. Large lakes and rivers with nearby tall pine trees are preferred for nesting. The breeding season extends from February through August. Favored wintering and roosting habitat includes wooded valleys near open water and major rivers from December through March.

Bog Fritillary

Bog fritillary (*Boloria eunomia*), a State Special Concern butterfly, has been found in open acid bogs with Labrador tea (*Ledum groenlandicum*), leatherleaf (*Chamaedaphne calyculata*), bog laurel (*Kalmia polifolia*) and cranberry (*Vaccinium spp.*) with scattered black spruce and tamarack.. The bog fritillary has a short flight period of usually two weeks or less in Wisconsin from about June 12 through June 25. Flight has begun as early as 23 May 1977, an extraordinarily early season, and records in other years have extended into late June.

Boreal Chickadee

Boreal chickadee (*Parus hudsonicus*), a bird listed as Special Concern, prefers lowland coniferous forests, often near bogs or muskegs. Indicative tree species include white spruce, white cedar, balsam fir, yellow

birch, black ash, green ash, tamarack, American Elm and red maple. The breeding period extends from early April through late July.

Canada Warbler

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

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.

Gray Wolf

Gray wolf (*Canis lupis*), also referred to as timber wolf, is the largest wild members of the dog family. Males average about 10% larger in size than females. In addition, gray wolves have a massive head and neck important in killing prey, which results in larger fore feet than hind feet. Body weight, height, and foot prints are important distinguishing characteristics when comparing gray wolves to other wild and domestic canids (shown in detail at <http://dnr.wi.gov/org/land/er/mammals/wolf/identification.htm>). Wolves are social animals, living in a family group, or pack. Pack sizes in Wisconsin average 2-6 individuals with a few packs as large as 8-10 animals. A wolf pack's territory may cover 20-120 square miles.

LeConte's Sparrow

LeConte's Sparrow (*Ammodramus leconteii*), a species of Special Concern, breeds primarily in the northern third of the state in weedy prairie marshes, sedge meadows, tall grasses, and weedy hayfields. This species is not detected easily as its singing periods are short and the song does not carry well. Threats to populations include water level fluctuations, wetland draining, mowing, and burning.

Mink Frog

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

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.

Olive-sided Flycatcher

Olive-sided Flycatcher (*Contopus cooperi*), a species of Special Concern, breed primarily in the northernmost counties of Wisconsin. The breeding season extends from June until September with preferred nesting habitats including lowland coniferous forests of spruce, tamarack, fir, and white cedar near openings of sedge meadow, streams or rivers, and flooded beaver dams. Scattered tall trees or snags in or near these openings are important perches for sallying out to capture flying insects.

Pygmy Shrew

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

Swainson's Thrush

Swainson's Thrush (*Catharus ustulatus*), a species of Special Concern, breed primarily in the northernmost counties of Wisconsin in spruce and maple dominated forests. Threats to breeding populations include habitat fragmentation, reduced conifer cover, and conversion of forests to plantations.

Water Shrew

Water Shrew (*Sorex palustris*), a state Special Concern mammal, is found in marshes, bogs, and cold, small streams with cover along the banks

Wood Turtle

Wood turtles (*Clemmys insculpta*), a Threatened species in Wisconsin, prefer clean rivers and streams with moderate to fast flows and adjacent riparian wetlands and upland deciduous forests. This species often forages in open wet meadows or in shrub-carr habitats dominated by speckled alder. They overwinter in streams and rivers in deep holes or undercut banks where there is enough water flow to prevent freezing. This semi-terrestrial species tends to stay within about 300 meters of rivers and streams but exceptions certainly occur, especially within the driftless area of southwestern and western Wisconsin. This species becomes active in spring as soon as the ice is gone and air temperatures reach around 50 degrees in March or April. They can remain active into mid-October but have been seen breeding under the ice. Wood turtles can breed at any time of year, but primarily during the spring or fall. Nesting usually begins in late May in northern WI and early June in southern WI and continues through June. This species nests in sand or gravel, usually very close to the water, although it is known to nest along sand and gravel roads or in abandoned gravel pits some distance from water. Hatching occurs in 55-75 days (August) depending on air temperatures. This species does not overwinter in nests, unlike other WI turtles.

Woodland Jumping Mouse

Woodland jumping mouse (*Napaeozapus insignis*), a state Special Concern mammal, is found in forested or brushy areas near water, wet bogs, stream borders.

