



Rapid Ecological Assessment for the Ice Age National Scientific Reserve at Cross Plains, Dane County, WI

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 Planning

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Wisconsin's Natural Heritage Inventory Program

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Cover Photo: Prairie restoration alongside Shoveler’s Sink. Photo by Cathy Bleser.

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Purpose and Objectives

This report is intended to be used in conjunction with other sources of information for developing a new master plan for the Ice Age National Scientific Reserve at Cross Plains (IANSR-CP). This assessment addresses issues specifically related to the conservation of biological diversity for this property.

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

Survey efforts for IANSR-CP were limited to a “rapid assessment” for 1) identifying and evaluating ecologically important areas, 2) documenting rare species occurrences, and 3) documenting occurrences of high quality natural communities. This report can serve as the “Biotic Inventory” document used for master planning, although it is a scaled down version in terms of both the time and effort expended when compared to similar projects conducted on much larger properties, such as State Forests. The information collected was the result of one partial season of survey work in 2008. There will, undoubtedly, be gaps in our knowledge of the biota of this property, especially for certain taxa groups; these groups have been identified by the DNR or others as representing either an opportunity or a need for future work.

Methods

The Wisconsin Natural Heritage Inventory (NHI) program resides in the Wisconsin DNR’s Bureau of Endangered Resources and is part of an international network of NHI programs. The defining and unifying characteristic of this network is the use of a standard methodology for collecting, processing, and managing data on the occurrences of natural biological diversity. This network of data centers was established by The Nature Conservancy and is currently coordinated by NatureServe, an international non-profit organization.

Natural Heritage Inventory programs focus on rare plant and animal species, natural communities, and other natural features, referred to as elements of biodiversity. Elements tracked by the Wisconsin NHI Program are listed on the Wisconsin NHI Working List, which is the list of Endangered, Threatened and Special Concern plants, animals and natural communities maintained. This list changes over time as the populations of species change (both up and down) and as knowledge about species and natural community status and distribution increases. The most recent Working List for the State of Wisconsin is available through the WDNR Endangered Resources Program (www.dnr.state.wi.us/org/land/er/wlist/).

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

Data for this report were compiled using existing NHI data as well as limited surveys during 2008, including rare plant, natural community, and breeding bird surveys. Information from previous inventory efforts include a Biotic Inventory conducted by NHI (WNHIP 1998) to assess the biological environment of the Cross Plains unit of the Ice Age National Scientific Reserve and the IAT Summary Report (Harrington and Stephenson n.d.) that conducted a vegetation inventory for part of the study area. The latter project assisted Wisconsin Department of Natural Resources staff in completing a feasibility study for expansion of the property.

General Background Information

The Ice Age National Scientific Reserve at Cross Plains is located in west-central Dane County about two miles southeast of the village of Cross Plains and about three miles west of the cities of Madison and Middleton. The IANSR-CP consists of a number of publicly owned lands. These lands are:

1. State of Wisconsin Cross Plains State Park – 123.4 acres.
2. National Park Service Ice Age National Scenic Trail Interpretive Site – 156.3 acres.
3. US Fish and Wildlife Service Leopold Wetland Management District Shoveler’s Sink Waterfowl Production Area - 173.5 acres.

The Cross Plains unit of the Ice Age National Scientific Reserve is part of a nine-unit system affiliated with the National Park Service. The Reserve was established in 1964 to protect glacial landforms and landscapes in Wisconsin. The IANSR-CP is located at the edge of the Johnstown Moraine, the maximum advance of the Green Bay Lobe and the eastern edge of the Driftless Area (Dott and Attig 2004). Within the IANSR-CP the Johnstown Moraine is relatively small (Schultz 1986). Other glacial features include a meltwater channel through what is known as Wilkie Gorge (Black 1974) and several small glacial lake basins (Schultz 1986), one of which is Shoveler’s Pond.

