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## Appendix D

### Natural Communities of the Northern Highland – American Legion State Forest

All natural community types are tracked by Wisconsin's NHI (cite NHI Working List). For rare communities or successional stages, as many stands of a given type as we can locate and make time for are surveyed. The information collected is then incorporated into the NHI database. For more common and widespread communities, the survey criteria are more restrictive, and include stand size, context, disturbance history, rare or declining seral stages or cover types, and potential to support rare or otherwise sensitive species.

There is no single standardized classification scheme for biotic communities so we have tried to maintain consistency with those types recognized on the NHI's natural community working list. In some cases we have referenced other classifications in the text, such as habitat types or cover types, that are in relatively wide usage by other groups.

COMMON NAME (SCIENTIFIC NAME)	FEDERAL STATUS	STATE STATUS	OBSERVATION DATE
ALDER THICKET		NA	1982
BLACK SPRUCE SWAMP		NA	1999
BOREAL FOREST		NA	1993
BOREAL RICH FEN		NA	1995
BRACKEN GRASSLAND		NA	1995
EMERGENT AQUATIC		NA	1994
EMERGENT AQUATIC – WILD RICE		NA	1999
EPHEMERAL POND		NA	1996
FLOODPLAIN FOREST		NA	1996
HARDWOOD SWAMP		NA	1993
INLAND BEACH		NA	1996
LAKE--DEEP, SOFT, SEEPAGE		NA	1997
LAKE--DEEP, VERY SOFT, SEEPAGE		NA	1995
LAKE--SHALLOW, SOFT, DRAINAGE		NA	1999
LAKE--SHALLOW, SOFT, SEEPAGE		NA	1996
MUSKEG		NA	1999
NORTHERN DRY FOREST		NA	1994
NORTHERN DRY-MESIC FOREST		NA	1999
NORTHERN MESIC FOREST		NA	1997
NORTHERN SEDGE MEADOW		NA	1996
NORTHERN WET FOREST		NA	1999
NORTHERN WET-MESIC FOREST		NA	1994
OPEN BOG		NA	1999
POOR FEN		NA	1996
SHRUB-CARR		NA	1981
SPRING LAKE		NA	1995

COMMON NAME (SCIENTIFIC NAME)	FEDERAL STATUS	STATE STATUS	OBSERVATION DATE
SPRING POND		NA	1993
SPRINGS AND SPRING RUNS, HARD		NA	1993
STREAM--FAST, HARD, COLD		NA	1995
STREAM--FAST, HARD, WARM		NA	1991
STREAM--SLOW, SOFT, COLD		NA	1993
STREAM—SLOW, WARM, HARD		NA	1999
SUBMERGENT AQUATIC		NA	1994
TAMARACK SWAMP		NA	1999
*Several additional aquatic community types are present on the NHAL and currently undergoing classification revision			

## Forest Communities

Forest communities are dominated by trees, with canopy closure typically exceeding 50%. We endeavored to survey representative examples of all forest community types naturally occurring on the Northern Highland, focusing on larger stands, later successional stages, and less isolated patches. For all upland forest types in northern Wisconsin, older successional stages are now rare, and large patches of relatively homogeneous older forest are virtually absent.

Tree species associated with natural or anthropogenic disturbances and early successional stages such as trembling aspen, paper birch, and pin cherry, though historically present in the northern highland landscape, have increased greatly in abundance since the catastrophic logging episodes of the late-nineteenth and early twentieth centuries. Several other tree species have apparently also increased since the initial logging, including red maple and red oak. Monotypic plantations of red (and sometimes jack) pine have replaced vast acreages of the forest communities native to the region.

For all upland forest types in northern Wisconsin, older successional stages are now rare and large patches of relatively homogeneous forest are scarce or absent.

For additional information on forest communities of northern Wisconsin see Curtis (1959) and Kotar et al (1988).

**Northern Dry Forest:** Occurs on coarse textured sands, of very low nutrient content. Jack pine, red pine, and Hill's (or northern pin) oak are the characteristic dominants. Catastrophic fire at relatively short intervals (10-100 years) was historically responsible for initiating and regenerating stands.

Jack pine was a relatively minor component of the presettlement forests of the Northern Highland. A number of stands were converted to plantations, usually of red pine. Others have been converted to aspen.

Natural stands are not presently common on the NH-AL SF, but could be restored, managed and protected at several sites. As a natural community, this type has experienced a major statewide decline in acreage in recent years owing to a serious outbreak of jack pine budworm, the subsequent salvage of dead or dying trees, and the replanting of affected stands to red pine monocultures.

Inventory Sites: Johnson Creek Pines, Nixon Creek and Wetlands, Papoose Creek Pines, Rainbow Wetlands, Boulder Flats.

**Northern Dry-mesic Forest:** Somewhat richer and moister than the "dry" forests, this community was typically composed of white and red pines, with red oak, red maple, bigtooth and trembling aspens, paper birch, and balsam fir among the important associates.

This community comprised the matrix vegetation of the northern highlands pitted outwash ecoregion prior to European settlement.

In the past this region supported one of Wisconsin's greatest "pineries", and despite over a century of development, remains, arguably, the best location in the state at which to practice the largescale restoration, management, and protection of this community. Remnant stands are widespread and common, but old-growth successional stages and large contiguous patches of more than a few hundred acres are now rare. Vast acreages of former white and red pine forest have been converted to stands of aspen, paper birch, and plantation-grown red pine.

Inventory Sites: Manitowish River Wilderness Area, Stone Lake Pines, Bittersweet Lakes Complex, Stevenson Springs, Dry Lake Pines, Mud Creek Springs, Border Creek Springs, Swanson Lake and Pines, Horsehead Lake, Two Lakes Pines, Camp Lake, Allequash Lake, Lost Canoe Hardwoods, Trout Lake Pines.

**Northern Mesic Forest:** Forests of sugar maple, yellow birch, and hemlock covered over ten million acres of northern Wisconsin in the mid-nineteenth century. Because of the combined influences of sandy soils and periodic wildfire, the Northern Highlands region was vegetated primarily with drier forest types in which pines were often dominant. The major exception occurred in the forests of the Winegar Moraine ecoregion, on the northern fringes of the NH-AL SF, which were composed primarily of mesic species. Smaller, but significant patches of mesic forest occurred to the west of Powell Marsh and in the vicinity of Star and Plum Lakes.

Inventory Sites: Bittersweet Lakes Complex, Plum Lake Hemlock Forest, Lake Laura-Salsich Lake, Lake Alva Hemlock-Hardwoods, Catherine Lake Hemlock-Hardwoods, North Bass Lake Hemlocks, Rice Creek Complex, Toy Lake.

**Boreal Forest:** Mature stands of this circumboreal community are composed of white spruce and balsam fir, with admixtures of balsam poplar, paper birch, white pine, trembling aspen, and white cedar. This type (actually a complex of types) is not well represented in our state but was formerly extensive in the Lake Superior clay plain of northwestern Wisconsin. Under current climatic and edaphic conditions away from the Great Lakes, dominance by "boreal" species seems to be a temporary condition.

Inventory Sites: We documented no representative stands of boreal forest of more than a few acres on the NH-AL SF. The few remnants surveyed may be transitional to other, more widespread communities.

**Northern Wet-mesic Forest:** This lowland forest community is dominated by white cedar, often mixed with balsam fir, black ash, tamarack, and black spruce. Hemlock, yellow birch, and red maple may be locally important. The understory flora may be particularly diverse, and some stands are notable for the number of rarities they support.

This type is generally not as common on the Northern Highland as it is elsewhere in northern Wisconsin (e.g., the Chequamegon-Nicolet National Forest) but several exceptional occurrences were found here. There is concern among many scientists, land managers, and conservationists for the long-term viability of this community, as the dominant tree, white cedar, is a preferred browse species of the white-tailed deer. Cedar reproduction was poor in all inventoried stands of wet-mesic forest on the NH-AL SF. This holds true for the vast majority of white cedar stands we have surveyed elsewhere in northern Wisconsin as well.

Inventory Sites: Toy Lake, Rice Creek Complex, Trout Lake Conifer Swamp. Minor occurrences were documented at Seed Lake, Manitowish River Pines, and several other locations.

**Northern Wet Forest:** This type was previously used to classify acid conifer swamps composed of black spruce and/or tamarack. The Natural Heritage Inventory has split this type into two distinct communities, "**Black Spruce Swamp**" and "**Tamarack Swamp**". See descriptions below for additional information.

**Black Spruce Swamp:** The canopy of this nutrient-poor swamp conifer community is composed primarily of black spruce. The usual substrate is acid peat, and the groundlayer associates are very similar to those found in bog/muskeg communities but include more shade tolerant species. Among the typical understory plants are sphagnum spp. mosses, ericaceous shrubs (especially Labrador tea), three-leaved false Solomon's seal, creeping snowberry, and three-seeded sedge.

Inventory Sites: Rice Creek Complex, Manitowish River Pines, Lake Alva Hemlock-Hardwoods, Partridge Lake Connection.

**Tamarack Swamp:** Tamarack swamps typically occur on less acidic substrates and are floristically richer than the black spruce swamps. The influence of mineral-enriched groundwater is suggested by the presence of plants such as speckled alder, marsh marigold, Canada bluejoint grass, woodland horsetail, and dwarf raspberry, and a correspondingly diminished presence of sphagnum mosses and ericaceous shrubs. A recent, detailed re-examination of the vegetation as described in Wisconsin's original land survey in the mid-nineteenth century indicated that stands of large tamarack were formerly more common in the Northern Highland landscape than they are today.

Inventory Sites: Devine Lake.

**Hardwood Swamp:** Black ash is the canopy dominant in this nutrient-rich lowland forest community. Associates may include red maple, American elm, white cedar, and balsam fir, but nearly pure stands of ash are common in some areas. The tall shrub layer is usually well developed, composed of speckled alder, red-osier dogwood, mountain maple, native honeysuckles, and sapling ash. The herb layer can be quite diverse, supporting many sedges, grasses, and forbs. Swamp saxifrage, marsh marigold, and skunk cabbage are among the typical herbaceous representatives.