Rare Plants

Arrow-leaved Sweet-coltsfoot

Arrow-leaved Sweet-coltsfoot (*Petasites sagittatus*), a State Threatened plant, is found in cold marshes and swamp openings, often forming large clones. This species hybridizes with *Petasites palmatus*, a more common species also found in moist to wet places. Blooming occurs throughout May, and fruiting occurs throughout June. The optimal identification period for this species is late May through late August. To date this plant is known from just one location in the Brule Addition, a small roadside depression documented during the BRSF biotic inventory and later relocated in 2008.

Assiniboine Sedge

Assiniboine Sedge (*Carex assiniboensis*), a State Special Concern plant, is found on rich alluvial terraces along rivers. Blooming occurs throughout May; fruiting occurs early June through early July. The optimal identification period for this species is late May through late June.

Climbing Fumitory

Climbing Fumitory (*Adlumia fungosa*), a State Special Concern plant, 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.

Large-flowered Ground-cherry

Large-flowered ground-cherry (*Leucophysalis grandiflora*) is a short-lived plant that is found most often in recently burned moist to dry forests, and also on gravel bars of large rivers. Blooming occurs throughout the month of July, and the large (3-4 cm wide) flower is white with a yellow center. Optimal identification period is throughout the month of July.

Large Roundleaf Orchid

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

Large Toothwort

Large Toothwort (*Cardamine maxima*), a State Special Concern plant, is found in rich mesic floodplain terraces. Blooming occurs late April through early June; fruiting occurs throughout June. The optimal identification period for this species is late April through late May.

Marsh Grass-of-Parnassus

Marsh Grass-of-parnassus (*Parnassia palustris*), a State Threatened plant, is found on clay bluffs on Lake Superior, cold northern fens, calcareous sandy, or gravelly borrow or gravel pits. Blooming occurs early August through early September; fruiting occurs throughout September. The optimal identification period for this species is throughout August.

Marsh Horsetail

Marsh Horsetail (*Equisetum palustre*), a State Special Concern plant, is found in fens, alder tickets, wet sedge meadow, bog and swamp margins. The optimal identification period for this species is late May through late September.

Marsh Ragwort

Marsh Ragwort (*Senecio congestus*), a State Special Concern plant, is found on beaches of lakes having fluctuating levels, based on recent records. It could also, perhaps, occur in cold marshes and fen-like sedge meadows.. Blooming occurs late May through late July; fruiting occurs late June through late August. The optimal identification period for this species is late May through late July.

Northern Black Currant

Northern Black Currant (*Ribes hudsonianum*), a State Special Concern plant, is found in cold, neutral to calcareous conifer swamps, as well as algific talus slopes. Blooming occurs late May through late June; fruiting occurs late June through early August. The optimal identification period for this species is late May through early August.

Northern Yellow Lady's-slipper

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

Purple Clematis

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

Showy Lady's-slipper

Showy Lady's-slipper (*Cypripedium reginae*), a State Special Concern plant, 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 early August.

Slim-stem Small-reedgrass

Slim-stem Small-reedgrass (*Calamagrostis stricta*), a State Special Concern plant, 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 Yellow Water Crowfoot

Small Yellow Water Crowfoot (*Ranunculus gmelinii*), a State Endangered plant, is found in cold brooks and springs, shallow water and muddy shores of ditches, streams, and lakes. Blooming occurs late June

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

Sparse-flowered Sedge

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

Variegated Horsetail

Variegated Horsetail (*Equisetum variegatum*), a State Special Concern plant, 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.

Natural Communities

Alder Thicket

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

Black Spruce Swamp

An acidic conifer swamp forest characterized by a relatively closed canopy of black spruce (*Picea mariana*) and an open understory in which Labrador-tea (*Ledum groenlandicum*) and sphagnum mosses (*Sphagnum* spp.) are often prominent, along with three-leaved false Solomon's-seal (*Smilacina trifolia*), creeping snowberry (*Gaultheria hispidula*), and three-seeded sedge (*Carex trisperma*). The herbaceous understory is otherwise relatively depauperate. This community is closely related to Open Bogs and Muskegs, and sometimes referred to as Forested Bogs outside of Wisconsin.

Boreal Forest

In Wisconsin, mature stands of this forest community are dominated by white spruce (*Picea glauca*) and balsam-fir (*Abies balsamea*), often mixed with white birch (*Betula papyrifera*), white cedar (*Thuja occidentalis*), white pine (*Pinus strobus*), balsam-poplar (*Populus balsamifera*) and quaking aspen (*Populus tremuloides*). Mountain-ash (*Sorbus* spp.) may also be present. Common understory herbs are large-leaved aster (*Aster macrophyllus*), bluebead lily (*Clintonia borealis*), Canada mayflower (*Maianthemum canadense*), wild sarsaparilla (*Aralia nudicaulis*), and bunchberry (*Cornus canadensis*). 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. Of potential interest from the perspectives of vegetation classification and restoration, 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.