Previous efforts

Past surveys and inventory efforts highlighting the ecological importance of the IANSR-CP include the Land Legacy Report (WDNR 2006a) which was designed to identify Wisconsin’s most important conservation and recreation needs for the next 50 years. The area comprising the IANSR-CP, known as the Shoveler Lakes – Black Earth Trench, was assigned a score of two points on their five-point scale for conservation significance, meaning it possesses “good ecological qualities, may be of adequate size to meet the needs of some the critical components, and/or harbors natural communities or species of state or ecological landscape significance.” This category implies that restoration efforts are likely needed for the area and that conservation actions would have a good chance of success.

Ecological Context

The Ice Age National Scientific Reserve at Cross Plains is located at the convergence of three Ecological Landscapes: the Western Coulee and Ridges Ecological Landscape, the Central Sand Hills Ecological Landscape, and the Southeast Glacial Plains Ecological Landscape (Figure 1). The surrounding landscape is currently dominated by agriculture, deciduous forest, and grassland, with several urban areas, including Madison, Wisconsin’s second largest city (Figure 2).

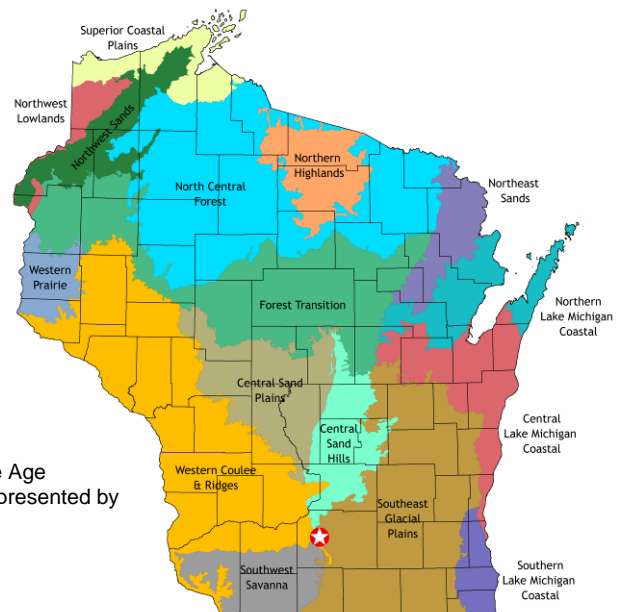
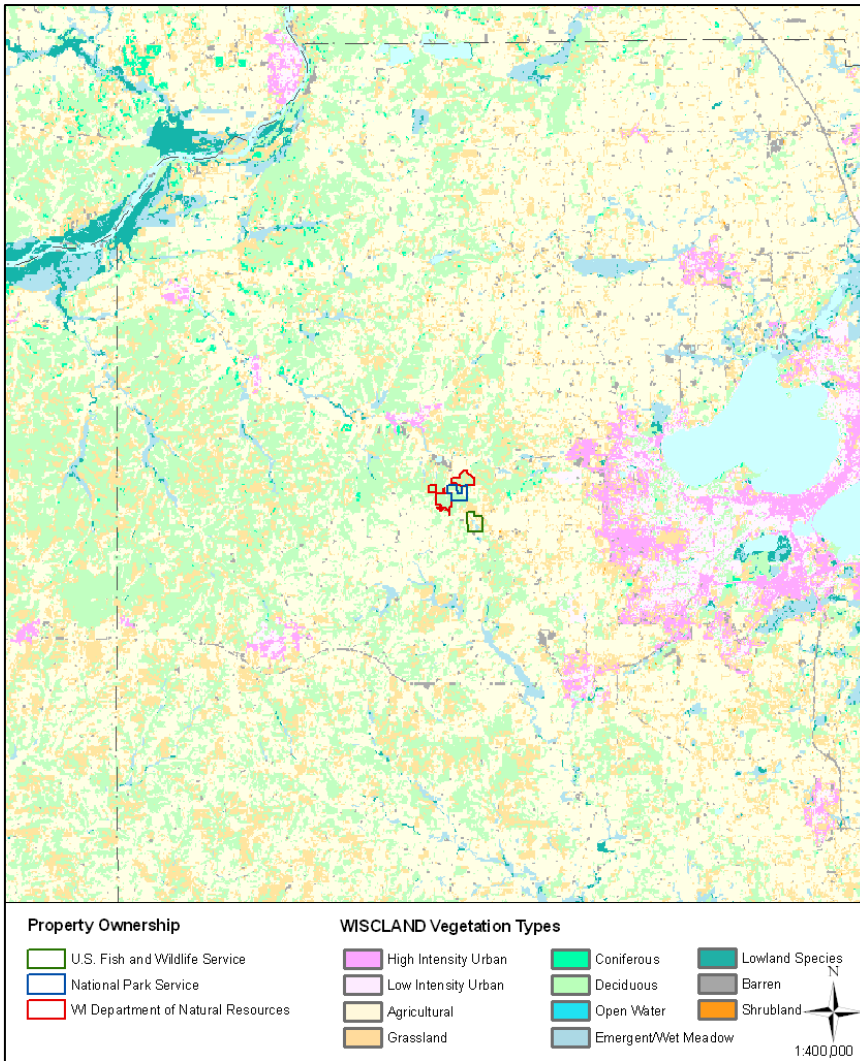