Though relatively rare in this ecoregion, one outstanding, diverse, extensive occurrence was documented. Because black ash swamps have only recently been recognized as a natural community type by the Natural Heritage Inventory, they are very poorly represented in special management areas to which a high level of protection has been granted.

Inventory Sites: Toy Lake. Small pockets of this type can occur on upland sites with impeded drainage owing to local soil conditions.

**Floodplain Forest:** Silver maple, green ash, box elder, and bur oak (or a bur X swamp white oak hybrid) are the trees most often found in this type in northern Wisconsin. The understory supports species such as tall coneflower, sensitive fern, Canada bluejoint grass, and a group of robust sedges.

Characteristic of the floodplains of the major rivers of southern Wisconsin where this community is much more extensive and diverse, in the Northern Highlands this is a minor type. Here it is found only in small stands within the floodplains of the region's two largest rivers, the Wisconsin and Manitowish.

Inventory Sites: Manitowish River Pines, Wisconsin River.

## Savanna Communities

Savannas are characterized by a scattered growth of trees interspersed with openings composed of herbs and shrubs. In northern Wisconsin, most of the savannas are classified as **Pine Barrens**, and consist of scattered

jack pine (and sometimes Hill's or bur oaks) with an understory of grasses and forbs usually associated with prairies. We found no stands of the Pine Barrens community on the NH-AL SF. See "**Bracken Grassland**" in the section on Herbaceous Communities.

## Shrub Communities

**Alder Thicket:** Wet thickets of speckled alder are common across northern Wisconsin, where they often border sluggish streams and also occur along lakeshores.

This widespread community is a component of the vegetation mosaic of many of the NH-AL SF survey sites containing wetlands, but no stands of alder have been singled out for special conservation attention.

Inventory Sites: Northeast Springs Macrosite, Lower Manitowish River Macrosite, Plum Creek.

**Shrub-carr:** This wet shrub community is composed mostly of willows and red-osier dogwood. Though more characteristic of southern Wisconsin, shrub-carr occurs statewide. It is not especially common on the Northern Highland, but several large occurrences were documented.

Inventory Sites: Lower Manitowish River Macrosite, Rainbow Wetlands.

**Open Bog (Muskeg):** Deep layers of sphagnum mosses form the highly acidic substrate of this widespread community. Though the mosses are the real dominants, the more commonly recognized plants include a highly adapted group of ericaceous shrubs (cranberries, leatherleaf, bog laurel, bog rosemary), sedges, and insectivorous plants. Scattered, stunted individuals of black spruce and tamarack are also characteristic of bogs. "Muskeg" is the term often applied to bogs exhibiting this sparse growth of small (but not necessarily young) swamp conifers.

The animals inhabiting open bog/muskeg also include many specialists, some of which reach the extreme southern limits of their ranges in northern Wisconsin. Examples are birds such as the Lincoln's Sparrow and Palm Warbler, and butterflies such as the Jutta arctic and bog fritillary.

This community type is widespread and very well represented on the NH-AL SF, and should be a priority for management and protection. It should be noted that all large occurrences of open bog/muskeg have been somewhat compromised by various developments, including road and utility crossings, cranberry bed construction, wild rice cultivation, and hydrologic alterations due to ditching and diking.

Inventory Sites: Lower Manitowish River Macrosite, Powell Marsh, Big Swamp, Rainbow Wetlands, Swanson Lake and Pines, Rice Creek Complex, Mud Creek Springs, Camp Lake, Bittersweet Lakes, Nixon Creek, Northeast Springs Macrosite.

## Herbaceous Communities

**Bracken Grassland:** Non-forested natural communities are rare on the uplands of the NH-AL SF, and are quite restricted in acreage. The flora consists mostly of herbs, such as sedges and grasses, and low shrubs such as blueberries and sweetfern. Exotic species are a significant component of many stands. Typical examples of these include quack grass, oxeye daisy, sheep sorrel, and orange hawkweed.

Several of the surveyed stands were at least partially within frost pockets, and it was evident that growing season frosts have played an important role in keeping encroaching woody vegetation at bay. One site is kept in a relatively open condition by the use of prescribed fire.

Inventory Sites: Johnson Lake Barrens, Allequash Lake, Frank Lake and Frost Pocket.

**Northern Sedge Meadow:** This minerotrophic herbaceous wetland is widespread in northern Wisconsin. Dominant species include tussock sedge (*Carex stricta*) and other sedges, and Canada bluejoint grass. Among the characteristic associates are swamp milkweed, spotted joe-pye-weed, blue flag (Iris), marsh fern, swamp loosestrife, and marsh bellwort. A shrub component is often present, with willows, speckled alder, and sweet gale common.

This type is somewhat of an ecological grab-bag, and additional sampling and classification work remains to be done.

Several large, diverse, or otherwise important occurrences were documented in the course of our fieldwork

Inventory Sites: Devine Lake, Lower Manitowish River Macrosite, Rainbow Wetlands, Nixon Creek and Wetlands, Stevenson Creek and Pines.

**Poor Fen:** This herbaceous peatland type is similar in composition to the open bog but differs in its higher floristic diversity, lower groundwater acidity, and microtopography. Sphagnum mosses are extensive in the poor fen, but they don't generally occur in thick blankets with pronounced hummock-hollow microtopography. Besides the typical bog ericads and sedges, the flora may include many additional sedge species, bog goldenrod, rush aster, several orchids, and bladderworts.

Among the animals found in this type are familiar species such as Sandhill Crane and Sedge Wren, as well as uncommon specialists such as the Le Conte's Sparrow and Yellow Rail.

This wetland type has been added to the Wisconsin community working list recently, so our understanding of its distribution is preliminary. It is apparently widespread in the northern part of the state. Occurrences are seldom encountered in isolation, but usually occur in mosaics composed of several wetland communities.

Inventory Sites: Black Tern Bog, Boulder Flats Meadow, Stevenson Springs and Wetlands.

**Boreal (Rich) Fen:** This herbaceous peatland community is dominated by sedges, usually of the "wire-leaved" type. A basal layer of mosses, when present, is not composed primarily of the highly acidic members of the Sphagnum genus. This community is typically diverse, and capable of supporting rare, specialized species. Dominant/characteristic plants include woolly sedge, alpine cotton-grass, twig rush, sage willow, marsh timothy, and common bog arrow grass.

This community has only recently been accorded recognition as an entity in Wisconsin. Formerly it was lumped with open bog or northern sedge meadow. Though its range and status here are imperfectly known at present, this is at best an uncommon community that frequently supports rare plants and animals.

The known occurrences on the NH-AL SF are few in number and small in area, but highly significant because of the rare species they support and their association with other natural communities.

Inventory Sites: Rice Creek Complex.

**Emergent Aquatic:** Emergent marshes occupy areas of relatively shallow standing water where there is protection from strong currents, and excessive wind and wave action. Many of the dominants, including cattails, bur-reeds, bulrushes, and spike-rushes, are tall, robust, plants with a grass-like form.

The stands of emergents in deeper water may overlap or be interspersed with stands of floating-leaved species such as white and yellow water lilies and water shield.

Inventory Sites: Johnson Creek and Pines, Rainbow Wetlands, Manitowish River Wilderness Area.

**Wild Rice Marsh:** Because of the biological and cultural interest in wild rice beds, NHI are recognizing emergent marshes dominated by wild rice (*Zizania aquatica*) as a community type. Some exceptionally good examples, among the state's finest, occur within and just outside of the NH-AL SF.

Inventory Sites: Allequash Lake, Aurora Lake, Rice Creek Complex.

**Submergent Aquatic:** Beds of submergent aquatic vegetation occupy sites similar to those supporting emergent aquatic stands but the water depth is typically greater. Representative species include pondweeds, coontail, waterweed, and the water-milfoils. There is often spatial overlap with beds of floating-leaved species such as the water lilies and water shield, as well as with emergents.

Inventory Sites: Allequash Lake, Aurora Lake, Bittersweet Lakes, Frog Lake and Pines, Johnson Lake Barrens, Rice Creek Complex, Swanson Lake and Pines.

**Ephemeral Pond** (vernal pond) – small seasonally flooded basins typically holding water in the spring following snow melt, then dry up during the summer. Vegetation is quite variable, but often includes knowtweeds (*Polygonum* spp.), sedges (especially *Carex* spp.), and beggar's ticks (*Bidens* spp.). These temporary ponds provide critical breeding habitat for frogs, salamanders, and invertebrates.

Inventory Sites: Lake Laura-Salsich Lake, Catherine Lake Hemlock-Hardwoods.

## Primary Communities

These communities develop directly on unvegetated geologic substrates. Two types are recognized on the NH-AL SF.

**Inland Beach:** Beaches of sand or gravel occur on the margins of certain lakes where the natural fluctuations in water levels permit the establishment and persistence of a specialized flora. Sedges and rushes are among the typical plants colonizing such habitats. With shoreline development pressures presently very high in the Northern Highland landscape, many natural beaches are experiencing or becoming increasingly vulnerable to damage or destruction.

Despite the high concentration of lakes on the NH-AL SF we documented few examples of well-developed inland beach communities here. We did identify several rare species populations dependent on NH-AL SF beaches.

Inventory Sites: Big Muskellunge Lake, Trout Lake.

**Bedrock Glade:** Outcroppings of bedrock that do not form cliffs (vertical faces) and are sparsely vegetated with pioneering lichens, mosses, and vascular plants are termed "bedrock glades". Exposures of bedrock are very rare on the NH-AL SF and those identified to date do not appear to be highly biologically significant.

Inventory Sites: Lower Manitowish River Macrosite.

## Aquatic Features Classification

This group includes lakes, streams, and springs. During 1999 the NHI will be working with The Nature Conservancy, a private conservation organization, to further refine and standardize our present classification of aquatic features. Following the completion of this project, our abilities to both identify ecologically significant aquatic "types", and to prioritize conservation actions, should be significantly enhanced.

The aquatic classification currently used by NHI is based on a limited group of chemical and physical parameters. This classification was developed in the 1970s by J. Magnuson (UW-Limnology), Bill Threinen (DNR - Fish Management), and Joe Ball (DNR - Water Resources), for use by the State Scientific Areas program. Attributes such as stream order, lake size and basin morphology, substrate, etc. were not used in this version but may in the future. TNC has been working on a lake and stream classification for several years, and a pilot program may be initiated with them this fall to attempt a more detailed classification of Wisconsin waterbodies. **Bolded** terms represent factors used in the Wisconsin Natural Heritage Inventory classification.