Hardwood Swamp

These are northern deciduous forested wetlands that occur along lakes or streams, or in insular basins in poorly drained morainal landscapes. The dominant tree species is black ash (*Fraxinus nigra*), but in some stands red maple (*Acer rubrum*), yellow birch (*Betula allegheniensis*), and (formerly) American elm (*Ulmus americana*) are also important. The tall shrub speckled alder (*Alnus incana*) may be locally common. The herbaceous flora is often diverse and may include many of the same species found in Alder Thickets. Typical species are marsh-marigold (*Caltha palustris*), swamp raspberry (*Rubus pubescens*), skullcap (*Scutellaria galericulata*), orange jewelweed (*Impatiens capensis*), and many sedges (*Carex* spp.). Soils may be mucks or mucky sands. The Hardwood Swamps found on the Brule Addition had been previously logged and were dominated by small diameter black ash.

Mesic Floodplain Terrace

These are deciduous forests developed on alluvial terraces along rich, infrequently flooding (or flooding only for a very short period) rivers draining into Lake Superior. The dominant trees are usually sugar maple (*Acer saccharum*), basswood (*Tilia americana*), and sometimes ashes (*Fraxinus* spp.). There is a diverse spring ephemeral flora (which in Wisconsin includes many southern species at their northern range limits), but by late spring, these may be overtopped by dense stands of ostrich fern (*Matteuccia struthiopteris*) and wood-nettle (*Laportea canadensis*).

Muskeg

Muskegs are cold, acidic, sparsely wooded northern peatlands with composition similar to the Open Bogs (*Sphagnum* spp. mosses, *Carex* spp., and ericaceous shrubs), but with scattered stunted trees of black spruce (*Picea mariana*) and tamarack (*Larix laricina*). Plant diversity is typically low, but the community is important for a number of boreal bird and butterfly species, some of which are quite specialized and not found in other communities.

Northern Sedge Meadow

This open wetland community is dominated by sedges and grasses. There are several common subtypes: Tussock meadows, dominated by tussock sedge (*Carex stricta*) and Canada bluejoint grass (*Calamagrostis canadensis*); Broad-leaved sedge meadows, dominated by the robust sedges (*Carex lacustris* and/or *C. utriculata*); and Wire-leaved sedge meadows, dominated by such species as woolly sedge (*Carex lasiocarpa*) and few-seeded sedge (*C. oligosperma*). Frequent associates include marsh bluegrass (*Poa palustris*), manna grasses (*Glyceria* spp.), paniced aster (*Aster lanceolatus*), joy-pyeweed (*Eupatorium maculatum*), and the bulrushes (*Scirpus atrovirens* and *S. cyperinus*). Some examples of this type at the Brule Addition were impacted by beaver.

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 (*Acer saccharum*) is dominant or co-dominant in most stands. Historically, eastern hemlock (*Tsuga canadensis*) was the second most important species, sometimes occurring in nearly pure stands with eastern white pine; both of these conifer species are greatly reduced in today's forests. American beech (*Fagus grandifolia*) can be a co-dominant with sugar maple in the counties near Lake Michigan. Other important tree species were yellow birch (*Betula allegheniensis*), basswood (*Tilia americana*), and white ash (*Fraxinus americana*). The groundlayer varies from sparse and species poor (especially in hemlock stands) with woodferns, blue-bead lily (*Clintonia borealis*), club-mosses (*Lycopodium spp.*), and Canada mayflower (*Maianthemum canadense*), to lush and species-rich with fine spring ephemeral displays. Historically, Canada yew was an important shrub, but it is now absent from nearly all locations. Historic disturbance regimes were dominantly gap-phase windthrow; large windstorms occurred with long return periods. After old-growth stands were cut, trees such as quaking and bigtoothed aspens (*Populus tremuloides* and *P. grandidentata*), white birch (*Betula papyrifera*), and red maple (*Acer rubrum*) became abundant and still are important in many second-growth northern mesic forests. Several distinct associations within this complex warrant recognition as communities, and draft abstracts of these are currently undergoing review.