Figure 1
Ecological Landscapes of Wisconsin. The Ice Age National Scientific Reserve-Cross Plains is represented by a red star.

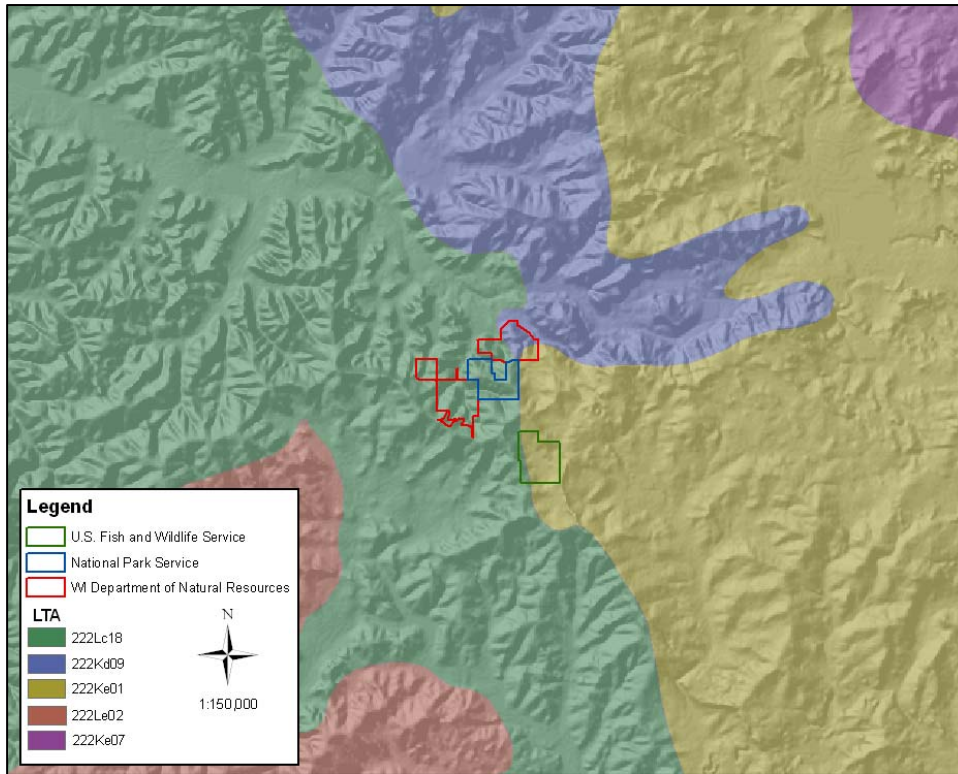
Figure 2
Landcover from the Wisconsin DNR WISCLAND GIS coverage (WDNR 1993).