## I. LAKES: Lentic systems 10 acres or larger (standing water)

### A. Water Source

1. **Seepage Lake** - Groundwater infiltration, overland flow, and precipitation are the primary water sources. These are essentially landlocked waterbodies.
2. **Drainage Lake** - The primary source of water is stream-borne, via an inlet, plus those sources listed under seepage types. Water leaves the system via an outlet stream.
3. **Spring Lake** - Springs contribute substantially to lake volume. Surface features such as spring runs or spring ponds may discharge waters directly into a spring lake, or the springs may discharge from beneath the lake's surface. An outlet stream is usually present.

### B. Thermal Stratification

1. **Deep Lake** - In these lakes a thermocline develops during the summer and winter. In the spring and fall this zone of marked temperature difference breaks down, allowing for the mixing of bottom and surface waters and a redistribution of oxygen and nutrients.
2. **Shallow Lake** - These lakes do not stratify thermally, and can become oxygen depleted as the water warms and decomposition exceeds primary production. This can also occur during the winter when ice and snow cover the surface, inhibiting photosynthesis. "Freezeout" conditions may then prevail.
3. **Meromictic Lake** - These are very deep lakes (often over 20 meters) with an exposed surface area of no more than a few hectares. Thermal and chemical stratification is permanent, or mixing of surface and deep waters very limited.

### C. Chemical Attributes

1. **Alkalinity** - Often used as a measure of productivity for a water body.
  - a. **Hard** water - Total alkalinity equals or exceeds 50 ppm.
  - b. **Soft** water - Total alkalinity is less than 50 ppm.
2. Other chemical characteristics sometimes used for classifying lakes: pH, conductance, size, basin morphology

### D. Miscellaneous Attributes

1. Shoreline configuration
2. Size

## II. STREAMS: Lotic systems (flowing water)

- A. **Gradient** - correlates roughly with substrate particle size, and to a degree, types of organisms that can stand up to high current velocity.
  - 1. **Fast** - Gradient exceeds 20'/mile
  - 2. **Slow** - Gradient is less than 20'/mile
- B. **Temperature** - Correlates roughly with ability of stream to support aquatic biota needing high levels of dissolved oxygen to sustain themselves.
  - 1. **Warm** - average summer temperature exceeds 24 degrees Celsius.
  - 2. **Cold** - average summer temperature is below 24 degrees Celsius.
- C. Chemical Attributes
  - 1. **Alkalinity**
    - a. **Hard** water - Total alkalinity equals or exceeds 50 ppm.
    - b. **Soft** water - Total alkalinity is less than 50 ppm.
  - 2. Other chemical characteristics sometimes used for classifying streams: pH, conductance
- D. Miscellaneous Attributes
  - 1. Stream order
  - 2. Channel configuration
  - 3. Stream flow (cfs)

The aquatic types recognized currently by the NHI are:

Ephemeral Pond (vernal pond) – <10 acres, shallow, water dries up most years.

Lake - deep, hard, drainage  
Lake - deep, hard, seepage  
Lake - deep, soft, drainage  
Lake - deep, soft, seepage  
Lake - deep, very soft, seepage  
Lake - hard bog  
Lake - meromictic  
Lake - oxbow  
Lake - shallow, hard, drainage  
Lake - shallow, hard, seepage  
Lake - shallow, soft, drainage  
Lake - shallow, soft, seepage  
Lake - shallow, very hard, drainage (marl)  
Lake - soft bog  
Lake - unique

Spring Lake

Spring Pond (< 10 acres)

Springs and spring runs - hard (tot. alk. > 50 ppm.)

Springs and spring runs - soft (tot. alk. < 50ppm.)

Stream - fast, hard, cold

Stream - fast, hard, warm

Stream - fast, soft, cold

Stream - fast, soft, warm

Stream - slow, hard, cold

Stream - slow, soft, warm

Stream - slow, soft, cold

Stream - slow, hard, warm

## Appendix E

### Rare Vascular Plants of the Northern Highland – American Legion State Forest

This appendix lists each of the rare plant species known to occur on the NHAL and provides information on the conservation status and species management. The Wisconsin Natural Heritage Database lists 34 rare plant species on the NHAL. Moor rush (*Juncus vaseyi*) is listed as Endangered in Wisconsin, and Calypso orchid (*Calypso bulbosa*), shore sedge (*Carex lenticularis*), and algae-like pondweed (*Potamogeton confervoides*) are listed as threatened in Wisconsin; all were documented on the NHAL. Thirty additional rare plant species found on the NHAL are designated of “special concern,” meaning experts suspect a problem in their abundance or distribution, but have not yet gathered proof of threats to their survival in Wisconsin.

Seven of the 34 rare species grow predominantly on upland sites. The remaining species grow in wetlands (18 species) or water (9 species). This high concentration of rare plants in aquatic habitats illustrates the biodiversity significance of abundant high-quality lakes, streams, and wetlands in the Northern Highland region. Many of the high quality habitats used by rare plants at the NHAL may be vulnerable to invasion by aggressive exotic species such as purple loosestrife, reed canary grass, Eurasian water milfoil, and glossy buckthorn. Preventing the spread of these species would greatly aid the survival of rare aquatic and wetland species at NHAL.

COMMON NAME (SCIENTIFIC NAME)	FEDERAL STATUS	STATE STATUS	OBSERVATION DATE
ADDER'S-TONGUE (OPHIOGLOSSUM VULGATUM)		SC	1995
ALGAE-LIKE PONDWEED (POTAMOGETON CONFERVOIDES)		THR	1995
AMERICAN SHORE-GRASS (LITTORELLA AMERICANA)		SC	1995
CALYPSO ORCHID/FAIRY SLIPPER (CALYPSO BULBOSA)		THR	1992
CAPITATE SPIKERUSH (ELEOCHARIS OLIVACEA)		SC	1929
CHILEAN SWEET CICELY (OSMORHIZA CHILENSIS)		SC	1993
COMMON BOG ARROW-GRASS (TRIGLOCHIN MARITIMUM)		SC	1995
DOWNY WILLOW-HERB (EPILOBIUM STRICTUM)		SC	1995
FARWELL'S WATER-MILFOIL (MYRIOPHYLLUM FARWELLII)		SC	1995
GIANT RATTLESNAKE-PLANTAIN (GOODYERA OBLONGIFOLIA)		SC	1996
HIDDEN-FRUITED BLADDERWORT (UTRICULARIA GEMINISCAPA)		SC	1995
HOOKER ORCHIS (PLATANThERA HOOKERI)		SC	1893
LARGE ROUNDLEAF ORCHID (PLATANThERA ORBICULATA)		SC	1996
LEAFY WHITE ORCHIS (PLATANThERA DILATATA)		SC	1995
MARSH WILLOW-HERB (EPILOBIUM PALUSTRE)		SC	1996
NORTHEASTERN BLADDERWORT (UTRICULARIA RESUPINATA)		SC	1997
NORTHERN BLACK CURRANT (RIBES HUDSONIANUM)		SC	1996
NORTHERN BOG SEDGE (CAREX GYNOCRATES)		SC	1993
PRICKLY HORNWORT (CERATOPHYLLUM ECHINATUM)		SC	1996

COMMON NAME (SCIENTIFIC NAME)	FEDERAL STATUS	STATE STATUS	OBSERVATION DATE
PURPLE BLADDERWORT (UTRICULARIA PURPUREA)		SC	1996
PURPLE CLEMATIS (CLEMATIS OCCIDENTALIS)		SC	1994
ROBBINS SPIKERUSH (ELEOCHARIS ROBBINSII)		SC	1996
SHEATHED SEDGE (CAREX VAGINATA)		SC	1995
SHORE SEDGE (CAREX LENTICULARIS)		THR	1996
SHOWY LADY'S-SLIPPER (CYPRIPEDIUM REGINAE)		SC	1995
SPARSE-FLOWERED SEDGE (CAREX TENUIFLORA)		SC	1993
SWAMP PINK (ARETHUSA BULBOSA)		SC	1996
VARIEGATED HORSETAIL (EQUISETUM VARIEGATUM)		SC	1993
VASEY'S PONDWEED (POTAMOGETON VASEYI)		SC	1996
WATER-THREAD PONDWEED (POTAMOGETON CAPILLACEUS)		SC	1994

## Field Survey Methods

A number of activities occur prior to the field season. First, all information on occurrences of state and federally listed rare vascular plants reported from the NHAL and surrounding area was obtained from the BER NHI Biological Conservation Database (BCD) and referenced to a set of USGS topographic quadrangles covering the area. Second, staff visited the University of Wisconsin-Madison Herbarium to become acquainted with unfamiliar or difficult to identify species. In some cases, herbarium specimens were photocopied and used as field references. At the herbarium, the draft "Flora of Wisconsin" was consulted to gain information on rare species likely to occur in the State Forest (for NHAL).

Third, staff visited DNR field offices. DNR personnel familiar with plant occurrences and ecological communities were consulted and queried about areas that would benefit from more intensive field surveys. This included sites identified as survey priorities by the NHI ecologist. In addition, forest compartment maps and air photographs maintained at these offices were consulted.

Finally, staff consulted with local college personnel and amateur naturalists knowledgeable of rare plant populations and unusual plant communities.

During the course of the field season, specific plant communities of interest may be surveyed several times for potential rare species. Initial visits of terrestrial habitat were often made in May in order to detect the spring ephemeral flora, followed by later visits in June and July during the major part of the flowering season. Surveys of aquatic areas were usually conducted in July and August when floating and submerged species were most likely to be in flower/fruit. Later blooming species, including asters and goldenrods, were searched for in August and September.

In some areas, drive-by surveys on every town and forest road in the area have proven valuable, particularly for rare species occurring along roadsides. This involves searching for those natural community sites most likely to contain rare plants. Surveys by bicycle were useful in areas with hard-packed, clay forest lanes, as were others using all-terrain vehicles (ATVs) in sandy barrens.

