
Regional and Property Analysis:
White River Property Group (WRPG)



Wildlife Area

1. White River (*Ashland Co.*)

Fishery Areas

2. White River (*Bayfield Co.*)
White River (*Ashland Co.*)

State Natural Areas

3. Bibon Swamp (*Bayfield Co.*)
4. Sajdak Springs (*Bayfield Co.*)
(*within White River Fishery Area*)



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Cover Photo – White River, Bayfield County

Scott Toshner, WDNR

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1. INTRODUCTION AND OVERVIEW

PURPOSE OF REGIONAL AND PROPERTY ANALYSIS

A Regional and Property Analysis is required by Chapter NR 44, Wisconsin Administrative Code, when developing a property master plan, a plan revision or amendment. Property Master Plans are required to be revisited and updated at 15-20 year intervals. The Regional and Property Analysis is the first phase and foundation of the planning process. Functionally, it highlights those elements in a regional context that are most important to consider when planning the property and identifies the most suitable potential future roles or niches for a property.

Regional Analysis

The Regional Analysis component of this document describes the biological/ecological, cultural, economic, and recreational environment that affects the properties and their uses. It characterizes the existing property resources within the Ecological Landscape in which they exist (see p. 3) and highlights the degree to which they are significant both regionally and within the project boundary. It identifies significant ecological and recreational needs of the region. It also defines existing and potential social demands or constraints that affect these properties and should be considered during the planning process.

Property History and Management

The Property Management component provides a brief property history, and describes existing uses, infrastructure, management, opportunities, and constraints on these properties. This section also describes surrounding and adjacent lands, indicating how the character of these lands may affect these properties or their uses.

Findings and Conclusions

Based on all the regional and property data in the body of the document, the Findings and Conclusions section outlines the best probable future role or niche for these properties. It helps focus the planning process and becomes the foundation for building the plan's vision and goals, and action strategies.

INTRODUCTION TO PROPERTIES BY DESIGNATION

The properties included in this planning group are one State Wildlife Area, two State Fisheries Areas and two State Natural Areas. One State Natural Area is designated within the boundaries of a Fisheries Area. The scope of use and management of a state property is governed by its official designation.

Wildlife and Fishery Areas

Wildlife and Fishery Areas are acquired and managed under the authority of Sec. 23.09 (2) (d) 3 Wis. Statutes, and Administrative Code ch. NR 1.51. Wildlife Areas are designated to provide places where people can hunt, trap or fish. Wildlife and Fishery Areas are also open for traditional outdoor uses of walking, skiing, snow shoeing, nature study, berry picking, and other low-impact recreational activities. As directed by chs. NR 1.51 and NR 1.61, other recreational uses may be allowed by the Master Plan if those uses do not detract from the primary purpose of these properties.

State Natural Areas

Natural Areas are defined and authorized in sections 23.27-23.29 Wisconsin Statute and ch. NR 1.32 Administrative Code as “an area of land or water which has educational or scientific value or is important as a reservoir of the state’s genetic or biological diversity and includes any buffer area necessary to protect the area’s natural value.”Section 23.27(1) defines natural areas as "reserves for native biotic communities...habitat[s] for endangered, threatened, or critical species...or areas with highly significant geological or archaeological features." Section 23.28(1) provides authority to designate areas as State Natural Areas and Section 23.29 provides authority to legally dedicate and protect State Natural Areas in perpetuity.

While the intent of the Natural Areas program is to preserve the best examples of the state’s diverse natural communities, other recreational uses may be allowed, if they do not threaten the site's natural values.

OVERVIEW OF THE WHITE RIVER PROPERTY GROUP: WILDLIFE, FISHERY & NATURAL AREAS

The project area is situated along the White River in two northern Wisconsin counties: Bayfield and Ashland. The White River and its watershed are important from a recreational and economic standpoint: it is one of the outstanding inland trout producing streams in northwest Wisconsin and is an important tributary to Lake Superior. For purposes of developing property Master Plans, a group of three properties forming an environmental corridor along the White River and its tributaries was identified as the White River Property Group (WRPG). Collectively, these properties have similar attributes, are located almost entirely within the Superior Coastal Plain Ecological Landscape, and comprise approximately 14,376 acres of state protected and managed land. Approximately 1,000 acres are State Wildlife Area;4,142 acres are Fishery Areas, and 9,274 acres are designated as State Natural Areas (includes 40 acre Sajdak Springs, within Fishery Area property). Property locations are identified among regional landmarks on Map A (Appendix A). Property infrastructure and vegetation details are further represented on additional maps (Appendix A) and discussed later in this document.

White River Planning Group property areas included in this planning group are:

1. **White River Wildlife Area** —northwest Ashland County, three miles south of Ashland.
2. **White River Fishery Areas** (incl. Sajdak Springs State Natural Area)—numerous land parcels along the White River in central Bayfield and northwest Ashland Counties.
3. **Bibon Swamp State Natural Area**—southeast Bayfield County, 1 mile north of Grandview. State Highway 63 runs parallel along the southern and eastern property boundary.

Property	Acreage
1. White River Wildlife Area	1,000
2. White River Fishery Areas	4,142
3. Bibon Swamp State Natural Area	9,234

2. REGIONAL ANALYSIS

This Regional Analysis uses an **Ecological Landscape** framework to describe the current knowledge, use and potential of three elements: Biological Resources, Socio-economic Characteristics, and Recreational Resources.

ECOLOGICAL LANDSCAPES OF WISCONSIN

The “Ecological Landscapes of Wisconsin” handbook (WDNR, 2012 in press), delineates 16 Ecological Landscapes in Wisconsin that have similar ecology and management potential. For each Ecological Landscape there are: 1) descriptions of ecological resources and socioeconomic conditions; 2) descriptions of Wisconsin’s role in sustaining these resources within regional and global perspectives, and 3) highlights of ecological management opportunities best suited for each Ecological Landscape.

This handbook was designed to provide the scientific information needed to make strategic and effective decisions in Department master planning. Its use creates efficiency by integrating and focusing the work of multiple department and partner programs (Water, Forestry, Fish, Wildlife, Endangered Resources), plans, and funding sources within the framework of an Ecological Landscape. The handbook provides tools to develop management strategies that are ecologically appropriate for a region. Applying ecosystem management concepts and opportunities described in the handbook may prevent conflicting or incompatible management among different Department programs on adjoining lands.

Superior Coastal Plain

The **Superior Coastal Plain** is the Ecological Landscape in which the majority of the White River Property Group resides. The Superior Coastal Plain regional descriptions of biological resources, socio-economic characteristics and recreational resources are provided in Chapter 20 of the *Ecological Landscapes Handbook*. This Chapter is incorporated by reference in its entirety within this planning document. Information on Chapter 20 and the remainder of the handbook are accessible on the Wisconsin DNR website (dnr.wi.gov) and by searching keywords “Ecological Landscape of Wisconsin or Superior Coastal Plain.”

The chapter’s introductory summary, “Superior Coastal Plain Ecological Landscape at a Glance” (below) provides a quick overview of the types of information useful in planning. It is included here verbatim from the *Ecological Landscape Handbook*, following a map of the WRPG properties overlaid on the Ecological Landscapes of Wisconsin (Figure 1).



Figure 1: White River Property Group (in black) and the Ecological Landscapes of Wisconsin.

Superior Coastal Plain Ecological Landscape at a Glance

Physical and Biotic Environment	
Size	1,416 square miles (905,929 acres), representing 2.5% of the area of the State.
Climate	Typical of northern Wisconsin, though conditions are somewhat moderated by the proximity to Lake Superior; mean growing season of 122 days, mean annual temperature is 40.2 °F, mean annual precipitation is 32 inches, and mean annual snowfall is 87.4 inches. Cool summers, deep snows (including lake effect snows), high humidity, fogs, mists, wave sprays, currents, ice, and strong winds (along exposed coasts, where tree blow-downs are frequent) affect parts of the Ecological Landscape, especially near Lake Superior. Areas near Lake Superior support grass-based agriculture (18.5% of the Ecological Landscape). Portions of the northern Bayfield Peninsula have a climate and soils favorable for growing apples and other fruits. Areas away from Lake Superior have a shorter growing season and forests become more important than agriculture.
Bedrock	Late Precambrian sandstones are exposed and form cliffs and ledges along the northern edge of the Bayfield Peninsula and on the shores of the Apostle Islands. Igneous rocks (e.g., basalts) form the underpinnings of several waterfalls.
Geology and Landforms	The “plains” on either side of the Bayfield Peninsula are relatively level and slope gently toward Lake Superior. They are dissected by many deeply incised streams and several larger rivers that flow generally northward to Lake Superior. Sandspits are well-developed in the Apostle Islands archipelago and at river mouths; some of the larger spits are several miles long.
Soils	Important soils include deep, poorly-drained reddish lacustrine clays on either side of the Bayfield Peninsula. The clay deposits may include lenses of sand or till (and such areas are especially erosion prone when cut by steep-sided stream drainages). The Bayfield Peninsula and Apostle Islands are covered with glacial tills.
Hydrology	Lake Superior has had an enormous influence on the climate, landforms, soils, vegetation, and economy of the Superior Coastal Plain. Freshwater estuaries are present along the coast. Inland lakes are rare, but lagoons, some of them quite large, occur behind coastal sandspits at several locations. Important rivers include the St. Louis, Nemadji, Bad, White, Amnicon, and Bois Brule. Coldwater streams originate in the aquifers at the northern edge of the Northwest Sands, flowing north across the Superior Coastal Plain before emptying into Lake Superior. Many streams deeply incised in and flowing across the red clays were severely altered and the banks and beds damaged during the era of heavy logging. Many of them have not recovered. Water (and soil) management can be challenging in this Ecological Landscape.
Current Landcover	Aspen-dominated “clay plain boreal forests” are abundant to the west and east of the Bayfield Peninsula. In some areas white spruce, balsam fir, and white pine are common understory species (these were the dominant overstory species prior to the Cutover). Older stands of boreal conifers occur in a few places, such as the City of Superior Municipal Forest. Forest fragmentation is significant on the clay plain owing to the interspersions of forests with fields and pastures. Northern hardwood and hemlock-hardwood forests occur on the Apostle Islands and include old-growth remnants. Dry forests of pine and northern pin oak, a rarity in this Landscape, occur on some of the sandspits associated with coastal estuaries. The coastal estuaries are regionally significant repositories for rare and specialized plants, and often contain diverse and intact wetland complexes of marsh, sedge meadow, fen, and conifer swamp.
Socioeconomic Conditions (The counties included in this socioeconomic region are: Douglas, Bayfield, and Ashland.)	
Population	75,056; 1.3% of the state total.
Population Density	20 persons/ mi ²
Per Capita Income	\$26,597

Economic Strengths	Government, tourism-related, health care and social services, and retail trade sectors employed the most people in 2007, reflecting high government service and recreation dependence. Agriculture, including the growing of specialty crops such as apples and cherries, occurs here. Forestry, commercial fishing, and agriculture have the largest effects on the natural resources of the Superior Coastal Plain.
Public Ownership	Federal lands include Apostle Islands National Lakeshore (NPS); Whittlesey Creek National Wildlife Refuge; several USCG light stations; and a very small portion of the Chequamegon-Nicolet National Forest. Important state-owned properties include the Brule River State Forest, and several state parks, wildlife areas, fishery areas, and state natural areas. Most county-owned land is County Forest (which includes “special use” areas). The City of Superior owns a Municipal Forest of over 4,000 acres, and a large part of Wisconsin Point (part of a coastal barrier spit separating St. Louis and Allouez bays from the waters of Lake Superior at the Twin Ports of Duluth-Superior). A map showing public land ownership (county, state, and federal) and private lands enrolled in the Forest Tax Programs in this Ecological Landscape can be found at the end of this chapter.
Other Notable Ownerships	Private lands of high conservation value include the reservations of the Bad River and Red Cliff Bands of Lake Superior Ojibwa, projects under the direction of NGOs (e.g., local land trusts), and industrial forests. The Nature Conservancy has a number of conservation easements within the boundaries of the Brule River State Forest, including some that encompass outstanding natural features such as “Ordway Pines and Barrens”, and has worked with many of the governmental units in this Ecological Landscape (including tribal governments) on conservation projects of mutual interest and benefit. Local land trusts have been active on Madeline Island (Ashland County) and in Douglas County.