The Ice Age National Scientific Reserve at Cross Plains is located within three Landtype Associations (LTA) (Figure 3):

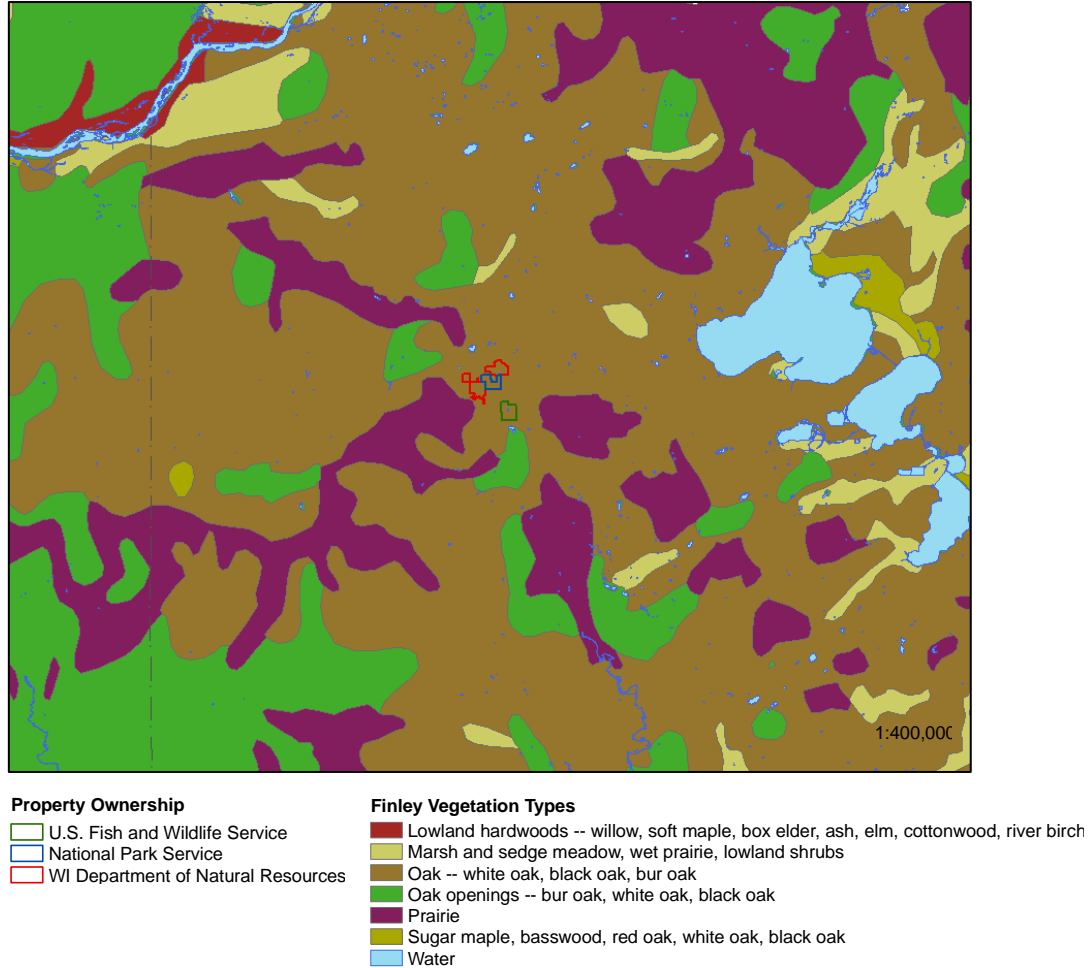
- **222Lc18** (Hills and Valleys- Wisconsin River Drainage). Soils are well drained and moderately well drained silty and loamy soils with a silt loam or sandy loam surface over non-calcareous clayey or loamy residuum or cover silty loess.
- **222Kd09** (Roxbury Hills). The characteristic landform pattern is hilly eroded moraine with nearly level to undulating valley floors. Soils are predominantly well drained silt and loam over sandstone or dolomite calcareous sandy loam till, or calcareous gravelly sandy outwash.
- **222Ke01** (West Johnstown-Milton Moraines). The characteristic landform pattern is rolling hummocky moraine and outwash plain complex with scattered bedrock knolls. Soils are predominantly well drained silt and loam over sandstone or dolomite calcareous sandy loam till, or calcareous gravelly sandy outwash.