The aquatic botanist, Susan Knight, used a small jon boat to survey lakes, usually spending most of one day at each site. Aquatic plants were surveyed to a depth of 3 meters by hanging over the edge of the boat and using a long-handled rake and net. Plants were identified in the field or brought back to the lab where reference keys and a dissecting microscope were used. At the end of the season, two days were spent at

the State Herbarium (at UW-Madison) identifying difficult members of *Potamogeton*, *Utricularia* and *Ceratophyllum*. Vouchers were collected of all of the rare aquatic plant species and have been deposited at the State Herbarium.

Various methods were used to search for rare plants. The method chosen depended upon the biologists' ability to maneuver through the habitat and the number of individuals conducting a given survey. Some surveys, especially those done in aquatic areas or by more than one individual searching for a fairly nondescript species, were done in a systematic fashion, often searching a habitat intensively along closely-spaced transect lines. Other surveys, where only one biologist was able to search an area and/or the potential habitat was reasonably consistent throughout, relied on the "meander" technique. In either case, the judgment and past field experience of the biologist involved is critical in areas of intensive field surveys that are often typified by subtle habitat differences.

When potential rare species are discovered, data is recorded on standard NHI field forms. If population size permits and if there is a question of identification, a voucher specimen is collected for later identification, verification, and deposition at the UW-Madison herbarium. In some cases, where a particularly rare species is found and/or population size is small, a diagnostic photograph may substitute for plant collection.

No survey can be completely comprehensive. For instance, it is impossible to search every square meter of habitat in difficult terrain when several hundred, or even thousand, hectares of similar habitat exist, (e.g. looking for a sedge or other small species occurring in a vast white cedar swamp). Logistical constraints prevent a thorough search of all potential habitat.

In addition, many rare plant species, such as grape-ferns and orchids, may exist as short-lived, above-ground plants which do not reliably appear every year. These, and other limitations not discussed here, must be taken into account when evaluating rare plant occurrences at any given site.

Typically, new and interesting sites are discovered throughout the course of the field season. Often these sites usually have had no survey coverage for seasons earlier than the initial visit. For example, a fine hardwood forest stand "discovered" in August may have spring ephemerals that have died back and are not evident at the time of the survey. Therefore, follow-up surveys of such sites are recommended for the spring or summer of the coming year. This point is worth stressing as the justification for thorough botanical surveys taking more than one field season since there are always significant plant sites that are missed during the first year of survey.

### **Rare Vascular Plant Descriptions**

The following is a description of each of the rare plants found on the NHAL, including status, conservation concern, and species management. The dates of last observations will vary greatly between species. An older, historic record does not necessarily mean the species no longer exists on the NHAL, only that it was not encountered during the inventory completed for this report. Each of the plants in this Appendix is accompanied by the Wisconsin protection status and a ranking code denoting its rarity in Wisconsin and throughout its range. These ranks are defined on the first pages of the Wisconsin Natural Heritage Working List (Appendix I). In addition, each NHAL rare plant population is ranked according to the significance of its contribution to a given species' success in Wisconsin and their sensitivity to land management practices or disturbance. These criteria were recommended to the Heritage staff by Clark Forestry, Inc., which used them in the Baraboo Hills (see methodology in main body of report). The significance and sensitivity ranks can range from A to C. A-level significance applies to species for which NHAL is very important to survival in Wisconsin. B applies to moderate significance, and C

describes species for which NHAL is not very important. A-level sensitivity refers to a species that has a high sensitivity to disturbance. For example, a species with the rank B/A is moderately dependent on NHAL for its persistence in Wisconsin, and is highly sensitive to land use disturbances.

**Moor rush or bog rush (*Juncus stygius*) – WI Endangered, S1G5**

Grows in patches around the boreal region of the globe, reaching as far south as New England, NY, MN, and WI. A documented population at Black Tern Bog is only Wisconsin's second verified occurrence of this species. The first known population, in Florence County, grows with sundews, pitcher plants, bog arrow-grass, bog clubmoss, dragon's-mouth orchids, and yellow-eyed grass. Outside of WI, bog rush also grows in marshes, shallow pools, and boggy meadows. The Black Tern Bog population appears to be small, but may include a larger, overlooked group of plants.

Conservation concerns: The calcareous bog mat depends on gentle groundwater flow from adjacent uplands. Bog rush would be sensitive to large water level fluctuations, severe timber removal from adjacent slopes, or pesticide drift.

**Swamp-pink or Dragon's-mouth-orchid (*Arethusa bulbosa*) - Special Concern, S3/G4, Rank B/B**

This is a beautiful orchid with a single brilliant, rose-purple flower and no obvious leaves at flowering time. It is endemic to boreal and north-temperate parts of eastern North America. Its habitat is open bogs and floating mats, often around lakes and in peaty, acidic sedge meadows, also in partial canopy gaps in coniferous swamps, in all cases on deep sphagnum moss substrate.

No statewide inventory has been done for this species but there are many records in Wisconsin, it is possibly secure here and may warrant deletion from the NHI working list. Recent records are from northeastern and northwestern Wisconsin. Our largest populations are from along the shore of Lake Superior in areas of extensive bogs in Bayfield and Ashland Counties, both along mainland and in Apostle Islands.

This species grows at 9 sites on NHAL. All but one are small to moderate in size. The best example is Little Fox Lake with a fairly large population (hundreds of stems). Others are: North Bass Lake - small; Devine Lake-small; Manitowish River-moderate; Rice Creek Fen-small-moderate; DuPage Lake -small; Big Swamp-small; Aurora Lake-small; Little Fox Lake-medium-large (falls outside primary survey sites); and Hawk Lake-small.

Conservation Concerns: out right habitat destruction, wetland drainage or other change to water level, exotics invasion.

**Fairy slipper, calypso orchid (*Calypso bulbosa*) - State Threatened, S2/G5, Rank C/B**

This wide-ranging boreal species is known from forested conifer swamps, specifically cedar swamps, in northern Wisconsin. Calypso appears to be highly dependent upon the quality of its habitat and its status in Wisconsin is thought to be quite tenuous. While reports of Calypso from about 40 sites in the State suggest that it may not be terribly rare, it should be noted that 11 of those occurrences are historical, two are known to be extirpated, and at least 21 have very small populations. A state survey for this species should be done. Because there is so little acreage of cedar swamp on NHAL, Calypso's habitat is marginal there. The one documented population, at Seed Lake Cedars, falls outside primary survey sites.

Conservation Concerns: vulnerable to habitat changes, including water level increase or decrease and logging. This showy flower captivates orchid poachers, and is often their victim. In Wisconsin, it prefers cold, dark areas. It is reported to be sensitive to the warmer, drier conditions that result from removing nearby canopy.

**Shore sedge (*Carex lenticularis*) - State Threatened, S1/G5, Rank A/B**

This is a boreal species of wet shore lines ranging south to far northern Wisconsin. Up until a few years ago, botanists thought shore sedge was very rare in Wisconsin. A number of populations were discovered on the Apostle Islands and the Bayfield peninsula in recent years. NHAL provides the only other known Wisconsin habitat for this species. At Vandercook Lake, shore sedge is very rare, covering a square yard. Lake Laura hosts a very small colony of about 20 plants.

The largest known population of shore sedge in Wisconsin grows in two patches on the shore of Big Muskellunge Lake. A colony along the north side stretches along roughly 1 mile of gravelly sandy shoreline. This lake falls outside any primary survey site, but the significance of this population warrants protection of this habitat. Shore sedge would be sensitive to recreational development such as docks, rip-rap, beach filling, dredging, or mowing. It is a robust plant that probably wouldn't be bothered by wakes produced by normal boating traffic.

Conservation Concerns: shore line development, road expansion, increased lake levels.

**Pale sedge (*Carex pallescens*) - Special Concern, S1/G5T/Q (should be at least S2, possibly S3), Rank C/C**

Known from a variety of moist, open habitats in the northeastern United States, pale sedge often grows in somewhat disturbed areas. It is fairly widespread in northern Wisconsin, and only marginal in NHAL.

Conservation Concerns: unknown.

**Northern bog sedge (*Carex gynocrates*) - Special Concern, S2/G5, Rank B/B**

Boreal species occurring at a few sites in northern Wisconsin. A large population at Toy Lake in the NHAL needs verification as does a smaller population reported elsewhere on that property.

Conservation Concerns: wetland flooding or draining.

**Sparse-flowered sedge (*Carex tenuiflora*) - Special Concern, S3/G5, Rank C/B**

Wisconsin falls in the southern portion of this boreal species' range of bogs and conifer swamps. Although most of our populations are reported from the northeastern part of Wisconsin, a significant number of recent records are from northwest Wisconsin. Apparently of marginal occurrence in the NHAL, this species was first collected from Lost Lake (near Sayner, outside of primary survey sites) in 1902 and was reported in 1993 at Devine Lake (record needs verification). There are good populations of this species elsewhere in the state.

Conservation Concerns: wetland flooding or draining.

**Sheathed sedge (*Carex vaginata*) - Special Concern, S1/G5, Rank C/B**

This wide-ranging polar sedge reaches into several areas of northern Wisconsin. Its habitats include conifer swamps, fenny bogs and alder thickets. Although large populations have been reported from northwestern Wisconsin, the few reported NHAL populations have consisted of only a few plants each. In addition, one record is historic and too vague to relocate and two of the others need verification. At the present time, the NHAL occurrences appear to be only marginal to the species' overall presence in Wisconsin.

Conservation Concerns: wetland flooding or draining, interruptions in groundwater flow.

**Prickly hornwort (*Ceratophyllum echinatum*) - Special Concern S2/G4?, Rank C/B**

Found in quiet waters throughout much of North America, there is uncertainty about the status of this species; it may be truly rare or merely under-reported because of its similarity to the common coontail (C.

*demersum*). While it has been collected in northern and central Wisconsin, most of those collections are historical. A moderate sized population persists at Nixon Creek. Prickly hornwort was historically documented at Flora Lake, which does not fall within a primary survey site.

Conservation Concerns: apparently very sensitive to decreases in water quality.