Considerations for Planning and Management

Climate change; impacts of water level changes (including attempts to stabilize the water level of Lake Superior); the appearance and spread of invasive species; and population trends in certain native species are major topics needing additional research. Increased shoreline development. Migratory bird use and fish spawning habitat are highly significant. Management of lands in the red clay country to lessen erosion and improve water quality and habitat for aquatic life, and reduce negative edge impacts (construction, agriculture, forestry – including reforestation), are issues deserving major consideration. Occurrences of many rare and geographically limited natural community complexes of exceptional quality have been documented here recently, along with numerous rare species.

Management Opportunities

Lake Superior proper, across state and international boundaries; “sandscapes”, with beach, dune, barrens, and dry forest communities; hemlock hardwood forest with old-growth conifer-hardwood remnants; sandstone cliffs and ledges; freshwater estuaries; boreal (Clay Plain) forest; Bad River-Kakagon Sloughs; Chequamegon Point-Long Island; Chequamegon Bay - Fish Creek; St. Louis River Estuary and Wisconsin Point; Lower Brule River Spillway, with boreal forest, various wetland types; red clay wetlands; river corridors with rich mesic hardwood and floodplain forests; coldwater streams emanating from the Bayfield Peninsula; colonial birds: gulls, terns, cormorants; rare species; migratory bird concentration areas; and surrogate grasslands. The National Oceanic and Atmospheric Administration (NOAA) designated a coastal wetland site from Wisconsin (the St. Louis River Estuary) as part of a nation-wide system of “National Estuarine Research Reserves”. This designation for the Lake Superior National Estuarine Research Reserve will present opportunities for coastal wetland-related research, stewardship, and education through private, state, and federal partnerships.

BIOLOGICAL RESOURCES

The biological resources of the White River properties are described in detail in the Superior Coastal Plain Ecological Landscape chapter noted above, along with details on socio-economic conditions and recreation resources. DNR staff tailored a summary of that chapter plus additional information and interpretation specific to the properties of interest for planning purposes. Biological resources descriptions are derived from both documents.

Rapid Ecological Assessment

Text in the following section is excerpted from the “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” (WDNR, 2010b).

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.

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 Bureau 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. 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.

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 American Bittern, Golden-winged Warbler, Canada Warbler, LeConte's Sparrow, and Bobolink (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. The full report is available at (dnr.wi.gov/fish/reports/).

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.

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 1). 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.).

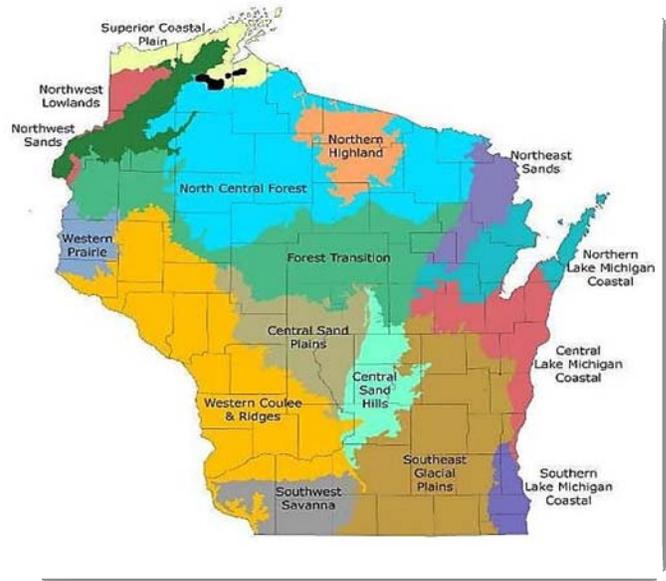


Figure 2: Location of the WRPG sites within the Ecological Landscapes of Wisconsin (shown in black).

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 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*).

The WRPG sites fall primarily within three Landtype Associations: Ashland Lake – Modified Till Plain,

Bibon Marsh, and Bayfield Rolling Outwash and Washed Till.

- The Ashland Lake – Modified Till Plain LTA has a characteristic landform pattern of undulating modified lacustrine moraine with deep v-shaped ravines common along the White River and its tributaries in the WRPG. **Soils** are predominately somewhat poorly drained clay loam over calcareous clay till or loamy lacustrine.
- The Bibon Marsh LTA has characteristic landform patterns of nearly level swamp with outwash plains and alluvial plains common. **Soils** are predominately very poorly drained organic deposits. Common habitat type is forested lowland.
- The Bayfield Rolling Outwash and Washed Till LTA has a characteristic landform pattern of rolling collapsed outwash plain and moraine. **Soils** are predominately excessively drained loamy sand over outwash or acid loamy sand debris flow.

Current Vegetation

The majority of the WRPG is located in a landscape dominated by lacustrine deposits on clay and slow draining soils. 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 vary 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 (*Mattencia 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.

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*

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

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.

Land Cover

(For use in addition to the “Rapid Ecological Assessment”—this Land Cover section represents the Department’s sustainable forestry data.)

Note: Different terminology exists in this document for describing GPS-mapped land cover than for describing vegetation ecology. This reflects programmatic and database differences between forestry management and other DNR programs. Vegetation and ecological community descriptions include details based on analyses of plant and animal communities, viewed from a “ground up” perspective. Land “cover types” in the Map E series (Appendix A) and listed in tables for each property description, provide ‘tree-top’ or aerial land cover perspectives, a forestry management perspective. The “top down” land cover perspective provides a broad-brush overview and generally omits ground level ecological communities; for instance, a rare bog or springs community will be defined only as a wetland.

The **White River Wildlife Area** is dominated by Aspen, Fir/Spruce and Pine (collectively referred to as “Upland Conifer”), with a significant component of Swamp Hardwoods found on the lowlands adjacent to the White River (Map E-1, Appendix A). Table 1 provides a breakdown of current cover types on the property, based on DNR Forestry Management data (WISFIRS). Rare animal and plant species, and high quality Natural Communities are identified in text and tables of the Rapid Ecological Assessment preceding this section.

Swamp Hardwood stands occur within the floodplain of the Wildlife Area, and are dominated by black and green ash, with diverse secondary components including sugar maple, basswood, red maple and box elder. Aspen dominates 45% of the uplands at the property, with white and red pine, white spruce and balsam fir found as secondary forest types. The steep slopes adjacent to the White River contain upland conifer forest types, with pine, spruce, fir and white cedar represented in the overstory.

Table 1. White River Wildlife Area Cover Types	
Cover Types	% Cover
Aspen	45
Swamp Hardwood	17
Upland Conifer	30
Upland Hardwood	0.5
Water	3.5
Wetland / Non Forested	3
Non-Forest / ROW /G	1

The **White River Fishery Area** is predominately forested, with a significant component of aspen present throughout the property (Maps E-2a and E-2b, Appendix A). Table 2 provides a breakdown of current cover types on the property, based on DNR Forestry Management data (WISFIRS).

Table 2. White River Fishery Area Cover Types

A diversity of cover types are present on the properties' parcels, including pine-dominated upland conifers, with some stands containing older age classes (trees ranging 15-20" dbh). Also present are stands of oak and northern hardwoods. Scattered around the properties are small areas of swamp conifers, dominated by white cedar and balsam fir. Unforested wetlands are found throughout the White River Fishery Area, comprised of both open sedge meadows and brush thickets of speckled alder and associated swamp shrubs. An eight acre native grass and forb seed nursery along White River Fisheries Road and the Delta-Drummond Road is maintained by DNR wildlife staff. This seed is used for DNR projects throughout the Lake Superior Basin.

Bibon Swamp State Natural Area is the largest property in the WRPG and contains the most wetlands among the range of cover types (Map E-3, Appendix A). Table 3 provides a breakdown of current forestry-based cover types (DNR WISFIRS) on the property.

Cover Types	% Cover
Aspen	39
Grassland	4
Oak	9
Shrub	1
Swamp Conifer	4
Swamp Hardwood	5
Upland Conifer	14
Upland Hardwood	11
Water	3
Wetland – non Forested	10

Cover Types	% Cover
Aspen	27
Developed	3
Shrub	10
Swamp Conifer	17
Swamp Hardwood	12
Upland Conifer	1
Water	2
Wetland, non-Forested	28

Lowland cover types, both forested and unforested, make up the majority of the acreage at Bibon Swamp. Swamp conifers, comprised mostly of black spruce and tamarack, are common throughout the property. White cedar is present as well, both in pure stands, and as a secondary component of many black ash-dominated Swamp Hardwood stands. Areas of non-forested wetland are common and extensive, with a mix of open sedge meadow and alder-dominated brushy lowlands. The uplands at Bibon Swamp are primarily found on the south side of the White River and are aspen-dominated, although northern hardwoods are also present.

Management Considerations and Opportunities for Biodiversity Conservation

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 Coastal 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 WRPG 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 WRPG 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 WRPG, 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 established within the WRPG pose a significant threat to the natural communities. 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*), redtop (*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 (Figure 2). See dnr.wi.gov/org/land/er/wwap/explore/tool.asp for more information on the Ecological Priorities Tool.

Note: Appendix B contains a matrix with the vertebrate SGCN and associated ecological opportunities (native communities) for this landscape.

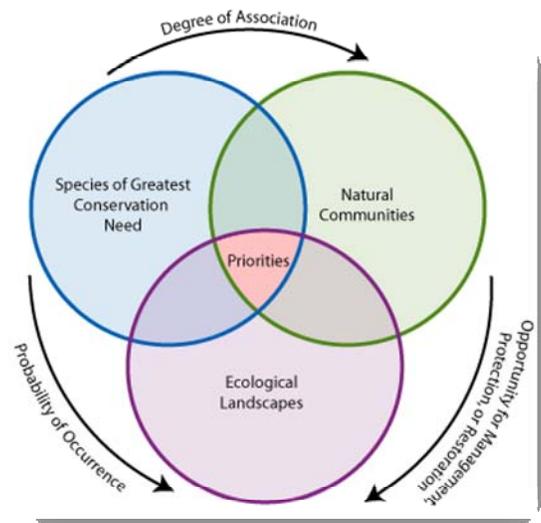


Figure 2. Illustrates the process used for identifying Ecological Priorities in the Wisconsin Wildlife Action Plan.

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 (three) 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.

WRPG01. White River Boreal Forest Primary Site—491 acres (White River Wildlife Area)

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 (Figure 3).