Figure 3
Landtype Associations for the Ice Ace National Scientific Reserve-Cross Plains.



Data from the original Public Land Surveys are often used to infer vegetation cover types for Wisconsin prior to widespread European settlement. Public Land Surveys for the area comprising the IANSR-CP were conducted between 1832 and 1835. Finley's (1976) Original Vegetation Map described the area that now comprises the IANSR-CP (Figure 4) as dominated by oak dominated forest with white oak, black oak, and bur oak. Western Dane County also included a significant acreage of oak openings with bur oak, white oak, and black oak, as well as prairies.

Figure 4
Pre-European Settlement Vegetation for the Ice Ace National Scientific Reserve-Cross Plains. Data are from Finley (1976).



Current Vegetation

Current vegetation for the IANSR-CP is characterized by Southern Dry-mesic Forest dominated by red and white oak with shagbark hickory, black cherry, white oak, and basswood as canopy associates. Disturbance history and landscape position have allowed variability within the areas of Southern Dry-mesic Forest. This variability includes areas dominated by large white oak, some greater than 24 inches diameter and open-grown; some areas dominated by red oak with white birch and big-tooth aspen as canopy associates; and other areas with a very widely spaced canopy and a dense tall shrub layer composed mostly of common buckthorn and prickly ash. Southern Mesic Forest can be found within the IANSR-CP in the narrow bottoms of steep ravines. This forest is characterized by a canopy of sugar maple with basswood and ironwood as associates. The shrub layer has a moderate cover with eastern prickly gooseberry as a common species. Spring ephemerals are present, although not abundant, and include wild ginger, sharp-lobed hepatica, jack-in-the-pulpit, mayapple, and bloodroot. Shoveler's Sink is currently fringed by reed canary grass with some sedges and smartweeds. Many of the uplands have been planted into prairie with big bluestem, switch grass, reed canary grass, smooth brome, and Kentucky bluegrass common or remain as old fields.

Management Considerations and Opportunities for Biodiversity Conservation for IANSR-CP

Migratory Birds – Shoveler’s Sink

Shoveler’s Sink is a small, permanent, remnant glacial depression that provides excellent habitat for migratory birds such as waterfowl, shorebirds, songbirds, and waterbirds seeking a freshwater pond, marsh, and grassland. An online checklist program for recreational and professional bird watchers, eBird, highlights this important resource, as at least 17 species of waterfowl have been observed using the pond. Waterbirds recorded include several species of herons and large numbers of geese and cranes which stage here (eBird 2008). The presence of food and water are two important resources present at Shoveler’s Sink that allows for large numbers of individuals from many species to accumulate here during migration. The pond provides floating and submerged plants in the open water zone and is surrounded by an emergent zone that includes cattails, smartweed, and arrowheads whose tubers provide important food for migrating waterfowl and geese. Shovelers Sink is also an important area for breeding amphibians, which in turn, makes it very attractive for waterbirds such as herons and cranes. Stresses to migratory birds include habitat destruction and habitat alteration (Duncan 2002). Many ponds and depressions like this have been filled for agriculture and development both of which could threaten the viability of this valuable resource. As these depression are maintained through direct precipitation and runoff from the surrounding landscape, nutrient runoff could pose an indirect threat if not monitored closely.