**Flodman's thistle (*Cirsium flodmanii*) – Special Concern S2/G5, Rank C/B**

Flodman's thistle grows in prairies, plains and dry meadows through the northern Great Plains and rarely reaches as far east as New York. One 1958 collection documents a population of unknown size from an open field near Manitowish. Dominated by forests and lakes and outside its core historic range, NHAL does not present good opportunities for the protection of Flodman's thistle.

Conservation Concerns: needs open canopy.

**Purple clematis (*Clematis occidentalis*), Special Concern, S3/G5, Rank C/B**

This species is known from rocky woods and stream banks in southeastern Canada and northeastern United States. It has been collected in scattered localities across northern Wisconsin, and reported from 5 stations on the NHAL. Two of these occur at the high quality Rice Creek Complex. Three historic populations fall outside of primary survey sites, at Edith Lake, Katherine Lake – Tigertail Point, and near Tomahawk Lake.

Conservation Concerns: This species enjoys partial canopy, although it persists in full canopy. Selective winter logging in its habitat may benefit the population. Harvesting during the growing season may destroy the roots and eliminate the population. Do not eliminate the surrounding shrub layer, which clematis climbs.

**Showy lady's-slipper (*Cypripedium reginae*), Special Concern, S2S3/G4, Rank B/B**

The main portion of this species' range occurs in southeastern Canada and the northeastern U.S. where it grows in semi-open, calcareous swamps, fens, and occasionally in open wetlands and wet woods. While it has been reported from nearly 100 sites located throughout Wisconsin (concentrated near Lake Michigan), about one-half of those records are historical. Most recent reports are from the northeastern part of the state. Although the showy lady's-slipper has been reported from only one location on the NHAL (Rice Creek Fen), the population there is significant because it is one of the state's largest populations. It is also in high quality habitat.

Conservation Concerns: Showy lady's-slipper is quite susceptible to deer damage and collection in addition to the usual threats to wetland habitats.

**Capitate spikerush (*Eleocharis olivacea*), Special Concern, S2/G5, No rank**

Historical collection from 1 site in NHAL (Trout Lake), not relocated.

**Robbins spikerush (*Eleocharis robbinsii*), Special Concern, S3/G4G5, Rank A/B**

This species ranges from along the Atlantic coast inland to the western Great Lakes. Its habitat consists of sandy-mucky shorelines and marshy bogs; it grows as an emergent aquatic plant in shallow lakes and ponds. There are a few records of this species in the northwestern and east-central parts of the state. However, most of the occurrences of Robbins spikerush are from Oneida and Vilas counties. The NHAL has the largest populations in the state, including 10 sites. Very large populations live at Hemlock Lake; Benedict Lake, Lake 33-7, Wind Pudding Lake and Shallow Lake. Black Tern Bog; Erickson Lake, and Rainbow Flowage (river mile 375) support medium-sized populations. Reports from Little John Junior Lake and North Creek - Trout Springs do not specify population size. The substantial populations at Lake 33-7 and the Rainbow Flowage do not fall within primary survey sites. The importance of NHAL

habitats to this species' success in Wisconsin warrants special consideration in management decisions. The fact that most of the lakes where it grows are completely undeveloped suggests that it may be sensitive to some aspects of development.

Conservation Concerns: prevent draining, or dredging wetlands, impounding and other extreme changes in water level; avoid mowing, filling or dredging shore habitats; avoid increased turbidity from heavy boat traffic.

**Marsh willow-herb (*Epilobium palustre*), Special Concern, S2/G5, Rank B/B**

This boreal species of low, wet ground has been reported from scattered localities throughout the state, concentrating in northwestern and northeastern Wisconsin. Five occurrences are known from the NHAL, including 2 very large, robust populations (Devine Lake, Rainbow Wetlands ). Smaller populations were reported from Johnson Lake, Sandy Beach Lake and DuPage Lake.

Conservation Concerns: wetland drainage and other changes in water level

**Downy willow-herb (*Epilobium strictum*), Special Concern, S2S3/G5?, Rank C/C**

This flower of bogs and swamps grows in the eastern U.S. and adjacent Canada. It is known from 19 Wisconsin sites. Most are in southeastern counties, but some are scattered in northern counties. Only one small colony has been found in NHAL, where it is in exceptionally high quality habitat (Rice Creek Complex).

Conservation Concerns: wetland destruction, flooding.

**Variiegated horsetail (*Equisetum variegatum*), Special Concern, S3/G5, No rank**

A small colony of this species was reported from Toy Lake, but needs verification.

**Giant rattlesnake-plantain (*Goodyera oblongifolia*), Special Concern, SU/G5, No rank**

An upland orchid of coniferous or deciduous forests, this species grows in southeastern Canada, around the northern Great Lakes, and in the western cordillera. Though historically known from Door, Florence and Iron Counties, all the giant rattlesnake-plantains collected in Wisconsin in the last 40 years are from the Apostle Islands and adjacent Bayfield peninsula. In the NHAL, only 1 plant was found at Catherine Lake Hemlock Hardwoods.

Conservation Concerns: should not be subjected to fully open canopy, nor trampling during growing season.

**American shoregrass (*Littorella americana*= *L. uniflora*), Special Concern, S2/G5, Rank A/B**

This aquatic plant grows a rosette of leaves that lie on the bottom of clear lakes. It is believed to flower only in years of low water, when its stalk can reach the surface. In North America, it is restricted to southeastern Canada and to northern NY, MN and Wisconsin. All of Wisconsin's known extant sites of this species are in Vilas and adjacent northeast Forest counties. Very few other populations have ever been reported from other parts of state. Wisconsin's largest populations are in Day and Little John Jr. lakes. A moderate colony is known from Firefly Lake, and an historical report from Trout Lake. Only two other American shoregrass populations have been verified in Wisconsin outside of NHAL in the past 30 years, and they were precariously small populations.

Conservation Concerns: Probably very sensitive to water quality changes, not only in chemistry but also in sediment levels (maintain water clarity).

**Farwell's water-milfoil (*Myriophyllum farwellii*), Special Concern, S2/G5, Rank B/B**

This aquatic species ranges from southeastern Canada south to NY and as far west as Minnesota. It has grown in scattered locations throughout much of Wisconsin, except the southwestern counties. Three small to moderate-sized populations occur in the NHAL (Wind Pudding Lake, Frog Lake, Lake 3-7) in high quality habitat with other listed species.

Conservation Concerns: Probably needs very clear, low nutrient water, and is sensitive to water chemistry changes.

**Adder's-tongue (*Ophioglossum vulgatum*), Special Concern, S3/G5, Rank C/C**

This circumboreal wetland plant has been reported about 30 times in Wisconsin, mostly from the southern 2/3 of the state. It generally prefers grassy edges of marshes and ponds. Its current status cannot be reliably assessed without field inventory since most of the records are historical. One small colony was found on NHAL in high quality habitat at Rainbow Wetlands, outside any primary survey site.

Conservation Concerns: Rise in water level could flood habitat; lowering could allow encroachment of shrubs that might result in too much shade.

**Chilean sweet cicely (*Osmorhiza chilensis*), Special Concern, S3/G5, No rank**

Heretofore, this species was only known from near Lakes Superior and Michigan. The presence of a very small colony at Toy Lake, on the NHAL, needs to be verified.

**American ginseng (*Panax quinquefolius*), Special Concern, S4G4, Rank C/B**

This species of the eastern U.S. and southeastern Canada inhabits mesic hardwood forest and occasionally conifer-hardwood forest. On the NHAL, a small colony has been found at the North Bass Lake Forest.

Conservation Concerns: The biggest threat to this species has been widespread and persistent removal of its roots for sale as an herbal medicine. Avoid bringing public attention to its location.

**Leafy white orchis (*Platanthera dilatata*), Special Concern, S3/G5, Rank A/B**

This wide-ranging orchid species is found in spring-fed bogs, fens, shorelines and semi-open conifer swamps. There are about 30 records of this species in Wisconsin, mostly from northeastern counties. Many of them are historical and haven't been verified in recent years. This species has been located at three sites on NHAL. Devine Lake and Rice Creek Fen appear to support the state's largest populations by far. Together, they constitute half of the vigorous leafy white orchis sites known in Wisconsin. In 1923, it was recorded near the confluence of the Wisconsin and Eagle Rivers, outside any primary survey site.

Conservation Concerns: wetland flooding or draining, disruption of ground water flow.

**Hooker orchis (*Platanthera hookeri*), Special Concern, S3/G5, No rank**

Pioneering Wisconsin botanist L. S. Cheney collected this species at "Doherty Lake, near Tomahawk Lake, near Clear Lake" in 1893. This location falls outside of any primary survey site, and was not verified in our inventory.

**Large roundleaf orchid (*Platanthera orbiculata*), Special Concern, S2S3/G5?, Rank C/B**

This species occurs throughout Canada and much of the northern and mountainous U.S. It inhabits dry to wet conifer forest, conifer hardwood forest, hardwood forest and swamp forest. Most recent reports of the species are from along Lake Superior and Lake Michigan in Door County. Inland reports are almost

entirely historical. There are two historical reports in the NHAL. Our inventory was unable to relocate either population. One plant was seen at a new location - North Bass Lake Forest.

Conservation Concerns: maintain appropriate habitat.

**Water-thread pondweed (*Potamogeton capillaceus*), Special Concern, SU/G?, Rank B/B**

This species, mainly of the Atlantic coastal plain, is found scattered at inland sites west to central Minnesota. It has been reported from a handful of soft water lakes and ponds in Juneau and Wood counties in central Wisconsin. In addition, two very small colonies were found in the course of this study, on Shallow and Shannon lakes. The latter falls outside any primary survey site.

Conservation Concerns: maintain lake levels, water chemistry, minimal sediment load.

**Algae-like pondweed (*Potamogeton confervoides*), State Threatened, S1/G3G4, Rank A/B**

Occurring in southeastern Canada and northeastern U.S., this is a submerged aquatic species of soft water lakes and ponds. The NHAL appears to be a stronghold for this species, with 4 known populations (Catherine Lake, Lake 3-7, Shallow Lake and Swanson Lake). Lake 3-7 and Shallow Lake each have very large populations, probably the largest in the state. The population at Swanson Lake is also substantial. Other than the NHAL, this species is known to be extant at 2 sites in northern Wisconsin, one of which occurs within the bounds of the proposed Crandon Mine. The few historical records are from northern and central Wisconsin. The close proximity of the NHAL populations to one another probably enhances their vigor and long term viability, whereas the other Wisconsin populations appear to be isolated.