Figure 3. 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
(White River Fishery Area – Bayfield Co)**

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
(White River Fishery Area – Bayfield Co)**

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



Figure 4. Golden-winged Warbler.
Photo by Brian Collins.

for various rare or uncommon birds, mammals, and plants (Figure 4).

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.

SOCIO-ECONOMIC CHARACTERISTICS

Information is largely from the “Superior Coastal Plain Ecological Landscape” chapter (WDNR, 2012 in progress).

Archaeological Resources

A cultural review indicated the presence of recorded prehistoric campsites and a historic foundation within the White River Fishery and Wildlife Areas. Management policy (Wis. Stats. 44.40 and Manual Code 1810.10) requires that any activities with the potential to disturb archaeological sites will only be undertaken after consultation with the Department Archaeologist (Dudzick 2012).

Population

The population density of the Superior Coastal Plain counties is second lowest of any Ecological Landscape county approximation in Wisconsin. There are less than 20 persons/square mile in Superior Coastal Plain Counties combined, compared to 99 persons/square mile in Wisconsin as a whole according to 2009 US Census Bureau information. However, the Lake Superior coastline of each of the counties, tends to be more densely populated than the area to the south.

Although there are few minorities, the Superior Coastal Plain region has the largest percentage of Native Americans. The Superior Coastal Plain Counties are not economically prosperous. The per capita income and average wage are relatively low and they have the highest poverty rates for both adults and children, and the second highest rate of unemployment of all landscape approximations.

Land Use and Ownership

The total area of the Superior Coastal Plain Ecological Landscape is approximately 906,000 acres, of which 57% is classified as timberland. Publicly owned lands make up about one-fifth of the area; about half county forest, the remainder state or federally owned and managed. Two tribal reservations of the Lake Superior Bands of the Chippewa, Red Cliff and Bad River, are situated along Lake Superior. The large Municipal Forest of the City of Superior encompasses over 4,000 acres.

The present coastal plain forest has been fragmented by past and ongoing agricultural uses, and approximately one-third of this landscape is now non-forested (or sparsely forested with new growth). Most of the open land is in grass cover, having been cleared and then subsequently pastured or plowed. Aspen and birch forests, managed for pulp, now occupy about 40% of the total land area, and have increased in prominence over the formerly dominant boreal conifers. On the Bayfield Peninsula, second-growth northern hardwood forests are interspersed among extensive early successional aspen stands.

Older forests are now rare throughout the Superior Coastal Plain. Small but exceptional stands of old-growth forest occur on the Apostle Islands, and these are often associated with U.S. Coast Guard lighthouse reservations.

Economic Issues

Bayfield and Ashland counties rely on the area's natural resources and related tourism. Bayfield County's local economy, historically based in forestry, fishing and farming, has evolved into an economy that is dominated by the tourism industry. Based on March 2000 figures, logging-related employment, a traditional manufacturing industry in the county, is no longer in the top ten industry groups. The county's land use plan indicates the substantial economic impact of tourism on Bayfield County. Between 1992-2001, tourism expenditures increased by nearly 170 percent in Bayfield County. Many tourism-related jobs tend to be part-time and seasonal, which corresponds with the area's higher unemployment and poverty rates. Both counties have a greater percentage of persons below the statewide income averages. (WDNR, 2004 WR Feasibility Study – green sheet).

Government Service and Tourism/Outdoor Recreation are important contributors to the economy of the Superior Coastal Plain Counties. The number of state parks, forests and recreation areas, as well as acreage of federal lands, is relatively high, contributing to these sectors of the economy. Forest products and processing industries contribute about 9% to the total industrial output of the Superior Coastal Plain Counties. Agriculture is not a major contributor to the economy and has seen the greatest decrease in the state in both farm numbers and acreage in agricultural land since 1970. Important educational institutions include Northland College and Wisconsin Indianhead Technical College in Ashland, and the University of Wisconsin-Superior in Superior.

RECREATION RESOURCES: USE AND POTENTIAL

Information on outdoor recreation in Wisconsin comes from multiple sources: 1) the Statewide Comprehensive Outdoor Recreation Plan (SCORP) (WDNR 2006a) a national template that describes the status, trends and needs for outdoor recreation in Wisconsin; 2) the Wisconsin DNR Ecological Landscapes Handbook (WDNR, 2012 in progress); 3) information in the Land Legacy Report, (WDNR, 2006b) to identify the most important remaining sites in the state that warrant protection for their natural resource and outdoor recreation values, and 4) the UW-Madison Applied Population Laboratory, who produced "Regional Profile, Region 1" for northwestern Wisconsin.

For planning purposes, this Regional Analysis focuses on “nature-based” and motorized activities that generally take place in natural or undeveloped settings. These include traditional activities (e.g., hunting, trapping, fishing, camping, hiking, wildlife watching, canoeing, swimming in lakes and rivers, horseback riding), non-traditional activities (e.g., geocaching, kayaking, and off-road biking) and motorized activities (e.g., ATV, snowmobile riding). These properties have either been purchased or managed with funds from the Federal Aid in Wildlife Restoration Act (Pittman-Robertson Act) and/or the Sport Fish Restoration Act. Statutes and applicable regulations prohibit a state fish and wildlife agency from allowing recreational activities and related facilities that would interfere with the purpose for which the State acquired, developed, or is managing the land. This analysis does not include outdoor activities associated with developed settings, facilities, and infrastructure.

The Department is committed to providing exceptional outdoor recreation opportunities for people of all abilities. All new construction and renovation of infrastructure will follow guidelines set forth within the Americans with Disabilities Act and also be done in a manner consistent with Wisconsin Ch. NR 44 standards for land use classification, at the site where the development is located.

The property manager has the authority to make reasonable accommodations for people with disabilities, consistent with the requirements of the area’s land use classification. Property managers may also allow the use of power-driven mobility devices (PDMDs) on trails consistent with federal law for PDMDs located in 28 CFR s. 35.137.

Recreational Opportunity and Need

The ten northwest Wisconsin counties identified in SCORP offer an exceptional amount of outdoor recreation destinations, such as the Chequamegon National Forest, the Apostle Islands National Seashore, and the St. Croix National Scenic Riverway (WDNR, 2006a). Relative to the rest of the state, these counties contain an abundance of natural resources, host an active resident population, and attract many out-of-state visitors through their proximity to the Twin Cities and Duluth, Minnesota.

Nature-Based Recreation

Outdoor recreation demand is defined by SCORP according to the reported desires of users of outdoor recreational facilities within a region. As part of the national template for SCORP, outdoor recreation participation surveys were conducted by the National Survey on Recreation and the Environment. The surveys examined 62 recreational uses by region. The Recreation Demand table (shown right) shows the percentage of responders participating in each recreational activity in northwest Wisconsin. The recreational uses were selected from 62 uses in the survey as the top 10 uses in the Northwest region of Wisconsin that are nature-based activities.

Rank	Recreational Uses*	Region (%)	State (%)
1	Visit a Wilderness or Primitive Area	62.2%	38.3%
2	Picnicking	60.9%	56.6%
3	Boating	56.2%	47.6%
4	Swimming in Lakes, Streams, etc.	52.9%	45.8%
5	Freshwater fishing	49.4%	40.7%
6	Visit a beach	48.8%	47.3%
7	Snow/ice activities	48.7%	44.4%
8	Fishing	44.1%	36.4%
9	Day hiking	42.7%	35.0%
10	Bicycling	42.6%	49.3%

Out-of-State Recreation Interest

In 2004, the Wisconsin Department of Tourism surveyed the Chicago and Minneapolis-St. Paul Designated Market Areas (DMAs) to gauge out-of-state recreation interest. The 5 most popular activities identified by the study for the Great Northwest SCORP region are shown in the Out-of-State Recreation Demand table (shown right).

Rank	Chicago DMA	Twin Cities DMA
1	Fishing	Fishing
2	Bird watching	Sightseeing
3	Camping	Camping
4	Boating	Picnicking
5	Hiking	Hiking

Hunting, Trapping & Fishing

Hunting and trapping are major recreational activities in the WRPG region, with opportunities for wild turkey, ruffed grouse, woodcock, waterfowl, white-tailed deer, black bear, bobcat, fisher, coyote, wolf, beaver, river otter, mink, weasel, muskrat, raccoon, striped skunk, red fox, gray fox, snowshoe hare, cottontail rabbit, gray squirrel, mourning dove, snipe, and sora and Virginia rail. Public lands are heavily used for deer hunting and competition can be an issue.

Approximately 18 species of fish inhabit the springs and streams within the White River properties. Brown and brook trout are the primary species sought by anglers. Trout angling is considered excellent as is the

trout population. Other game fish present in the warmwater areas include northern pike, largemouth bass, yellow perch and bluegill. Catostomids include shortheadredhorse and white suckers and minnow species include central mud minnow, fathead minnow, creek chub, longnose and blacknose dace, common and golden shiners, slimy sculpin, brook stickleback and trout perch. No endangered or threatened fish species are known to exist within the fishery area.

Fishing and hunting license sale data from 2007 indicate the highest revenue producers for the Superior Coastal Plain Counties were resident hunting licenses (32% of total sales), non-resident fishing licenses (23% of total sales) and resident fishing licenses (18% of total sales). Table 6 shows a breakdown of various licenses sold in the Superior Coastal Plain Counties in 2007. This represents about 2% of total license sales in Wisconsin. Where people buy licenses and how much they spend are an indirect measure of resource use in an area and the contribution to the local economy.

Table 6. Fishing and hunting licenses and stamps sold in the Superior Coastal Plain Counties, 2007.							
County	Resident Fishing	Non-resid Fishing	Misc. Fishing	Resident Hunting	Non-resid Hunting	Stamps	Total
Ashland	3,969	1,174	517	9,140	446	4,615	19,861
Bayfield	5,421	6,206	960	5,854	592	5,274	24,307
Douglas	8,092	4,638	902	12,630	1,377	7,158	34,797
I	17,482	12,018	2,379	27,624	2,415	17,047	78,965
Sales (\$)	\$396,489	\$499,358	\$36,327	\$702,094	\$366,602	\$161,746	\$2,162,616

Source: Wisconsin Department of Natural Resources, FY2007 Sales per County.

Wildlife Viewing and Outdoor Education

Because of their location near Northland College, Wisconsin Indianhead Technical College, UW-Superior, and the Northern Great Lakes Visitor Center there is a great opportunity for public outreach and education. The future of wildlife is best assured by raising the public's awareness and understanding of wildlife conservation. This can be done effectively on public lands where visitors can see for themselves the connections between people and wildlife, habitat, and land management. Well-designed interpretive signs and exhibits would explain wildlife's needs and DNR management actions. While helping to instill a land ethic, these properties can also show landowners how to make sustainable use of their lands and leave room for wildlife (USFWS, 1999).

Bird watching is a very popular and growing activity, both in Wisconsin and nationally. Exceptional concentrations of migratory birds (waterbirds, songbirds, and raptors) occur at the western end of Lake Superior and Chequamegon Bay and attract bird watchers from across the region. The Bibon Swamp is recognized as significant among the Important Bird Areas of Wisconsin (WDNR, 2007).

At each property, there are opportunities for an information kiosk with maps and information about points of interest (springs, trails, etc).

Reptiles, amphibians and other nongame species lack baseline survey data for educational or scientific purposes. Opportunities may exist for citizen scientists to help fill these gaps when funds allow.