Grassland Birds

Grassland bird species are exhibiting one of the most significant declines of any suite of bird species in Wisconsin and across the Midwest (Herkert 1995). The major cause for this decline has been the alteration and loss of breeding habitat (Robbins et al 1996). The IANSR-CP presents opportunities for addressing several area sensitive bird species that require large grassland patches to enable for good nest success and persistence of viable populations. Estimates show patch size of greater than 100 hectares must be maintained for conservative species (pers. comm. D. Sample). The context of the surrounding landscape should be assessed to determine if larger tracts could be connected to develop and protect larger grassland areas. Continued restoration efforts on the ridge tops, maintaining surrogate grasslands, removing brushy edges and fencerows, and connecting larger grassland areas would all benefit grassland birds.

The grasslands surrounding Shoveler’s Sink as well as the old agricultural fields on the former Wilke / McNutt lands support several conservative grassland obligate species including a State-Threatened species and several SGCN . These species have the potential to increase in density and potentially improve nest productivity if the grasslands are connected with open areas allowing for a larger matrix of treeless habitats. Suitable open areas could include pastures, hayfields (cut late summer), idle grasslands, and even row crops which can be a suitable buffer when compared to woodlots or hedgerows. The current open agricultural land cover on private land between the IAT old field south of the former Wilke residence and Timber Lane to the east, are likely critical in providing sufficient open space for these area-sensitive birds.

Oak Opening Restoration

Historically, the study area was a mosaic of oak forests, Oak Openings, and prairies. In the absence of fire many of the historic Oak Openings have converted to closed canopy forests. The presence of several areas with open grown and semi-open grown oaks and some residual savanna groundlayer species such as Tinker’s weed, indicates that there is a possibility of restoring the critically imperiled globally rare Oak Opening natural community within the project area. Prior restoration efforts could potentially be expanded to include more areas of Oak Opening and prairie. Red-headed woodpecker, a

savanna specialist SGCN, was observed in the walnut grove bordering the south side of Old Sauk Road, and would be expected to nest in cavity trees where oak opening is restored.

Wisconsin Wildlife Action Plan

All of the vertebrate SGCN known from IANSR-CP along with the natural communities they inhabit represent Ecological Priorities for at least one of the three ecological landscapes comprising the study area (WDNR 2006b). The priorities were developed based on the probability that a species occurs in an Ecological Landscape, their degree of association with Natural Communities, and the opportunities in a given Ecological Landscape for sustaining the Natural Community (see dnr.wi.gov/org/land/er/wwap/explore/tool.asp for more information) (Figure 5). Appendix B contains a matrix with the vertebrate SGCN and associated ecological opportunities (native communities) for this landscape.

Invasive Plants

Some invasive plants are well-established within IANSR-CP, including common buckthorn, Tatarian honeysuckle, prickly ash, and reed canary grass. Other invasive plants that are present and present possible future threats to diversity include garlic mustard, winged burning-bush, star-of-bethlehem, multiflora rose, Asian bittersweet, Japanese barberry, and common burdock. Numerous other invasive species are present within the old field and planted prairie areas.

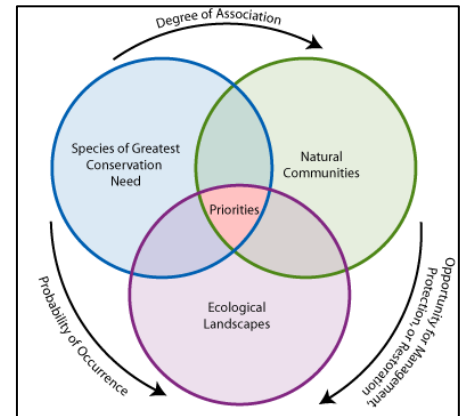


Figure 5
Graphic illustrating the process used for identifying Ecological Priorities in the Wisconsin Wildlife Action Plan.

Site-specific Opportunities for Biodiversity Conservation

The following Primary Sites were delineated because they generally encompass the best examples of 1) both rare and representative natural communities and 2) rare species populations that have been documented to date within IANSR-CP. 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. This report is meant to be considered along with other information when identifying opportunities for various management designations during the master planning process.