Conservation Concerns: lake levels, water chemistry, sediment loads.

**Vasey's pondweed (*Potamogeton vaseyi*), Special Concern, S2?4, Rank B/B**

This submerged aquatic species of southeastern Canada and the northeastern U.S. inhabits soft water lakes and ponds and quiet areas along rivers. Little is known about the species. It has been verified from central and northern Wisconsin sites. Of the 18 populations statewide, 11 are historic and at least two others have not been updated for over 20 years.

Vasey's pondweed is known from one site on the NHAL (Nixon Creek) where a moderate size population occurs in good quality habitat.

Conservation Concerns: lake levels, water chemistry, sediment loads.

**Northern black currant (*Ribes hudsonianum*), Special Concern, S3/G5, Rank C/C**

Northern black currant grows in cool swamps, often in association with white cedar. It occurs throughout Canada, ranging to northern parts of western U.S. and the western Great Lakes region as far south as Iowa. File records indicate that the species is widespread in northern Wisconsin. It has been reported from 4 or 5 small populations in the NHAL in several high quality areas that have other, more significant natural qualities. These include Dunn Lake Pines, Catherine Lake Hemlock Hardwoods and Toy Lake (population needs verification). Historically, northern black currant also grew near Trout Lake (1961) and High Lake (1940), outside any primary survey site.

Conservation Concerns: wetland destruction.

**Common bog arrow-grass (*Triglochin maritimum*), Special Concern, S3/G5, Rank B/B**

This circumboreal species ranges south into the northeastern U.S. It is found in fens, marshes and bogs. Many of the sites occur in southeastern Wisconsin and are protected on fens. However, probably 50% of

these occurrence records are based on historical data. Farther north, the species occurs along Lake Michigan and Lake Superior and inland in the northeastern counties.

The latter includes the NHAL where 3 populations have been reported, one historic. A small colony occurs at Devine Lake. A very large, robust population, perhaps the state's largest, occurs at Rice Creek Fen in excellent quality habitat.

Conservation Concerns: avoid large water level changes and changes in water quality; protect ground water recharge areas.

**Hidden-fruited bladderwort (*Utricularia geminiscapa*), Special Concern, S3/G4G5, Rank B/B**

This submerged aquatic plant ranges from southeastern Canada to the northeastern U.S. as far south as eastern VA and PA and west to Wisconsin. It typically inhabits soft water lakes and ponds. Like the other bladderworts, it eats insects by ingesting and dissolving them in small bladders. It has been reported from 56 sites in Wisconsin, with 36 of those verified in the last 20 years. It has been reported from 14 different sites in the NHAL, six of which fall outside primary survey sites (indicated below with *italics*). Several populations were recorded in the 1970's and 1980's without assessments of their size. Because of time limitations, field surveys did not cover the entire property in 1995-96. Thus, for some sites, the species has only been reported as present at the site. Such records are generally from the 1980s, one from 1973. These include *5-15 Lake*, Little Blueberry Lake bog, Blueberry Lake, *Trilby Lake*, *Elizabeth Lake*, *Trout Bog*, and *Ted's Bog*. We have quantitative data on population size and habitat characteristics have for Black Tern Bog, Boulder Flats Pond, Camp Lake, Lake 3-7, Shallow Lake, *Shannon Lake*, Swanson Lake and Wind Pudding Lake. Very large and robust populations (probably the largest in the State) occur at Lake 3-7 and Swanson Lake.

Conservation Concerns: extreme changes in lake levels, water chemistry, sediment loads, shore development.

**Purple bladderwort (*Utricularia purpurea*), Special Concern, S3/G5, Rank A/B**

This submerged aquatic plant occurs in southeast Canada and the eastern U.S. in soft water lakes and ponds. In Wisconsin, it has been collected in about 25 sites, mostly in the northern part of the state. Half of those records have been verified in the last 20 years. The area of the NHAL appears to have Wisconsin's greatest concentration of purple bladderwort, with a total of 8 sites, including all of the largest populations. Very large, excellent quality populations are found at Hemlock Lake, Cedar Lake, Frog Lake and Shallow Lake. Slightly smaller, but also quite substantial populations live at Wind Pudding Lake, Sandy Beach Lake, Swanson Lake and Lake 3-7.

Conservation Concerns: maintain lake levels, water chemistry, minimal sediment loads.

**Northeastern bladderwort (*Utricularia resupinata*), Special Concern, S2S3/G4, Rank B/B**

Similar to other *Utricularia* species, northeastern bladderwort is found in southeastern Canada and the eastern United States. It inhabits the edges of lakes and ponds where its' stems grow just beneath the surface of muddy, sandy substrate at or near the shoreline. In Wisconsin, northeastern bladderwort has been recorded from scattered northern counties, but many of the records are historical. It is reported from 13 sites on NHAL. Five of those lie outside any primary survey site, and are noted below with *italics*. Very large and robust populations live at *Big Gibson Lake*, Oberlin Lake, Sandy Beach Lake, Little John Jr. Lake, *Lake 3-7*, Camp Lake, Prong Lake, Frog Lake and Shallow Lake. Large and substantial populations have been reported at White Sand Lake and *a small nameless lake in section 25 of T. 41 N, R. 6 E*. Small colonies have been found at *White Sand Lake* and *Palette Lake*. It is also documented from *Vandercook* and *Camp Lakes*.

Conservation Concerns: lake levels, water chemistry, sediment loads, shore development.

## Rare lichen species

Wisconsin's Natural Heritage Inventory has not formally adopted a list of rare lichen species. In 1996, eminent lichenologist Dr. John Thomson compiled a list of species he considers rare in Wisconsin. These are species that are only known from five or fewer places in Wisconsin. To screen out species that may be more common than they appear, Dr. Thomson only included members of genera that he considered well-studied in Wisconsin. Dr. Will-Wolf found twelve species from this list at NHAL. Dr. Thomson also highlighted a subset of rare species that show signs of decline in Wisconsin. Two of these species grow at NHAL: *Hypogymnia tubulosa* and *Icmadophila ericetorum*.

Each of the six lichen sampling sites presented between 57 and 84 species. Species compositions between stands varied quite a bit. One way to describe this is to look at “unique” species and “common” species of this survey. “Unique” is defined here as occurring in only one or two of the six sites. “Common” species occurred on five or six of the sites. Of the 159 species found in the whole survey, a larger portion were “unique” (36%) than were “common” (18%). This suggests that it is hard to protect all of the lichen species by just protecting a few important stands. On the contrary, each of the stands made unique contributions to the lichen flora.

Of the six survey sites, Lake Alva Hemlock Hardwoods and Trout Lake Conifer Swamp hosted the largest number of “unique” species. Just the “unique” portion of their site floras accounts for 32 species (20%) of the NHAL-wide lichen list. Will-Wolf found 84 lichen species at Trout Lake Conifer Swamp, making it the most species-rich stand in her survey, and accounting for 53% of NHAL's known lichen species. Lake Alva was the only site to host nitrogen-fixing lichens, which are associated with old forests.

One of Will-Wolf's research objectives was to compare the lichen composition in stands of varying management history. She found that stands that had received less intensive management were characterized by higher levels of non-“common” species than the more heavily managed stands. The “unique” species on less-managed stands include the two rare and declining species listed above, and the distinctive nitrogen-fixing species.

## Rare bryophyte species

Dr. Frank Bowers of University of Wisconsin – Stevens Point surveyed the mosses and hepatics at 6 sites on NHAL in 1996. Between these 6 sites and one on the Brule River State Forest, he found 134 moss taxa and 33 hepatic taxa. He found between 22 and 89 bryophyte species at each site, including *Mylia anomala* (a liverwort, S1, SC). Dr. Bowers found 4 other bryophytes that he considers rare although they have not yet been added to Wisconsin's under-tended draft list of rare bryophytes. These include the mosses *Anomodon rugelii*, *Campylium radicale*, *Pseudobryum cinclidioides*, and *Ulota coarctata*.



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## APPENDIX F

### Vascular Plants for the Northern Highland – American Legion State Forest, Wisconsin

There are a total of about 725 vascular plant species recorded from the Northern Highlands – American Legion State Forest, or about 30% of Wisconsin's total flora. The State Forest is particularly rich in aquatic species. The following is a list of the vascular plants known from the Northern Highlands – American Legion State Forest in Vilas, Oneida, and Iron Counties, Wisconsin. The list was compiled from the following sources:

- The template for the list is the “Checklist of the Vascular Plants of Wisconsin,” (in press) by M.A. Wetter, T.S. Cochrane, M.R. Black, H.H. Iltis, and P.E. Berry. These authors, in turn, base their nomenclature upon J.T. Kartesz (1994), “A Synonymized Checklist of the Vascular Flora of the United States, Canada, and Greenland.”
- Field work completed from 1996-1997 by Wisconsin Department of Natural Resources (WDNR) biologists, primarily Eric J. Epstein and Andy Clark. The data from this field work include mostly sight records, although some species were collected and deposited at the University of Wisconsin-Madison herbarium.
- Records of rare species from the BCD, Natural Heritage Inventory data, WDNR.
- Manuscript dot distribution maps of the University of Wisconsin, Department of Botany, including relatively recent maps of about 1,500 species.
- Online dot distribution maps of the University of Wisconsin, Department of Botany Website ([www.wisc.edu/herbarium](http://www.wisc.edu/herbarium)). As of 10 August 1999, there were approximately 550 species mapped statewide. (All species should be mapped by 2001).



## APPENDIX G

### Rare Animals of the Northern Highland-American Legion State Forest

This appendix lists each of the rare animal species known to occur on the NHAL and provides information on the conservation status and species management. The Wisconsin Natural Heritage Database lists 67 rare animal species on the NHAL. This includes one WI Endangered, nine WI Threatened, and 57 WI Special Concern species. Also included in these 67 species are one US Endangered (timber wolf) and one US Threatened (bald eagle). The 57 WI Special Concern species found on the NHAL included 20 birds, 18 aquatic insects, 7 terrestrial insects, 4 fish, 3 mussels, 2 mammals, 2 amphibians, and 1 reptile.