Northern Wet-mesic Forest

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

Tamarack (poor) Swamp

These weakly to moderately minerotrophic conifer swamps are dominated by a broken to closed canopy of tamarack (*Larix laricina*) and a frequently dense understory of speckled alder (*Alnus incana*). The understory is more diverse than in Black Spruce Swamps and may include more nutrient-demanding species such as winterberry holly (*Ilex verticillata*) and black ash (*Fraxinus nigra*). The bryophytes include many genera other than Sphagnum. Stands with spring seepage sometimes have marsh-marigold (*Caltha palustris*) and skunk-cabbage (*Symplocarpus foetidus*) as common understory inhabitants. These seepage stands have been separated out as a distinct type or subtype in some nearby states and provinces.

Appendix D

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

	Major				Important				
	Boreal Forest	Coldwater streams	Coolwater streams	Alder Thicket	Northern Hardwood Swamp	Northern Sedge Meadow	Northern Wet Forest	Northern Wet-mesic Forest	Shrub Carr
Species that are Significantly Associated with the Superior Coastal Plain Ecological Landscape									
American Bittern				L		S			L
American Woodcock	L			S	M	L	L	L	S
Bald Eagle									
Black Tern						M			
Black-billed Cuckoo	L			S	L	L	L		S
Black-throated Blue Warbler	L								
Blue-winged Teal						M			
Bobolink						S			
Boreal Chorus Frog						S			
Canada Warbler	S			M	S		M	S	L
Four-toed Salamander	M	M	M	S	M	M	M	S	S
Golden-winged Warbler	L			S	M		M	L	S
Gray Wolf	S			S	M	L	S	S	M
Le Conte's Sparrow						S			
Least Flycatcher	M				M			L	L
Mink Frog	L	M	S	M	L	S	L	L	M
Mudpuppy		M	L						
Northern Flying Squirrel	S				M		S	S	

Northern Harrier				L		S			L
	Major				Important				
	Boreal Forest	Coldwater streams	Coolwater streams	Alder Thicket	Northern Hardwood Swamp	Northern Sedge Meadow	Northern Wet Forest	Northern Wet-mesic Forest	Shrub Carr
Veery	S			S	S		M	L	S
Water Shrew	S	S	S	M	S	L	S	S	L
Wood Thrush					L		L	L	
Wood Turtle		S	S	S	M	M	M	M	S
Woodland Jumping Mouse	M			L	M	L	M	M	L
	Major				Important				
	Boreal Forest	Coldwater streams	Coolwater streams	Alder Thicket	Northern Hardwood Swamp	Northern Sedge Meadow	Northern Wet Forest	Northern Wet-mesic Forest	Shrub Carr
Species that are Moderately Associated with the Superior Coastal Plain Ecological Landscape									
American Marten	S				L		L	L	
Black-backed Woodpecker	M						S	L	
Eastern Red Bat	M	S	S	M	M	M	M	M	M
Hoary Bat	M	S	S	M	M	M	M	M	M
Moose	S	L	L	S	S	M	M	S	S
Northern Long-eared Bat	L	S	S	M	M	M	L	L	M
Olive-sided Flycatcher	M			L			S	M	L
Pickerel Frog		S	S	M		S	M	M	M
Red Crossbill	L						L		
Rusty Blackbird				M					M
Sharp-tailed Grouse						M			L
Silver-haired Bat	M	S	S	M	M	M	M	M	M
Solitary Sandpiper		M	M	L		L			L
Yellow Rail						S			

	Major	
	Northern Dry-mesic Forest	Northern Sedge Meadow
Species that are Significantly Associated with the Northwest Sands Ecological Landscape		
American Bittern		S
American Woodcock	L	L
Black Tern		M
Black-backed Woodpecker	L	
Black-billed Cuckoo	L	L
Blanding's Turtle		M
Blue-winged Teal		M
Bobolink		S
Boreal Chorus Frog		S
Connecticut Warbler	L	
Golden-winged Warbler	M	
Gray Wolf	S	L
Le Conte's Sparrow		S
Least Flycatcher	M	
Nelson's Sharp-tailed Sparrow		S
Northern Flying Squirrel	S	
Northern Harrier		S
Northern Prairie Skink	M	
Red Crossbill	S	
Red-headed Woodpecker	L	
Sharp-tailed Grouse		M
Trumpeter Swan		L
Upland Sandpiper		L
Veery	M	
Water Shrew		L
Whip-poor-will	M	
Wood Turtle		M
Yellow Rail		S
Species that are Moderately Associated with the Northwest Sands Landscape		
American Golden Plover		L
Canada Warbler	M	
Four-toed Salamander		M
Mink Frog		S
Northern Goshawk	M	
Olive-sided Flycatcher	L	

Pickereel Frog		S
Red-shouldered Hawk	M	
Solitary Sandpiper		L
Wilson's Phalarope		S
Wood Thrush	L	
Woodland Jumping Mouse	L	L

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).