IANSR-CP01. Glaciated Gorge – 24 acres

This Primary Site features a north-south trending narrow, steep gorge with an ephemeral stream. Unlike other parts of the study area, the forests in this site are primarily mesic with canopy dominants including sugar maple, red oak, and basswood. Buckthorn is common on the forested ridge top. Species in the ground flora include bloodroot, sharp-lobed hepatica, abundant wild ginger, Canadian wood-nettle, Virginia waterleaf, large patches of shooting star, and Dutchman's breeches. Pines occur occasionally on the steep slopes. Bedrock outcrops, present on an east-facing slope, are 3-4 meters tall and have open grown oaks. Also within this Site is an area that has had previous management to restore oak savanna. This area has semi-open grown white oak, with some red oak over pale-leaved woodland sunflower, big bluestem, flowering spurge, large-flowered yellow false foxglove, white snakeroot, and Pennsylvania sedge. Common buckthorn and multiflora rose are present.

IANSR-CP02. South Gorge – 63 acres

This Primary Site contains an east-west running gorge with an ephemeral stream. Along the south-facing slope is a fairly open, good quality Oak Woodland. The white and red oak were generally grown under closed canopy, but scattered white and bur oak are open grown. The shrub layer is relatively open with scattered gray dogwood, hazelnut, gooseberry, and brambles. The ground layer is sparse and patchy, but woodland herbs such as wild geranium are common. The north-facing slope has a closed canopy forest dominated by red oak with scattered canopy white oak and sugar maple saplings. The shrub layer has scattered brambles, common buckthorn, and nannyberry, and scattered pagoda dogwood. In portions of the site, the ground flora is rich with wild geranium, bloodroot, lady fern, maidenhair fern, mayapple, and jack-in-the-pulpit.

Areas of lesser quality forest are found within the Site and include the east end of the Site, an area where red oak and black cherry have been logged and common buckthorn is common underneath, and the south end of the site, where groves of big-tooth aspen have invaded former openings. An old camp site sits within a bur oak savanna that has had numerous large (>30 inches diameter) trees cut.

Future Needs

This project was designed to provide a rapid assessment of the biodiversity values for IANSR-CP. Although the report is 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 IANSR-CP.

- Invasives monitoring and control should be continued and expanded, if necessary. State parks and many other public lands throughout Wisconsin are facing major management problems because of serious infestations of highly invasive species such as garlic mustard, common buckthorn, and Tatarian honeysuckle. Some of these species are easily dispersed by humans and vehicles; others are spread by birds, mammals, insects, water, or wind.

Glossary

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

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

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

Element –the basic building blocks of the Natural Heritage Inventory. They include natural communities, rare plants, rare animals, and other selected features such as colonial bird rookeries and mussel beds. In short, an element is any biological or ecological entity upon which we wish to gather information for conservation purposes.

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

matrix- used in this document to refer to the dominant land cover within which other features of the landscape are embedded.

National Hierarchical Framework of Ecological Unit - a land unit classification system developed by the U.S. Forest Service and many collaborators. As described by Avers et al (1994): “The NHFEU can provide a basis for assessing resource conditions at multiple scales. Broadly defined ecological units can be used for general planning assessments of resource capability. Intermediate scale units can be used to identify areas with similar disturbance regimes. Narrowly defined land units can be used to assess specific site conditions including: distributions of terrestrial and aquatic biota; forest growth, succession, and health; and various physical conditions.”

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

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

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

surrogate grasslands- these are the main habitats (e.g. CRP, old field, pasture) now available for birds that require grasslands, especially large grasslands, for portions or all of their life cycles. These communities are similar in structure (but not species composition) to the native prairies and open (i.e., recently burned) barrens that were formerly more abundant in Wisconsin. The dominant plants in “surrogate” grasslands are typically exotic “cool season” grasses. See Sample and Mossman (1997) for more information.