Camping

There are 79 public and privately-owned campgrounds which provide about 2,393 campsites in the Superior Coastal Plain Counties. With 4% of the state's campgrounds, this Ecological Landscape ranks 10th (out of 16) in number and density of campgrounds (campgrounds per square mile of land; Prey 2010). Camping opportunities exist at nearby state parks, county and federal camping areas. State-owned public fish and wildlife lands are not open to overnight camping.

There is one primitive campsite located on county land along the White River within the Bibon Swamp State Natural Area. It is accessible only by canoe and its use is on a first-come basis.

Canoeing & Kayaking

Several rivers flowing off the surrounding uplands through the Superior Coastal Plans are popular paddling waters, most notably the Brule, the Montreal, and the Namekagon. Canoeing and canoe-fishing are popular on the White River from Pike's Bridge and Sutherland Bridge through the Bibon Swamp.

Trails

As shown in Table 7, approximately 2,200 miles of recreational trails exist within the counties of the Superior Coastal Plain, which ranks 8th (out of 16 Ecological Landscapes) in terms of trail density (miles of trail per 100 square miles of land). Compared to the rest of the state, there is a higher density of mountain-biking, ATV and cross-country ski trails (Prey, 2010).

The North Country Scenic Trail runs through the adjacent Chequamegon National Forest for approximately 48 miles, providing opportunities for cross-country skiing and hiking.

The Chequamegon Area Mountain Bike Association (CAMBA) was formed in 1993 as a non-profit organization with off road (non-motorized) trails. CAMBA's mission is "to support mountain bike advocacy, education, sustainable trail development and tourism in the Chequamegon Area in partnership with the U.S. Forest Service, local governments, agencies and private landowners." CAMBA developed and maintains off road bike trails in southern Bayfield and northern Sawyer Counties in the communities of Cable, Delta, Drummond, Hayward, Namakagon and Seeley. The majority of the trails not on town roads are on Chequamegon National Forest and a small area of Bayfield County Forest. These trails comprise what is referred to as the Delta Cluster.

Snowmobiling is a popular winter pursuit, with groomed trails maintained by local snowmobile clubs. These trails cross both private and public land. Snowmobile trail access is available in most portions of the WRPG counties, and provide links to cities and village amenities.

Table 7. Miles and trail density in the Superior Coastal Plain Counties compared to the state.

Trail Type	Superior Coastal Plain (miles)	Superior Coastal Plain (miles/100 square mile)	Wisconsin (miles/100 square mile)
Hiking	84	2.2	2.8
Road biking	94	2.5	4.8
Mountain biking	97	2.5	1.9
ATV: summer & winter	634	16.6	9.3
X-country skiing	361	9.5	7.2

Snowmobile	934	24.5	31.2
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Recreation Challenges

Results of a statewide survey of Wisconsin residents indicate that certain issues are causing impediments to outdoor recreation opportunities within Wisconsin. Many of these issues, such as increasing ATV usage, overcrowding, increasing multiple-use recreation conflicts, loss of public access to lands and waters, invasive species, and poor water quality, are common across many regions of the state (WDNR 2006b).

Over the next decade the most dominant recreation management issues will most likely revolve around motorized and non-motorized recreation interests. Recreational motorized vehicles include snowmobiles, ATVs, motor boats and jet skis. A survey of statewide residents found that, many silent-sport recreationists, including hikers, bikers, bird watchers and skiers, are opposed to intrusions by motorized recreationists that conflict with their activities. ATV use is especially contentious.

Littering is an ongoing problem, especially on public parking lots and roadways. Avoiding disposal fees for tires, appliances, and electronic devices have caused these items to be dumped on public lands. Demands on time and funds for clean up continue to increase.

This region contains some of Wisconsin's most attractive and diverse outdoor recreation opportunities with the blending of federal, state and local recreation resources. While this region's population density is low, its recreational resources are used by an active resident base along with in-state and out-of-state visitors. Travel for the purposes of outdoor recreation is an integral part of the state's tourism industry and a key economic sector within this region.

Despite its significant opportunities, there is still a demand for better access to interior sites for hunting opportunities, for trails and for water access. These types of recreational amenities could be provided with continued preservation and protection of the White River Land Legacy areas.

3. PROPERTY HISTORY & MANAGEMENT

The following section provides a brief property history and describes existing uses, infrastructure, management, opportunities, and constraints on these properties. (For descriptions of rare animal and plant species, high quality Natural Communities, and Land Cover (forestry) Types, refer to the text and tables of the Rapid Ecological Assessment preceding this section and in Appendix B.) Information sources include original property master plans, knowledge from the property manager and regional staff, property descriptions on the DNR web site, the preceding Rapid Ecological Assessment, and DNR Forestry data. This section also describes surrounding and adjacent lands, indicating how the character of these lands may affect these properties or their uses.

1. WHITE RIVER WILDLIFE AREA

The White River Wildlife Area (1,000 acres) is an undeveloped tract of forest located in northwestern Ashland County, three miles south of the City of Ashland and 15 miles north of the City of Mellen, WI. It is the smallest property in this planning group and is bordered on the east by tribal land belonging to the Bad River Band of the Lake Superior Chippewa (Maps A and B-1, Appendix A).

Managed Land:	1,000 acres
Current Project Boundary:	1,000 acres
Approved Property Master Plan:	1986

The wildlife area was established in 1946 primarily to protect winter habitat for deer and other wildlife. The Swamp Hardwood and aspen stands provide browse and a food source for a variety of wildlife. Compared to other northern lands, this area of poorly drained, red clay soils with deeply eroded gullies and balsam fir covered steep slopes offers deer a unique shelter from harsh winters. The varying age and size structure of the conifers offers thermal cover, nesting, perching and forage opportunities for numerous wildlife species. The White River flows diagonally through the property from southwest to northeast towards its confluence with the Bad River, emptying into Lake Superior. The area is mostly wooded and features good species diversity due to undisturbed habitat amidst varying topography and forest successional stages.

Administrative Facilities and Access

There are no DNR-owned buildings on the White River Wildlife Area. The property is managed by DNR Wildlife Management staff working out of the Service Center in Ashland, WI.

Property access is available from State Highway 13, where an unimproved parking area (owned by WI Dept. of Transportation) exists on the south side of the White River, serving a dual purpose as a canoe takeout for those floating the river from the west. No other boat access exists on the property. Additional foot access is available by driving from Highway 13 east 0.4 miles on Tapani Road, then north 0.7 miles on Park Road, where roadside parking is possible near a trail heading east from Park Road. Access to the Wildlife Area is by walking east-northeast on a two-track logging trail easement for 0.81 miles over adjoining private and industrial forest lands. The easement access is often wet, rutted, and unsafe for vehicular traffic. It leads to a gated DNR service road on the Wildlife Area, not specifically maintained for public use, though often used by hunters walking through the property.

A county-maintained snowmobile trail runs north-south along Park Road through the property. The trail crosses the White River via a large wooden bridge which spans the floodplain.

Infrastructure for the White River Wildlife Area is shown on Map D-1 (Appendix A).

Recreation

Primary public uses are hunting and trapping. Snowmobiling occurs on a small segment of county trail. Other permitted uses include fishing, canoeing, hiking, cross-country skiing, nature study, and berry picking. Despite its location near the City of Ashland, public use is limited due to difficult access.

Game and furbearer species commonly found include muskrat, beaver, mink, otter, raccoon, weasel, skunk, red fox, gray fox, white-tailed deer, coyote, wolf, black bear, ruffed grouse, woodcock, fisher, bobcat, wild turkey and snowshoe hare. Waterfowl include mallards, blue-winged teal, wood ducks, and hooded mergansers. Fishing opportunities are limited due to challenging access to the river and difficult terrain.

The property's close proximity to the City of Ashland (three miles), Northland College, Wisconsin Indianhead Technical College campuses, and the Ashland school system provides potential opportunities for recreational and educational uses. Prohibited activities include horseback riding, vehicular use (including bicycles, ATVs, other vehicles), and snowmobiles except on the designated snowmobile trail. All dogs must be leashed April 15 – July 31.

Current Management, Challenges, & Constraints

Management is challenging due to topography and soil conditions, including a perched water table. Forestry work takes place during frozen ground conditions. Access to the northern-most and eastern-most portions of the property is limited due to lack of internal trails, surrounding private lands and generally challenging topography, including a White River tributary that flows diagonally across the property. Fish habitat management is severely limited by extreme flow variations and shifting sand bottoms.

Management activities are intended to provide a wide range of hunting, trapping, fishing and other nature-based recreational opportunities. Timber management strategies attempt to maintain a conifer component mixed with hardwoods in and near areas of steep topography. On the flatter upland areas, maintenance of varying age classes of aspen habitat is the major emphasis, along with maintenance of scattered patches of red pine.

Typical challenges include maintaining approximately 4.8 miles of service access (mowed as conditions allow) that continues into the adjoining Fishery Area. Disabled users have requested ATV access; however access over the normally wet easement conditions and red clay soils cause concerns for user safety, potential trail maintenance and watershed health. Private landowners adjacent to the Wildlife Area, and their guests are the primary users of the property. Both DNR staff and the public have expressed interest in developing future access to enhance year-round recreation opportunities.

Invasive species threats and control opportunities are described previously in the Rapid Ecological Assessment section.

2. WHITE RIVER FISHERY AREA

The White River Fishery Area was established in 1961 to manage and conserve the integrity of its ecological resources together with its recreational and educational opportunities. The White River is the largest stream in Bayfield and Ashland counties.

Though relatively shallow with an average depth of 12 inches, it is one of the outstanding inland trout producing streams in northwest Wisconsin and is heavily used for fishing and canoeing. Excellent water quality in the headwaters results in good natural reproduction of brook and brown trout. The stream begins near the Village of Delta, where it is formed by the unions of the East, West, and South Forks of

Managed Land:	4,142 acres
Current Project Boundary:	10,754 acres
Approved Property Master Plan:	1981

the White River in the 4,500 acre Porcupine Lake Wilderness Area, part of the Chequamegon National Forest. (Map A, Maps B-2a and B-2b, Appendix Map series).

The White River flows through more than 10,000-acres of wetlands including the Bibon Swamp State Natural Area. It continues flowing in an easterly direction into Ashland County and the Bad River Indian Reservation. The River drains in to the Bad River-Kakagon Sloughs, a very large estuarine wetland complex located on the Lake Superior coast.

Timber harvesting has historically been associated with the White River. Sawlogs found and removed from the headwaters spring ponds indicate the river was used as a transportation route during the early logging era. The vast Nicolet-Chequamegon National Forest virtually surrounds the river headwaters to the north, west, and south.

Administrative Facilities and Access

There are no Department-owned buildings on the property. The property is managed by DNR staff working out of the Ashland Service Center.

The Department maintains six gravel parking lots (W. Delta Road, Rocky Run Road, White River Fisheries Road, Delta Drummond Road (two), and White River Road). Parking is permitted seasonally along the shoulders of most town and county roads. Thirteen miles of Department-owned, unimproved service roads provide interior property access for DNR maintenance and walk-in public recreation, including access to springs and the stream. Interior roads are closed to vehicular traffic to alleviate erosion problems. White River Fisheries Road runs west approximately 0.4 miles from Delta-Drummond Road, terminating at the South Branch, where there is a flowing well and a parking area.

Canoe access is possible at two stream crossings: at Mason Delta Road, where parking and picnic facilities are maintained by the Town of Delta, and at Pike River Road.