Of the 67 species occurring on the NHAL, over 75 percent of the species occur in wetland and aquatic sites. Only 19 (28 percent) occur on upland sites (differences in percentages is due to species occurring in more than one habitat). Though these figures do not convey greater importance of any particular species over another, it does provide and indication of the importance of protecting wetland and aquatic ecosystems to maintain rare animal species.

COMMON NAME (SCIENTIFIC NAME)	FEDERAL STATUS	STATE STATUS	OBSERV. DATE	GROUP
BULLFROG (RANA CATESBEIANA)		SC/H	1996	AMPHIBIAN
FOUR-TOED SALAMANDER (HEMIDACTYLIUM SCUTATUM)		SC/N	1996	AMPHIBIAN
AMERICAN BITTERN (BOTAURUS LENTIGINOSUS)		SC/M	1993	BIRD
AMERICAN BLACK DUCK (ANAS RUBRIPES)		SC/M	1993	BIRD
BALD EAGLE (HALIAEETUS LEUCOCEPHALUS)	LTNL	SC/FL	1997	BIRD
BLACK TERN (CHLIDONIAS NIGER)		SC/M	1992	BIRD
BLACK-BACKED WOODPECKER (PICOIDES ARCTICUS)		SC/M	1994	BIRD
BLACK-THROATED BLUE WARBLER (DENDROICA CAERULESCENS)		SC/M	1996	BIRD
BOREAL CHICKADEE (POECILE HUDSONICUS)		SC/M	1993	BIRD
CAPE MAY WARBLER (DENDROICA TIGRINA)		SC/M	1993	BIRD
CERULEAN WARBLER (DENDROICA CERULEA)		THR	1996	BIRD
CONNECTICUT WARBLER (OPORORNIS AGILIS)		SC/M	1990	BIRD
EVENING GROSBEAK (COCCOTHAUSTES VESPERTINUS)		SC/M	1994	BIRD
GRAY JAY (PERISOREUS CANADENSIS)		SC/M	1995	BIRD
LE CONTE'S SPARROW (AMMODRAMUS LECONTEII)		SC/M	1993	BIRD
LONG-EARED OWL (ASIO OTUS)		SC/M	1988	BIRD
MERLIN (FALCO COLUMBARIUS)		SC/M	1969	BIRD
NORTHERN GOSHAWK (ACCIPITER GENTILIS)		SC/M	1997	BIRD
NORTHERN HARRIER (CIRCUS CYANEUS)		SC/M	1993	BIRD
OSPREY (PANDION HALIAETUS)		THR	1997	BIRD
PINE SISKIN (CARDUELIS PINUS)		SC/M	1996	BIRD
RED-SHOULDERED HAWK (BUTEO LINEATUS)		THR	1981	BIRD
SHARP-TAILED SPARROW (AMMODRAMUS NELSONI)		SC/M	1992	BIRD
SPRUCE GROUSE (FALCIPENNIS CANADENSIS)		THR	1993	BIRD
SWAINSON'S THRUSH (CATHARUS USTULATUS)		SC/M	1994	BIRD

COMMON NAME (SCIENTIFIC NAME)	FEDERAL STATUS	STATE STATUS	OBSERV. DATE	GROUP
YELLOW RAIL (COTURNICOPS NOVEBORACENSIS)		THR	1988	BIRD
YELLOW-BELLIED FLYCATCHER (EMPIDONAX FLAVIVENTRIS)		SC/M	1996	BIRD
BANDED KILLIFISH (FUNDULUS DIAPHANUS)		SC/N	1985	FISH
GREATER REDHORSE (MOXOSTOMA VALENCIENNESI)		THR	1990	FISH
LAKE HERRING (COREGONUS ARTEDI)		SC/N	1967	FISH
LEAST DARTER (ETHEOSTOMA MICROPERCA)		SC/N	1985	FISH
LONGEAR SUNFISH (LEPOMIS MEGALOTIS)		THR	1993	FISH
PUGNOSE MINNOW (OPSOPOEODUS EMILIAE)		SC/N	1907	FISH
PUGNOSE SHINER (NOTROPIS ANOGENUS)		THR	1990	FISH
A CADDISFLY (BANKSIOLA DOSSURIA)		SC/N	1983	INVERTEBRATE
A CAENID MAYFLY (CAENIS YOUNGI)		SC/N	1994	INVERTEBRATE
A PREDACEOUS DIVING BEETLE(LIOPOREUS TRIANGULARIS)		SC/N	1994	INVERTEBRATE
BLACK-TIPPED DARNER (AESHNA TUBERCULIFERA)		SC/N	1994	INVERTEBRATE
BOG COPPER (LYCAENA EPIXANTHE)		SC/N	1995	INVERTEBRATE
BOG FRITILLARY (BOLORIA EUNOMIA)		SC/N	1993	INVERTEBRATE
CITRINE FORKTAIL (ISCHNURA HASTATA)		SC/N	1962	INVERTEBRATE
CYRANO DARNER (NASIAESCHNA PENTACANTHA)		SC/N	1994	INVERTEBRATE
ELFIN SKIMMER (NANNOTHEMIS BELLA)		SC/N	1966	INVERTEBRATE
FORCIPATE EMERALD (SOMATOCHLORA FORCIPATA)		SC/N	1964	INVERTEBRATE
FREIJA FRITILLARY (BOLORIA FREIJA)		SC/N	1996	INVERTEBRATE
FRIGGA FRITILLARY (BOLORIA FRIGGA)		SC/N	1993	INVERTEBRATE
GREEN-FACED CLUBTAIL (GOMPHUS VIRIDIFRONS)		SC/N	1997	INVERTEBRATE
JUTTA ARCTIC (OENEIS JUTTA)		SC/N	1995	INVERTEBRATE
KENNEDY'S EMERALD (SOMATOCHLORA KENNEDYI)		SC/N	1965	INVERTEBRATE
LAKE DARNER (AESHNA EREMITA)		SC/N	1994	INVERTEBRATE
LAKE EMERALD (SOMATOCHLORA CINGULATA)		SC/N	1994	INVERTEBRATE
MOTTLED DARNER (AESHNA CLEPSYDRA)		SC/N	1994	INVERTEBRATE
RED-DISKED ALPINE (EREBIA DISCOIDALIS)		SC/N	1996	INVERTEBRATE
ROBUST DUBIRAPHIAN RIFFLE BEETLE (DUBIRAPHIA ROBUSTA)		SC/N	1994	INVERTEBRATE
SKILLET CLUBTAIL (GOMPHURUS VENTRICOSUS)		SC/N	1997	INVERTEBRATE
SKI-TAILED EMERALD (SOMATOCHLORA ELONGATA)		SC/N	1994	INVERTEBRATE
SPLENDID CLUBTAIL (GOMPHURUS LINEATIFRONS)		SC/N	1997	INVERTEBRATE
SUBARCTIC BLUET (COENAGRION INTERROGATUM)		SC/N	1967	INVERTEBRATE
ZEBRA CLUBTAIL (STYLURUS SCUDDERI)		SC/N	1994	INVERTEBRATE
LYNX (LYNX CANADENSIS)		SC/P	1972	MAMMAL
TIMBER WOLF (CANIS LUPUS)	LELTXN	END	1999	MAMMAL
WATER SHREW (SOREX PALUSTRIS)		SC/N	1946	MAMMAL
EASTERN FLOATER (ANODONTA CATARACTA)		SC/H	1990	MUSSEL
ELKTOE (ALASMIDONTA MARGINATA)		SC/H	1976	MUSSEL
ROUND PIGTOE (PLEUROBEMA SINTOXIA)		SC/H	1997	MUSSEL
NORTHERN RINGNECK SNAKE (DIADOPHIS PUNCTATUS EDWARDSII)		SC/N	1996	REPTILE
WOOD TURTLE (CLEMMYS INSCULPTA)		THR	1998	REPTILE

## Methodology

Animal survey work was completed over the field seasons of 1992 through 1996. NHI zoologist Bill Smith surveyed dragonflies from 1993 to 1995. Mussel surveys were coordinated by David Heath and conducted during the summer of 1994. Dr. Kurt Schmude of the Lake Superior Research Institute was contracted to do basic surveys of aquatic insects on representative habitats on the forest in 1994 and 1995. Kevin and Cass Brewster completed wood turtle surveys in 1996 and Gary Casper completed 4-toed salamander surveys in 1996. Breeding bird surveys were conducted by Eric Epstein, Becky Isenring, and Randy Hoffman in 1992 through 1995. A study to determine nesting density of northern goshawks and other forest dependent raptors in WI was initiated in 1996. Fifteen square mile randomly located study plots were surveyed for all nesting raptors. One such study plot was located on the NHAL. This work was done under contract by Dr. Robert Rosenfield.

### Aquatic Invertebrates

Due to the large number of lakes within the NHAL, only selected waterbodies, 9 percent of the total, were sampled. Additional data were compiled from WDNR Biomonitoring Program samples. The general approach for aquatic invertebrates was to sample representative waterbodies at least once during the study to gain a rudimentary picture of macro-invertebrate diversity. Waterbodies to be sampled were chosen based on an attempt to represent the basic aquatic community types present on the forest and in each LTA. Additional searches were conducted in habitats likely to contain rare species or unusual communities.

Sampling for general macro-invertebrates is best conducted in spring and fall. However, due to time constraints in this study, much of the sampling was conducted in the summer months resulting in lower numbers of taxa being found. Macro-invertebrate diversity reported in this study should be considered in a relative rather than an absolute sense. An attempt was made to sample stoneflies immediately after the ice was out when many species are detectable. Difficult access at this time of year and the unpredictable timing of ice break-up limited our success.