Migratory Bird Stopover Site – describes a site comprising a set of habitats that birds select during migration. Ideal stopover sites provide accessible water, protection, and food so that birds can not only survive but also regain energy lost during their travels (Duncan 2002).

Species List

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

Common Name	Scientific Name
Animals	
Bobolink	<i>Dolichonyx oryzivorus</i>
crane	<i>Grus spp</i>
Dickcissel	<i>Spiza americana</i>
Eastern Meadowlark	<i>Sturnella magna</i>
geese	<i>Branta</i>
Henslow's Sparrow	<i>Ammodramus henslowii</i>
heron	<i>Egretta, Ardea</i>
Hooded Warbler	<i>Wilsonia citrina</i>
Western Meadowlark	<i>Sturnella neglecta</i>
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>
Plants	
arrowhead	<i>Sagittaria spp</i>
Asian bitterweet	<i>Celastrus orbiculata</i>
basswood	<i>Tilia americana</i>
big bluestem	<i>Andropogon gerardii</i>
big-tooth aspen	<i>Populus grandidentata</i>
black cherry	<i>Prunus serotina</i>
black oak	<i>Quercus velutina</i>
bloodroot	<i>Sanguinaria canadensis</i>
brambles	<i>Rubus spp</i>
bur oak	<i>Quercus macrocarpa</i>
Canadian wood-nettle	<i>Laportea canadensis</i>
cattail	<i>Typha spp</i>
common buckthorn	<i>Rhamnus cathartica</i>
common burdock	<i>Arctium minus</i>
Dutchman's breeches	<i>Dicentra cucullaria</i>
eastern prickly gooseberry	<i>Ribes cynosbati</i>
flowering spurge	<i>Euphorbia corollata</i>
garlic mustard	<i>Alliaria petiolata</i>
gooseberry	<i>Ribes spp</i>
gray dogwood	<i>Cornus racemosa</i>
hazelnut	<i>Corylus spp</i>
Ironwood	<i>Ostrya virginiana</i>
Jack-in-the-pulpit	<i>Arisaema triphyllum</i>
Japanese barberry	<i>Berberis thunbergii</i>
Kentucky bluegrass	<i>Poa pratensis</i>
lady fern	<i>Athyrium filix-femina</i>
large-flowered yellow false foxglove	<i>Aureolaria grandiflora</i>
maidenhair fern	<i>Adiantum pedatum</i>
mayapple	<i>Podophyllum peltatum</i>
multiflora rose	<i>Rosa multiflora</i>
nannyberry	<i>Viburnum lentago</i>
pagoda dogwood	<i>Cornus alternifolia</i>
pale-leaved woodland sunflower	<i>Helianthus strumosus</i>
Pennsylvania sedge	<i>Carex pensylvanica</i>
prickly ash	<i>Zanthoxylum americanum</i>
red oak	<i>Quercus rubra</i>
reed canary grass	<i>Phalaris arundinacea</i>
Common Name	Scientific Name

Plants continued...

sedges	<i>Carex spp</i>
shagbark hickory	<i>Carya ovata</i>
sharp-lobed hepatica	<i>Anemone acutiloba</i>
shooting star	<i>Dodecatheon meadia</i>
smartweed	<i>Polygonum spp</i>
smooth brome	<i>Bromus inermis</i>
star-of-Bethlehem	<i>Ornithogalum umbellatum</i>
sugar maple	<i>Acer saccharum</i>
switch grass	<i>Panicum virgatum</i>
Tatarian honeysuckle	<i>Lonicera tatarica</i>
tinker's-weed	<i>Triosteum perfoliatum</i>
Virginia waterleaf	<i>Hydrophyllum virginianum</i>
white birch	<i>Betula papyrifera</i>
white oak	<i>Quercus alba</i>
white snakeroot	<i>Eupatorium rugosum</i>
wild geranium	<i>Geranium maculatum</i>
wild ginger	<i>Asarum canadense</i>
winged burning-bush	<i>Euonymus alata</i>

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