A club-maintained snowmobile trail exists on a former railroad bed from the gate at Delta-Drummond Road to the gate at Pike River Road. Evidence of a former airplane runway appears west of Delta-Drummond Road. A y-shaped utility easement crosses the property approximately one mile east of Pike River Road.

Infrastructure for the White River Fishery Area is shown on Map D-2a and D-2b (Appendix A).

Recreation

The White River is a highly scenic stream in one of Wisconsin's least developed river systems. Historically it is a premier wild brown trout fishery in Bayfield County. It is one of only eight rivers in Wisconsin with over 40 miles of Class I or Class II trout water. The 15-mile river segment between the Sutherland and Bibon Road bridges is the longest reach of high quality trout water in Wisconsin inaccessible by public road; it provides a rare canoe fishery for wild brown trout. The White River system attracts anglers from all over the Midwest. In a 2003-2005 creel survey performed by Wisconsin DNR, an average of 31% of the trips were made by anglers living at least 100 miles from the river. Fish species present in the White River include: brown and brook trout, northern pike, longnose dace, blacknose dace, creek chub, white sucker and sculpins.

In addition to the fishing and canoeing described above, hiking, wildlife viewing, cross-country skiing and snowshoeing are popular; however there are no groomed or designated trails. Hunting and trapping opportunities exist for muskrat, beaver, mink, otter, raccoon, weasel, skunk, red fox, gray fox, white-tailed deer, coyote, wolf, black bear, ruffed grouse, woodcock, fisher, bobcat, snowshoe hare, wild turkey, waterfowl and mourning doves. All dogs must be leashed April 15 – July 31. Snowmobiling is available from Dec 1–March 31, as conditions allow on the designated trail maintained by the county snowmobile

club. Prohibited activities include horseback riding and vehicle use, including bicycles and ATVs.

Current Management, Challenges & Constraints

The **White River Fishery Area** is managed to improve fish habitat and stream flow, improve upland wildlife habitat, restore native plant communities and protect its watershed within the Lake Superior Basin.

The **Sajdak Springs Natural Area** (40 acres) designated within the property is managed as an ecological reserve for northern wet-mesic forest and wetland protection. Natural processes determine the structure of the site's natural communities. Opportunities for research and education exist on high quality, northern wet-mesic forest and spring runs.

The **White River Watershed Management Plan** (Trout Unlimited-WI and Friends of White River, 2004) was developed for the 'middle' privately-owned segment of the White River, with this stated goal: "to protect and preserve the White River between state Highway 63 (Bayfield County) and Highway 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. Annual review of the Plan was originally proposed for the major contributor, the Bad River Watershed Association Technical Advisory Committee, including members of Trout Unlimited, UW Extension, WDNR, TNC, Bad River Natural Resources Department, NRCS, and County Land Conservation.

The **Friends of the White River** is a dedicated volunteer group who serve as an informational resource for White River area landowners and river users, with a vision of preserving the ecological integrity of the water resource, although it is challenged by habitat fragmentation within the central corridor. They advocate for the protection and preservation of the White River for all generations. The group serves as an advisory panel to DNR regarding purchase and management of state-acquired land within the central project boundary of the White River Fisheries Area. (see 2004 Management Plan noted above).

The concept of a fully accessible hunting trail system on the eastern portion of the Fishery Area that links to the adjacent Wildlife Area has been an item of interest for several years.

Prescribed burning and mowing of the seed nursery fosters warm season grasses and forbs while retarding competition from cool season grasses. Mowing the wildlife openings occurs on a five-year rotation to maintain early successional vegetation. Timber sales occur on a regular schedule. According to DNR Forestry data in WisFIRS, 20% of the property is scheduled for either a regeneration harvest or a thinning in 2012. Interior service roads are mowed as conditions allow.

Habitat improvements in much of the Fishery Area are not conducive to the remote and inaccessible nature of much of the river. The White River Friends Group provides occasional labor for habitat improvement projects, including buckthorn removal, especially in the south fork area. Trout Unlimited volunteers assist with fish surveys, and prompt the Department to consider future access improvements, land acquisitions and additional fish surveys.

Management challenges include resolution of the ability to provide future access to artesian springs on White River Fisheries Road via a culvert or bridge. Current safe access has deteriorated and repair or resolution may be costly.

The Chequamegon Area Mountain Bike Association (CAMBA) has submitted a request to DNR for: 1) bicycle use on the Fishery Area in Bayfield County; 2) use of Fishery Area lands to construct and maintain a new 3-mile mountain bike trail with parking access; and 3) potential to develop a larger trail

circuit in the same vicinity. CAMBA volunteers are awaiting initiation of the Department's property master planning process for evaluation of their proposed bike trail possibilities.

3. BIBON SWAMP STATE NATURAL AREA

Bibon Swamp State Natural Area is almost 10,000 acres in size (over 15 square miles) along the White River, making it the largest wetland in Bayfield County and the largest non-coastal wetland in the Superior Coastal Plain. Map B-3 (Appendix A) shows its central location amidst the WRPG properties. It

Managed Land:	9,234 acres
Current Project Boundary:	9,439 acres
Approved Property Master Plan:	1980

occupies the basin of an extinct glacial lake drained by the White River. Land use history includes hydrological disruptions and impacts from heavy logging during the turn-of-the-century logging era and post-logging fires of the early 1900's, all of which affected land cover. Subsequently, vegetation is diverse across this large expanse of land, influenced heavily by the behavior and chemical composition of groundwater. The southwestern portion of the Bibon Swamp contains a rich wet-mesic conifer swamp of 150 year-old white cedar, which supports a number of rare species. Bunchberry, twinflower, small bishop's-cap and a number of orchid species are representative of the groundlayer. The Bibon Swamp has been recognized numerous times as a priority aquatic conservation site (WDNR, 2012b and in preceding section from the Rapid Ecological Assessment).

Bibon Swamp was designated a State Natural Area in 1992.

Administrative Facilities and Access

Several sites provide access to the White River. Along the northern boundary, parking and canoe landings are available at Sutherland Bridge (a private landing - public welcome for small fee), Goldberg Landing and Bibon Bridge. These sites are located along Sutherland, Goldberg and Bibon Roads. Each site provides parking for 4-6 cars. Access to the west side of the property is from Nymphia Lake Road, which ends at the property entrance. An unmaintained two track road leads south to a gated entrance with parking for one to two cars, or north to an old log landing with parking for 2-3 cars. Along the southern boundary, Bergeman Lane leads to a former farm site turn-around with parking for 2-4 cars. Taylor Lane also leads north from North Sweden Road to the south property boundary, but dead ends at private property. There are no established parking areas along this road. Also along North Sweden Road, Matt's Lane leads north to an old farm site within the property, with parking for 4-6 cars. There are no established access points into the east side property along State Highway 63.

Most access roads and parking lots are not snow-plowed.

A county snowmobile trail follows an old railroad corridor through the property's east side, paralleling State Highway 63. It is open to snowmobile traffic only.

The only structure on the property is the concrete shell of an old farm silo located just east of 18 Mile Creek, north of Taylor Lane.

There are two artesian wells on the property: one at Goldberg Landing and the other at the end of Matt's Lane. Use of these wells has been mainly limited to property users.

Infrastructure for Bibon Swamp Natural Area is shown on Map D-3 (Appendix A).

Recreation

Recreational bird watching is growing in popularity. Bibon Swamp habitat provides nesting, migratory stopover, and wintering opportunities for an extensive list of birds (WDNR, 2010b). It is listed among the state Important Bird Areas (WDNR, 2007).

Float fishing is popular from canoes, as are recreational canoeing and kayak trips through the property, with access points along the north property boundary.

The White River is a highly scenic stream in one of Wisconsin's least developed river systems. Historically it is a premier wild brown trout fishery in Bayfield County. It is one of only eight rivers in Wisconsin with over 40 miles of Class I or Class II trout water. The 15-mile river segment between the Sutherland and Bibon Road bridges is the longest reach of high quality trout water in Wisconsin inaccessible by public road; it provides a rare canoe fishery for wild brown trout. The White River system attracts anglers from all over the Midwest. In a 2003-2005 creel survey performed by Wisconsin DNR, an average of 31% of the trips were made by anglers living at least 100 miles from the river. Fish species present in the White River include: brown and brook trout, northern pike, longnose dace, blacknose dace, creek chub, white sucker and sculpins.

One primitive camp site exists along the White River, on county-owned land within the project boundary.

Primary game species are white-tailed deer, bear, wild turkey, grouse, and waterfowl (mallard, blue-winged teal, wood duck), followed by bobcat, beaver, muskrat, coyote, wolf, red and gray fox, raccoon, fisher, striped skunk, woodcock, snipe, rail, gray squirrel, snowshoe hare, and cottontail rabbits.

Due to sensitive ecosystem concerns associated with State Natural Area status, prohibited activities on the property include horseback riding, driving vehicles (bicycles, ATVs, aircraft). However, snowmobiling is allowed on one designated snowmobile trail located along the old railroad grade following Highway 63. It is maintained by the county snowmobile club.

Current Management, Challenges & Constraints

The property is managed as a reserve for northern wet and wet-mesic forest, hardwood swamp and shrub-carr, as an aquatic reserve and wetland protection site, and as an ecological reference area. Natural processes determine the structure of the wetland forest and shrub-carr. There are opportunities for research and education on the highest quality native northern wetland forests, shrub-carr, and rivers.

Native species are managed passively, which allows natural succession and stochastic events to determine the ecological characteristics of the site. Active management includes control of invasive plants and animals, and activities intended for fire management. Tree salvage after a major wind event is not compatible with management objectives on a state natural area.

Management at canoe landings includes removal of windfalls and hazard trees. Roadside easement areas are managed by the township and county. Soil disturbance is not permitted during any maintenance operations. Beaver dams found on Class I or II trout waters are typically removed.

The **Bibon Swamp Advisory Council**, consisting of representatives from the Bayfield County Board, the Townships of Mason and Grandview, a local resident from each of Mason and Grandview and the DNR property manager, meets periodically to: 1) review whether the management prescriptions of the Master Plan are being carried out, 2) bring citizen ideas or problems concerning the Bibon Swamp to the attention of the Department, and 3) facilitate dissemination of information from the Department to the County Board, Townships and the local citizens.

Challenges include visitors riding prohibited vehicles (ATV/UTVs) arriving from adjoining private lands. Land management and efforts to improve access in much of the Natural Area are not feasible due to soil

characteristics and topographical features that characterize the inaccessible nature of much of the riverway.

4. FINDINGS AND CONCLUSIONS

This section presents the findings and conclusions from the White River Property Group (WRPG) Regional and Property Analysis. Two parts summarize existing conditions and trends on the properties and in the region: 1) the ecological significance and capability of the property, and 2) the property's recreational needs, opportunities, limitations and significance. A summary of the major findings and conclusions is not meant to include every issue.

These findings and conclusions will help guide future management, use and development of WRPG properties by highlighting significant opportunities and limitations on these properties, and setting the stage for a reasonable range of management alternatives that may be considered during the master planning process. As planning continues, these conclusions help define the future Vision and Goals.

The WRPG Properties: Regional Opportunities and Limitations

The White River Planning Group properties contain a rich mosaic of wetlands, streams and rivers that drain into Lake Superior in a predominantly remote, forested setting in Bayfield and Ashland Counties. The White River is one of Wisconsin's least developed river systems, highly scenic, historically known as a premier wild brown trout fishery in Bayfield County and attracts anglers from all over the Midwest. It is one of only eight rivers in Wisconsin with over 40 miles of Class I or Class II trout water. A 15-mile river segment between the Sutherland and Bibon Road bridges is the longest reach of high quality trout water in Wisconsin inaccessible by public road—a rare canoe fishery for wild brown trout.

The White River and watershed are important recreational and economic resources: beside being one of the outstanding inland trout producing streams in northwest Wisconsin, it is an important tributary to an *internationally* recognized wetland estuary complex of Lake Superior (Kakagon-Bad River Slough). The properties form an environmental corridor along the White River, and with its tributaries, reside almost entirely within the Superior Coastal Plain Ecological Landscape.

Nearly 15,000 acres are state protected and managed lands. Approximately 1,000 acres are State Wildlife Area; 4,142 acres are Fishery Areas, and 9,287 acres are designated as State Natural Areas (includes 40 acre Sajdak Springs, within the Fishery Area property).

This coastal plain forest has been fragmented by past and ongoing agricultural uses; approximately one-third of the landscape is presently non-forested. Most open lands are in grass cover, having been cleared and subsequently pastured or plowed. Aspen and birch forests, managed for pulp, occupy about 40% of the total land area, and have increased in prominence over the formerly dominant boreal conifers. Older forests are now rare throughout the landscape.

The population density of the Superior Coastal Plain counties is second lowest of any Ecological Landscape in Wisconsin. There are less than 20 persons/square mile, compared to 99 persons/square mile in Wisconsin as a whole according to 2009 US Census Bureau information. Government Service and Tourism/Outdoor Recreation are the primary contributors to the economy of the Superior Coastal Plain Counties.

The goal of this master planning process is to be able to manage the WRPG properties so they will continue to provide high-quality natural resources, recreational experiences, and to a limited extent, timber resources for present and future generations.

ECOLOGICAL SIGNIFICANCE AND CAPABILITY

Forest fragmentation and overall loss of forests have been identified as a major threat to northern forests in the Great Lake States. As Wisconsin forests become parcelized and developed, the White River properties and vast forests of the Chequamegon – Nicolet National Forest, Bayfield County Forest, Brule River State Forest, Bad River Reservation and Industrial Forest Lands collectively represent an important opportunity to maintain an intact forested landscape, serving important ecological functions on a regional and statewide level. Much of the landscape surrounding the WRPG is represented by young and medium-aged stands, often dominated by early successional species such as aspen, within small patches of older forests. Larger areas of older, less disturbed Northern Dry-mesic and Boreal Forests are not well represented. The WRPG offers opportunities to manage for a variety of age classes, including stands of older forest, within a context of outstanding aquatic features, intact and relatively undisturbed wetlands, and vast public landholdings.

The following sections describe the most significant regional attributes to benefit from protecting high quality and/or rare ecological landscapes. Protecting or restoring habitat at the landscape level maintains the widest variety of species. Discussion begins with protection opportunities for rare, threatened, and endangered species and closes with threats posed by invasive species. These are the major ecological attributes of the WRPG landscape of plant and animal communities to be addressed during the Master Planning process.

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 are found at White River Wildlife Area and in scattered stands throughout the White River Fishery Area on the highly-erodible slopes above the White River.

Northern Dry-Mesic Forest

Once found throughout the Northwest Sands Ecological Landscape, extensive stands of natural-origin red and white pine are now relatively uncommon in the region. Although restricted to the westernmost portions of the White River Fishery Area, there are opportunities to manage pine-dominated Northern Dry-Mesic Forest in older age classes. Adding further value to these stands are the presence of aquatic and wetland features and several uncommon plant and animal species.

Forested and Non-forested Wetlands

Wetlands of both forested and non-forested types are abundant throughout the WRPG. These include Northern Wet Forest, Northern Wet-mesic Forest, Muskeg, Alder Thicket, and Northern Sedge Meadow, with many in good to excellent condition. Coniferous wetlands support a high percentage of the rare species. Opportunities exist to manage forested wetlands and fens as part of a vegetation mosaic that includes open wetland communities, shrub swamp, and swamp conifer forest.

Forested Seeps and Springs

Many springs and seeps exist 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, Tributaries and Macroinvertebrates

The free-flowing stretches of the White River provide important habitat for rare animal species. Management of lands adjacent to the river have important effects on water quality. Many of the areas along the river slopes contain mature forests and forested seeps that can harbor rare plant assemblages. A management “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 with high ecological importance are Eighteen Mile Creek and Long Lake Branch. Eighteen Mile Creek is a high gradient, cold water stream that originates within the Great Divide District of the Chequamegon Nicolet National Forest (CNNF). Its 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. Eighteen Mile Creek has moderate aquatic taxa richness and two rare macroinvertebrate species. Long Lake Branch originates at Lake Owen in the CNNF before flowing through rugged moraines and forested terrain, eventually reaching the marshy areas of Bibon Swamp SNA where Eighteen Mile Creek joins it. Long Lake Branch had exceptionally high diversity of aquatic macroinvertebrates and high taxa richness during 1996 aquatic inventories.

Herptiles

A fundamental lack of data for herptile presence and sustainability on WRPG properties makes it difficult to gauge their ecological significance in the region. Inventory and monitoring is needed to locate and protect wood turtle nesting sites near the White River and its tributaries. Inventory and monitoring would likely reveal important links between ephemeral ponds and their surrounding forests that provide habitat needed for amphibians.

Wildlife and Game

In addition to habitat for rare and sensitive wildlife species, WRPG properties provide high-quality habitat for common wildlife species. Primary wildlife game species include white-tailed deer, American black bear, bobcat, ruffed grouse, waterfowl and small game. The demand for wildlife-based recreation is likely to increase and opportunities exist on the WRPG properties to improve habitat for these common wildlife species. In addition to wildlife for hunting, these properties provide excellent birdwatching opportunities.

Fish Communities

The White River and many of its tributaries are classified as either Exceptional or Outstanding Resource Waterways by WDNR. It 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.

Invasive Species & Other Biodiversity Threats

Invasive species are a significant and growing threat to native communities. Protecting wetlands, spawning habitat and minimizing impacts from invasive species, such as carp, lamprey, zebra mussels and Eurasian milfoil, are needed to maintain game and native species abundance and diversity. Glossy buckthorn removal efforts currently underway within the Fishery Area are important to maintain site integrity. Problematic species include common reed grass, Canada thistle, Helleborine orchid and reed canary grass.

Most importantly, monitoring for new or not yet widespread invasive species and rapid response to small infestations represent high-impact actions. For example, purple loosestrife is not noted within the WRPG but is abundant in open wetlands nearby and should be monitored closely. Early detection with rapid control of new and/or small infestations is top priority. Where large extensive infestations are present,

control efforts target the highest quality areas first. Additional threats to maintaining current levels of biodiversity include habitat fragmentation, altered ecological processes, and deer herbivory.

RECREATIONAL SIGNIFICANCE AND CAPABILITY

This region contains some of Wisconsin's most attractive and diverse outdoor recreation opportunities with the blending of federal, state and local recreation resources. While this region's population density is low, its recreational resources are used by an active resident base, along with in-state and out-of-state visitors. Travel for the purposes of outdoor recreation is an integral part of the state's tourism industry and a key economic sector within this region.

Despite good opportunities, there is still a need to provide better access to interior sites within the WRPG via a trail system for hunting opportunities, and improved water access. These types of recreational amenities can be provided with continued preservation and protection of the White River Land Legacy areas.

Hunting

Hunting and trapping are major recreational activities in the WRPG region, with opportunities to pursue waterfowl, white-tailed deer, American black bear, wolf, bobcat, fisher, snowshoe hare, American beaver, North American river otter and small game. Hunting ruffed grouse is very popular on the forests of the region. Public lands are heavily used for hunting and crowding can be an issue, especially for deer, waterfowl, and bear hunting. Disabled users have requested ATV access in some areas of the WRPG; however access limited by the normally wet conditions and red clay soils cause concerns for user safety, potential trail maintenance and watershed health. Both DNR staff and the public have expressed interest in developing future access to enhance year-round recreation opportunities.

Fishing

Approximately 18 species of fish inhabit the springs and streams within the White River properties. Brown and brook trout are the primary species sought by anglers. Trout angling is considered excellent within a sustaining trout population. Game fish present in the warmwater areas include northern pike, largemouth bass, yellow perch and bluegill. Catostomids include shortheadedhorse and white suckers, and minnow species include central mud minnow, fathead minnow, creek chub, longnose and blacknose dace, common and golden shiners, slimy sculpin, brook stickleback and trout perch. No endangered or threatened fish species are known to exist within the fishery area.

Canoeing, Kayaking and Water-based Activities

The region is a popular destination for water-based activities and many WRPG properties offer good opportunities for fishing, waterfowl hunting, and non-motorized boating. Floating the White River by canoe and kayak is an increasingly popular way to experience the property.

Birdwatching, Wildlife Viewing, and Nature Study

Birdwatching, wildlife viewing and nature study are popular activities in the region and on WRPG properties due to significant and diverse wetland habitat. Numerous bird species congregate in the region during migration due to the proximity of Lake Superior and the Mississippi River Flyway. Bibon Swamp is recognized as one of the Important Bird Areas of Wisconsin (WDNR, 2007).

Property Friends Groups, the Northern Great Lakes Visitor Center, Wisconsin Indianhead Technical College and Northland College all contribute to public awareness, education, and opportunities for conservation and enjoyment.

Hiking, Cross-Country Skiing and Snowshoeing

Cross-country skiing, snowshoeing, and hiking are likely to increase in usage. Regionally, walking for pleasure, hiking and sightseeing are among the highest demanded activities by recreational users.

Motorized Sports

Segments of regional snowmobile trails traverse almost all WRPG properties. The trails and associated bridges are maintained by local snowmobile clubs. ATV use is currently prohibited on the properties due to the combination of very wet soils and sensitive ecological communities. ATV and other off-road vehicle uses are generally not compatible with the purpose of state wildlife, fishery, and natural areas.

Horseback Riding and Mountain Biking

Horseback riding and mountain biking are not authorized uses on the WRPG properties. Physical limitations of the properties such as the predominance of wet soils and limited contiguous uplands are not conducive to trail development. Opportunities for horse and bike uses on these properties are limited by the requirement that non-primary uses not significantly detract from the primary purposes of the property(ch. NR 1.51).

Camping

There are no public camping opportunities provided on the WRPG properties. Camping opportunities exist at nearby state parks, county and federal camping areas. There are 79 public and privately-owned campgrounds which provide about 2,393 campsites in the Superior Coastal Plain Counties.

SUMMARY

Ecologically significant attributes of all WRPG properties include remnant stands of Boreal and Northern Dry-Mesic Forests within a context of high quality rivers, streams and wetlands. They offer opportunities to protect good-quality examples of natural communities, rare plant populations and habitat for both common and uncommon wildlife species. The White River and watershed are important recreational and economic resources: it is one of the outstanding inland trout producing streams in northwest Wisconsin and an important tributary to an *internationally* recognized wetland estuary complex of Lake Superior. The properties offer regionally significant opportunities for hunting deer, bear, waterfowl and small game. Wildlife-viewing will continue to be a popular activity with opportunities for observing waterfowl, wetland birds, raptors and opportunities for in-the-field environmental education and research. The WRPG properties offer potential for lightly developed, non-motorized recreation experiences such as hiking, cross country skiing, snow shoeing, and nature study. Although the properties within the WRPG grouping have various official designations and primary purposes, the properties come together in their significant recreational use as areas of fishing, hunting, trapping, and watershed protection.

Major threats to the biodiversity of the WRPG include habitat fragmentation, altered ecological processes, deer herbivory, and infestation by aggressive invasive species.

In some areas, opportunities for access are limited by the normally wet conditions and red clay soils, presenting concerns for user safety, potential trail maintenance and watershed health. Both DNR staff and the public have expressed interest in improving access to enhance year-round recreation opportunities. Thoughtful planning and management will be needed to maintain high quality wildlife and fisheries habitat while also providing recreational experiences for an increasing number of users and uses.

SELECTED BIBLIOGRAPHY

- Dudzik, M. (2012) WDNR Email communication.
- Trout Unlimited-WI and Friends of the White River. 2004. White River Watershed Management Plan. 31pp. Available at:
<https://dnrx.wisconsin.gov/swims/public/downloadDocument.do?id=22579928>
- U.S. Fish and Wildlife Service. 1999. Fulfilling the Promise. The National Wildlife Refuge System.
<http://refuges.fws.gov> 94 pp.
- Wisconsin Department of Natural Resources. 1980. Bibon Swamp Master Plan Concept Element. 30pp. Madison, WI.
- Wisconsin Department of Natural Resources. 1981. White River Fishery Area Bayfield County Master Plan Concept Element. 27 pp. Madison, WI.
- Wisconsin Department of Natural Resources. 1986. White River Wildlife Area Management Plan Concept Element. 14 pp. Madison, WI.
- Wisconsin Department of Natural Resources. 2004. Feasibility Study of the White River Fishery Area Boundary Expansion. 27 pp. Madison, WI.
- Wisconsin Department of Natural Resources. 2006a. The 2005-2010 Wisconsin Statewide Comprehensive Outdoor Recreation Plan: SCORP. Primary authors/editors: Jeffrey Prey, Kathleen Kiefaber. Madison, WI. PUB-PR-026-2006.
- Wisconsin Department of Natural Resources. 2006b. Wisconsin Land Legacy Report: An inventory of places to meet Wisconsin's future conservation and recreation needs. Madison, WI. PUB LF-040-2006.
- Wisconsin Department of Natural Resources. 2007. Important Bird Areas of Wisconsin: Critical Sites for Management of Wisconsin's Birds. Yoyi Steel, Editor. 240 pp.
- Wisconsin Department of Natural Resources [WDNR] 2008. Biological and Social Dynamics of the White River Brown Trout Fishery 2003-2005. Fisheries Mgmt. Report No. 153. Available online at:
<http://dnr.wi.gov/fish/reports/final/bayfieldwhiteriverbrowntrout2003-2005.pdf>
- Wisconsin Department of Natural Resources [WDNR] 2010a Wisconsin's Statewide Forest Assessment. Available online: <http://dnr.wi.gov/forestry/assessment/strategy/assess.htm>.
- Wisconsin Department of Natural Resources. 2010b. Rapid Ecological Assessment for the White River Planning Group. Madison, WI. PUB-ER-817-2010.
- Wisconsin Department of Natural Resources 2012a. Property specific webpages for State Wildlife, Fishery, and Natural Areas:
- Wildlife Areas: http://dnr.wi.gov/org/land/wildlife/wildlife_areas/
 - Fishery Areas: <http://dnr.wi.gov/org/land/facilities/fisheryareas/>
 - Natural Areas: - <http://dnr.wi.gov/org/land/er/sna/bycountylist.htm>
- Wisconsin Department of Natural Resources. 2012b, in press. Ecological Landscapes of Wisconsin: Parts 1 – 3, and especially Chapter 20 (Part 2), Superior Coastal Plain Ecological Landscape. 132pp. Wisconsin Department of Natural Resources Handbook 1805.1 Visit <http://dnr.wi.gov> and search “Ecological Landscapes.”

APPENDIX A: MAPS

Visit <http://dnr.wi.gov> and search “Master Planning” then “White River Planning Group”

Map A: Regional Locator and Public Lands

Map B Series 1-3: Existing Property and Adjacent Public Lands

Map C Series 1-2: Archaeological/Historical Areas

Map D Series 1-3: Existing Infrastructure

Map E Series 1-3: Existing Vegetation Cover Type

Map F Series 1-2:WRPG Primary Sites

APPENDIX B: EXCERPTS FROM RAPID ECOLOGICAL ASSESSMENT

1) 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 the data).

Species Significantly Associated with Superior Coastal Plain Ecological Landscape

<i>Highlighted species have been documented on the White River Planning Group sites.</i>	<i>Major</i>				<i>Important</i>				
	Boreal Forest	Coldwater streams	Coolwater streams	Alder Thicket	Northern Hardwood Swamp	Northern Sedge Meadow	Northern Wet Forest	Northern Wet-Mesic Forest	Shrub Carr
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
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

Species Moderately Associated with Superior Coastal Plain Ecological Landscape

<i>Highlighted species have been documented on the White River Planning Group sites.</i>	<i>Major</i>				<i>Important</i>				
	Boreal Forest	Coldwater streams	Coolwater streams	Alder Thicket	Northern Hardwood Swamp	Northern Sedge Meadow	Northern Wet Forest	Northern Wet-Mesic Forest	Shrub Carr
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
Pickering 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			

Species Significantly Associated with Northwest Sands Ecological Landscape

<i>Highlighted species have been documented on the White River Planning Group sites.</i>	<i>Major</i>	
	Northern Dry-Mesic Forest	Northern Sedge Meadow
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

Continued from above...	<i>Major</i>	
	Northern Dry-Mesic Forest	Northern Sedge Meadow
<i>Highlighted species have been documented on the White River Planning Group sites.</i>		
Trumpeter Swan		L
Upland Sandpiper		L
Veery	M	
Water Shrew		L
Whip-poor-will	M	
Wood Turtle		M
Yellow Rail		S

Species Moderately Associated with Northwest Sands Ecological Landscape

	<i>Major</i>	
	Northern Dry-Mesic Forest	Northern Sedge Meadow
<i>Highlighted species have been documented on the White River Planning Group sites.</i>		
American Golden Plover		L
Canada Warbler	M	
Four-toed Salamander		M
Mink Frog		S
Northern Goshawk	M	
Olive-sided Flycatcher	L	
Pickerel Frog		S
Red-shouldered Hawk	M	
Solitary Sandpiper		L
Wilson's Phalarope		S
Wood Thrush	L	
Woodland Jumping Mouse	L	L

2) Rare Species and Natural Communities Documented on the White River Planning Group (WDNR, 2010)

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

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 (*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 (*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 (*Boloria eunomia*), a State Special Concern butterfly, has been found in open acid bogs with Labrador tea (*Ledumgroenlandicum*), leatherleaf (*Chamaedaphnecalyculata*), 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 (*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 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 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 (*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 (*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 (*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 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 (*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.

Pigmy 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 (*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 (*Sorex palustris*), a state Special Concern mammal found in marshes, bogs, and cold, small streams with cover along banks.

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 (*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 (*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 (*Carex assiniboinensis*), 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 (*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 (*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) is flower is white with a yellow center. Optimal identification period is throughout the month of July.

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 (*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 (*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 (*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 (*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 (*Ribes budsonianum*), a State Special Concern plant, is found in cold, neutral to calcareous conifer swamps, as well as algal 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 (*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 (*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 (*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 (*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

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 (*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 (*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 (*Onocleas 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 (*Saxifragapennsylvanica*), 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 (*Calthapalustris*), swamp raspberry (*Rubus pubescens*), skullcap (*Scutellariagalericulata*), 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 (*Matteucia 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.), panicked 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 big toothed 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 *Listeracordata*), and wildflowers such as goldthread (*Coptis trifolia*), fringed polygala (*Polygala paniculata*), and naked miterwort (*Mitellanuda*), and trailing sub-shrubs such as twinflower (*Linnaea borealis*) and creeping snowberry (*Gaultheria hispida*). 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 (*Calthapalustris*) 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.

3) 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.

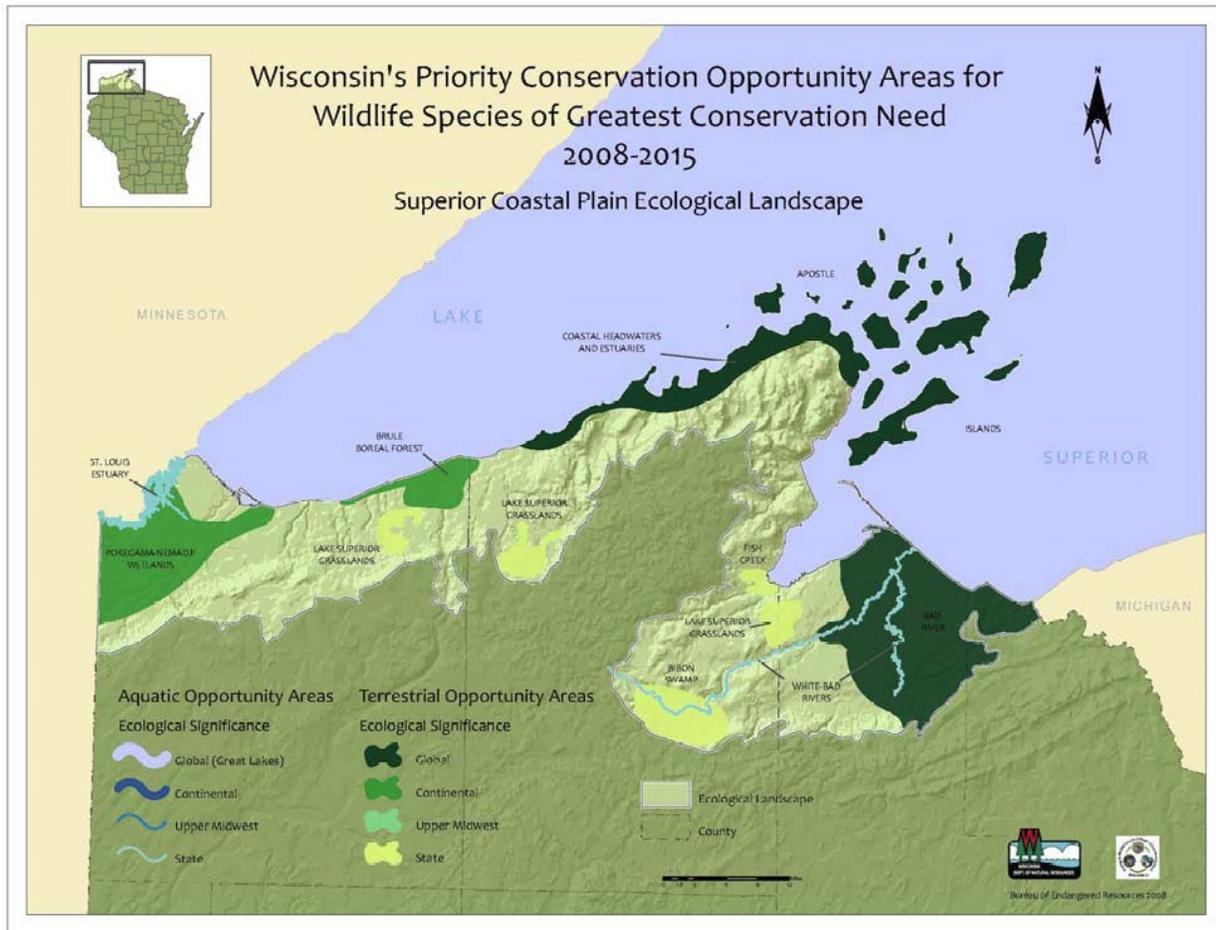
Table 1. Documented rare species and high-quality natural communities on the WRPG in alphabetical order by common name. There may be more than one element occurrence of the species or natural community per property. Bibon Swamp State Natural Area (BSNA), White River Wildlife Area (WRWA) and White River Fishery Area (WRFA). Species that have been documented on the WRPG but are not yet mapped in the NHI database appear in **BOLD**. For an explanation of state and global ranks, as well as state status, see Appendix E.

**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.*

Common Name	Scientific Name	Property Name	Last			
			Obs Date	State Rank	Global Rank	State Status
Animals						
A Flat-headed Mayfly	Heptageniapulla	BSNA	1996	SNR	GNR	SGCN
A Flat-headed Mayfly	Rhithrogenaimpersonata	BSNA	1996	SNR	GNR	SGCN
A Periodid Stonefly	Isoperiabilineata	BSNA	1996	S2S3	G5	SC/N
A Water Scavenger Beetle	Sperchopsis tessellates	BSNA	1996	S2S3	GNR	SGCN
American Bittern	Botauruslentiginosus	BSNA	2005	S3B	G4	SC/M
American Woodcock	Scolopax minor	BSNA	2008	S4B	G5	SGCN
Arctic Shrew	Sorexarcticus	BSNA	2005	S3S4	G5	SC/N
Bald Eagle	Halieetus leucocephalus	BSNA	2008	S4B,S2N	G5	SC/P
Bald Eagle	Halieetus leucocephalus	WRFA	2008	S4B,S2N	G5	SC/P
Black-billed Cuckoo	Coccyzus erythrophthalmus	BSNA	2005	S4B	G5	SGCN
Black-billed Cuckoo	Coccyzus erythrophthalmus	WRWA	2008	S4B	G5	SGCN
Bobolink	Dolichonyx oryzivorus	BSNA	2005	S4B	G5	SGCN
Bog Fritillary	Boloria eunomia	WRFA	1996	S3	G5	SC/N
Boreal Chickadee	Poecile hudsonicus	BSNA	1996	S2S3B	G5	SC/M
Canada Warbler	Wilsonia canadensis	BSNA	2005	S3B	G5	SC/M
Canada Warbler	Wilsonia canadensis	WRWA	2008	S3B	G5	SC/M
Canada Warbler	Wilsonia canadensis	WRFA	2008	S3B	G5	SC/M
Cape May Warbler	Dendroica tigrina	WRWA	2008	S3B	G5	SC/M
Eastern Meadowlark	Sturnella magna	BSNA	2005	S4B	G5	SGCN
Golden-winged Warbler	Vermivora chrysoptera	BSNA	2005	S4B	G4	SGCN
Golden-winged Warbler	Vermivora chrysoptera	WRWA	2008	S4B	G4	SGCN
Golden-winged Warbler	Vermivora chrysoptera	WRFA	2008	S4B	G4	SGCN
Gray Wolf	Canis lupus	BSNA	2008	S2	G4	SC/P
Gray Wolf	Canis lupus	WRWA	2008	S2	G4	SC/P
Gray Wolf	Canis lupus	WRFA	2008	S2	G4	SC/P
Least Flycatcher	Empidonax minimus	BSNA	2005	S4B	G5	SGCN
Least Flycatcher	Empidonax minimus	WRWA	2008	S4B	G5	SGCN
Least Flycatcher	Empidonax minimus	WRFA	2008	S4B	G5	SGCN
Le Conte's Sparrow	Ammodramus leconteii	BSNA	2006	S2S3B	G4	SC/M
Mink Frog	Lithobates septentrionalis	BSNA	2005	S3S4	G5	SC/H
Northern Goshawk	Accipiter gentilis	WRWA	2000	S2B,S2N	G5	SC/M
Northern Goshawk	Accipiter gentilis	WRFA	1981	S2B,S2N	G5	SC/M
Northern Harrier	Circus cyaneus	BSNA	2005	S3B,S2N	G5	SGCN
Olive-sided Flycatcher	Contopus cooperi	WRWA	2008	S2B	G4	SC/M
Pygmy Shrew	Sorex hoyi	BSNA	2005	S3S4	G5	SC/N
Red Crossbill	Loxia curvirostra	WRWA	2008	S2?B	G5	SGCN
Red Crossbill	Loxia curvirostra	WRFA	2008	S2?B	G5	SGCN
Swainson's Thrush	Catharusustulatus	BSNA	2005	S2B	G5	SC/M
Swainson's Thrush	Catharusustulatus	WRWA	2008	S2B	G5	SC/M
Veery	Cathartusfufuscens	BSNA	2005	S4B	G5	SGCN

Common Name	Scientific Name	Property Name	Last			
			Obs Date	State Rank	Global Rank	State Status
Veery	<i>Cathartusfuscescens</i>	WRWA	2008	S4B	G5	SGCN
Veery	<i>Cathartusfuscescens</i>	WRFA	2008	S4B	G5	SGCN
Water Shrew	<i>Sorexpalustris</i>	BSNA	1979	S2S3	G5	SC/N
Wood Thrush	<i>Hylocichlamustelina</i>	BSNA	2005	S4B	G5	SGCN
Wood Thrush	<i>Hylocichlamustelina</i>	WRWA	2008	S4B	G5	SGCN
Wood Thrush	<i>Hylocichlamustelina</i>	WRFA	2008	S4B	G5	SGCN
Wood Turtle	<i>Glyptemysinsculpta</i>	BSNA	1986	S2	G4	THR
Wood Turtle	<i>Glyptemysinsculpta</i>	WRWA	2007	S2	G4	THR
Wood Turtle	<i>Glyptemysinsculpta</i>	WRFA	2000	S2	G4	THR
Woodland Jumping Mouse	<i>Napeozapus insignis</i>	BSNA	1979	S2S3	G5	SC/N
Plants						
Arrow-leaved Sweet-coltsfoot	<i>Petasites sagittatus</i>	BSNA	2007	S3	G5	THR
Assiniboine Sedge	<i>Carex assiniboensis</i>	WRWA	1931*	S3	G4G5	SC
Climbing Fumitory	<i>Adlumiafungosa</i>	BSNA	1896*	S2	G4	SC
Large-flowered Ground-cherry	<i>Leucophysalisgrandiflora</i>	BSNA	1923*	S1	G4?	SC
Large Roundleaf Orchid	<i>Platantheraorbiculata</i>	BSNA	1896*	S3	G5	SC
Large Roundleaf Orchid	<i>Platantheraorbiculata</i>	WRWA	1917*	S3	G5	SC
Large Toothwort	<i>Cardamine maxima</i>	WRWA	1996	S1	G5	SC
Marsh grass-of-Parnassus	<i>Parnassiapalustris</i>	WRFA	1996	S2	G5	THR
Marsh Horsetail	<i>Equisetum palustre</i>	BSNA	1970*	S3	G5	SC
Marsh Ragwort	<i>Seneciocongestus</i>	BSNA	1896*	S1	G5	SC
Northern Black Currant	<i>Ribes hudsonianum</i>	WRWA	1917*	S3	G5	SC
Northern Yellow Lady's-slipper	<i>Cypripedium parviflorum</i> var. <i>makasin</i>	WRWA	2008	S3	G5T4Q	SC
Northern Yellow Lady's-slipper	<i>Cypripedium parviflorum</i> var. <i>makasin</i>	WRFA	2008	S3	G5T4Q	SC
Purple Clematis	<i>Clematis occidentalis</i>	BSNA	1994	S3	G5	SC
Purple Clematis	<i>Clematis occidentalis</i>	WRFA	2008	S3	G5	SC
Showy Lady's-slipper	<i>Cypripedium reginae</i>	BSNA	1996	S3	G4	SC
Showy Lady's-slipper	<i>Cypripedium reginae</i>	WRWA	1955*	S3	G4	SC
Showy Lady's-slipper	<i>Cypripedium reginae</i>	WRFA	2008	S3	G4	SC
Slim-stem Small-reedgrass	<i>Calamagrostis stricta</i>	BSNA	1896*	S3	G5	SC
Slim-stem Small-reedgrass	<i>Calamagrostis stricta</i>	WRFA	2008	S3	G5	SC
Small Yellow Water Crowfoot	<i>Ranunculus gmelinii</i>	BSNA	1895*	S2	G5	END
Small Yellow Water Crowfoot	<i>Ranunculus gmelinii</i>	WRWA	1917*	S2	G5	END
Small Yellow Water Crowfoot	<i>Ranunculus gmelinii</i>	WRFA	1895*	S2	G5	END
Sparse-flowered Sedge	<i>Carex tenuiflora</i>	BSNA	2006	S3	G5	SC
Variegated Horsetail	<i>Equisetum variegatum</i>	BSNA	1896*	S3	G5	SC
Variegated Horsetail	<i>Equisetum variegatum</i>	WRFA	1896*	S3	G5	SC
Communities						
Alder Thicket	Alder Thicket	BSNA	2007	S4	G4	
Black Spruce Swamp	Black Spruce Swamp	BSNA	2007	S3?	G5	
Boreal Forest	Boreal Forest	WRWA	2007	S2	G3?	
Forested Seep	Forested Seep	WRFA	2008	S2	GNR	
Mesic Floodplain Terrace	Mesic Floodplain Terrace	WRWA	2008	S2	GNR	
Muskeg	Muskeg	BSNA	1996	S4	G4G5	
Muskeg	Muskeg	WRFA	2008	S4	G4G5	
Northern Dry-mesic Forest	Northern Dry-mesic Forest	WRFA	2008	S3	G4	
Northern Sedge Meadow	Northern Sedge Meadow	BSNA	1996	S3	G4	
Northern Sedge Meadow	Northern Sedge Meadow	WRFA	2008	S3	G4	
Northern Wet-mesic Forest	Northern Wet-mesic Forest	BSNA	2007	S3S4	G3?	
Northern Wet-mesic Forest	Northern Wet-mesic Forest	WRFA	1990	S3S4	G3?	
Spring Pond	Spring Pond	BSNA	1980	S3	GNR	
Spring Pond	Spring Pond	WRFA	1990	S3	GNR	
Springs and spring runs, soft	Springs and spring runs, soft	WRFA	1990	SU	GNR	
Stream—slow, hard, cold	Stream—slow, hard, cold	BSNA	1983	SU	GNR	
Stream—slow, hard, cold	Stream—slow, hard, cold	WRWA	1983	SU	GNR	
Tamarack (poor) Swamp	Tamarack (poor) Swamp	BSNA	2007	S3	G4	

4) Priority Conservation Opportunity Areas—Superior Coastal Plain



5) 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 wood 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 American marten, small mammals, and bats.
- 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 Northern Goshawk nesting locations could be done within the WRPG.

6) References

(Rapid Ecological Assessment, WDNR, 2010)

- 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.
- 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.
- 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 SustainableFuture. 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/wvap/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>