- Kick sweeping technique: Stream and lake macroinvertebrates were sampled using a standard Wards D-frame aquatic net and dislodging specimens upstream of the net by disturbing the substrate with the foot. This was repeated in each of the habitat types apparent at each site until new taxa were not apparent. Wood substrates were removed from the stream when possible and all macroinvertebrates are hand-picked. Specimens are placed in 70% ethyl alcohol and labeled with date and location. Surveys were conducted primarily by Dr. Kurt Schmude of the Lake Superior Research Institute in 1994 and 1995.
- Dragonfly surveys: Measured lengths of shoreline adjacent to waterbodies are sampled for odonate exuviae (cast off skins left behind by emerging adults) at the appropriate time of year. Ideally sample effort in total is at least 50' in length and includes at least a 20' sample adjacent to each of the aquatic habitats represented. All exuviae found are placed in 70% alcohol and labeled appropriately.
- Adult dragonflies are captured with aerial insect nets and placed in glassine envelopes with date and location recorded. Preservation is accomplished by placing the specimens in acetone for several hours, then drying. Specimens are then placed in clear plastic envelopes along with a 3x5 index card on which pertinent data is recorded. Dragonfly surveys were conducted by William A. Smith et al. from 1993 to 1995.
- Data recording: At each site, sampling effort, location, technique(s) used, habitat, instream water quality indicators, factors potentially affecting habitat quality and pollutant sources were documented.

- **Mussel:Diversity:** Major streams were sampled in representative segments by divers collecting lots of 20 live mussels until no new species were found in six consecutive lots. Data was tallied in the field and the mussels returned upon completion of each site.

## **Birds**

For species that sing from established territories, the following standard methods are among those most frequently used by BER program biologists. These surveys are typically conducted during early morning hours in the month of June, although they can be run in late May in extreme southern Wisconsin and extended into early July in the far north.

These methods are designed to be repeatable and provide a baseline on the presence and relative abundance of resident birds at a given survey site. Whenever possible, a standardized survey is set up that can be replicated. The method(s) selected may vary with the site's size, topography, staff availability, target species, existence of previous survey data and especially, the kind of information needed. When other ornithological work is occurring in or near the study area, our methodology may be adjusted to assure standardization and to facilitate the use and interpretation of the data.

- **Walk 5: Stand 5 Counts** - In this method the observer selects a transect (or follows a previously established route) through the area to be surveyed and alternates walking periods of 5 minutes with stops of 5 minutes. Generally, the 5 minute walking periods are sufficient to ensure that individual birds are not recorded more than once. Observations of birds detected at each stand point may be recorded separately from those individuals encountered while walking between points, but a basic objective is to document as many birds present at a site as possible, so all birds detected are recorded. This method may be easily modified to incorporate some of the advantages of point counts.
- **Point counts:** Observation points are located within the area to be surveyed at intervals that eliminate or minimize the potential of double counting individuals. Depending on the objective of the survey, points may be located randomly or along transects designed to give the most thorough coverage of the site. The points may also be located along existing trail systems to facilitate repetition. Numerous variations of this method exist, usually differing with the period of observation at each point and/or the distance from the observer at which birds are detected (fixed, variable, or infinite radius points).
- **Road transects:** This method follows the protocol established by the US Fish and Wildlife Service for their continent-wide Breeding Bird Survey. Transects are set up along roads with stops at one half mile intervals from which observations are made for three minutes. The major advantage of this method is that large areas can be covered in a single morning.
- **Canoe surveys:** These surveys are designed primarily to cover wetland sites and species not accessible by foot or automobile. Routes are recorded on 7.5' topographic quadrangles and/or air photos to establish observation points which can be relocated during subsequent surveys. Standard 5 or 10 minute point counts may be used at these observation points in conjunction with canoe surveys.

For species that do not sing or otherwise advertise territories during June mornings, other methods are necessary. These include aerial nest surveys, lek counts, use of tape-recorded calls, and nocturnal surveys, among others. Projects designed to determine population density, nest productivity, habitat affinity, or food habits use different, often more rigorous methodologies.

A study to determine the status of forest dependent raptors was initiated and included sample plots located on the NHAL State Forest and elsewhere. Only about 15 sq. mi. of the state forest were surveyed as a result. Contact the NHI Section Chief for more information about this study.

## **Herps**

General surveys for amphibians and reptiles were not conducted. Rather, rare species with potential significant habitat on the NHAL State Forest were singled out for targeted searches. The only species systematically searched for were the four-toed salamander for which a new survey methodology was available, and the wood turtle. See Brewster and Brewster (1996) for a detailed description of wood turtle methodology and Casper (1996).

Four-toed Salamanders: The searching strategy employed was to locate nest sites because of the unique habitat requirements for this part of the life cycle. Potential breeding sites were pre-selected based on (1) absence of fish, (2) presence of enough moss to form vertical walls over water, (3) enough water to support larval development from early June through late August, (4) lack of extensive conifer forest canopy cover, and (5) predominant hardwood canopy in the direct drainage basin of the wetland. Then, in appropriate wetlands, nest searches were made starting the second week of June. Edges of standing or running water were examined for likely nest sites, i.e. moss at least 1.5 in. thick and situated such that larvae when they hatch can wiggle into the water. Once a site is found the moss is carefully peeled back or parted to expose potential nests without destroying them. Wetlands were systematically searched by walking shorelines and or walking transects across them. Effort was recorded as the amount of time spent.

## Rare Animals List

Each of the animals listed below is accompanied by the Wisconsin protection status and a ranking code denoting its rarity in Wisconsin and throughout its range. These ranks are defined on the first pages of the Wisconsin Natural Heritage Working List (Appendix H). In addition, each NHAL rare animal population is ranked according to the significance of its contribution to a given species' success in Wisconsin and their sensitivity to land management practices or disturbance. These criteria were recommended to the Heritage staff by Clark Forestry, Inc., which used them in the Baraboo Hills (see methodology in main body of report). The significance and sensitivity ranks can range from A to C. A-level significance applies to species for which NHAL is very important to survival in Wisconsin. B applies to moderate significance, and C describes species for which NHAL is not very important. A-level sensitivity refers to a species that has a high sensitivity to disturbance. For example, a species with the rank B/A is moderately dependent on NHAL for its persistence in Wisconsin, and is highly sensitive to land use disturbances.

## BIRDS

### Northern Goshawk (*Accipiter gentilis*) - Special Concern, S2N, S2S3B; Rank B/A

Brief Description: Large gray (adult) to brown (immature) hawk with pale stripe over eye.

Distribution: Circumboreal.

Habitat: Locally remote tracts of forest. These are typically hardwood, hardwood/conifer, or upland conifer stands and have not been recently managed. Nests in young stands are rare. Good numbers of prey animals such as medium-sized birds and mammals near nesting areas are required as well. Doesn't do well in areas dominated by red-tailed hawks or great-horned owls.

State Records: Wisconsin status uncertain. Reportedly declining in the NE. Nests typically reported from northern third of the state. Several nests are known from central WI. A few locations have been recently reported from east central WI as well. A study by WDNR is currently underway to determine nesting density in WI.

NHAL Records: There are five known breeding records from the NHAL.

Conservation Concerns: Logging, including clear cutting, thinning, and selective harvesting; increased accessibility to humans due to road building; trails, etc.

**Le Conte's Sparrow (*Ammodramus leconteii*) – Special Concern, S2B, SZN, Rank B/B**

Brief Description: A smaller sparrow with a bright eyebrow stripe, and with breast stripes confined to the sides.

Distribution: Breeding habitat extends from the northern part of the upper Midwest through a large part of Canada.

Habitat: Weedy prairie marshes, sedge meadows, tall grasses, weedy hayfields.

State Records: Large majorities of records are confined to the northern third of the state. Verified records are few, but the species is not detected efficiently during surveys as its singing periods are short and song does not carry well.

NHAL Records: There is only one known confirmed record of this species from the 1990s in the NHAL.

Conservation Concerns: Water level fluctuations, wetland draining, mowing, and burning.

**Sharp-tailed Sparrow (*Ammodramus nelsoni*) – Special Concern, S1B, SZN, Rank C/C**

Brief Description: An average size sparrow with a deep ochre-yellow of the face, which surrounds a gray ear patch.

Distribution: Majority of breeding records are in the Canadian prairies and coastal plains of the northeast United States.

Habitat: Marshes and muskegs.

State Records: Six records from NW WI, one from Northcentral WI

NHAL Records: Species known from one location in the NHAL in the 1980s and early 1990s.

Conservation Concerns: Water level fluctuations, wetland draining.

**American Black Duck (*Anas rubripes*) – Special Concern, S2N, S3B, Rank B/B**

Brief Description: A large dark marsh duck with white wing bars. Similar in appearance to a dark hen Mallard (*Anas platyrhynchos*.)

Distribution: Breeding range is from northeastern U.S. through the upper Midwest, up into northern Canada.

Habitat: Marshes and most permanent open water habitats.

State Records: Ranges throughout the state, but verified nests are not well documented.

NHAL Records: Only one breeding season record from the NHAL has been confirmed in the 1990s.

Conservation Concerns: Genetic swamping from the closely related Mallard (*Anas platyrhynchos*).

**Long-eared Owl (*Asio otus*) – Special Concern, S2S3B, SZN, Rank B/B**

Brief Description: A crow sized owl with long ear tufts. Undersides streaked lengthwise, not horizontally.

Distribution: From northern Canada down through south-central and southwestern U.S. in North America, also in Eurasia and northern Africa.

Habitat: Conifers, thickets, and woodlands. Very secretive.

State Records: Ranges throughout the state, but verified nests are few.

NHAL Records: One breeding season record, from the late 1980s, is known from the NHAL.

Conservation Concerns: Uncertain.

**American Bittern (*Botaurus lentiginosus*) - Special Concern, S3B, SZN, Rank C/B**

Brief Description: A stocky medium sized heron with a black neck stripe and outer wing blackish in flight.

Distribution: Eastern and central United States.

Habitat: Marshy reedy lakes, wet meadows, and sedge meadows.

State Records: Occurs statewide, but local in the southwest, and declining in the southeast. Declining steadily overall in past 15 years. Most recent records are from inventories conducted for state forest masterplans in the NW, NE and WC parts of the state.

NHAL Records: One breeding season record in the 1990s is known from the NHAL.

Conservation Concerns: shoreline development, wetland alteration, disturbance, recreational boating, or alteration of water quality.

**Red-shouldered Hawk (*Buteo lineatus*) – Threatened, S1N, S3S4B, Rank C/B**

Brief Description: A large hawk with rufous shoulders. Calls frequently on nesting territory.

Distribution: Eastern and central U.S. and southeastern Canada.

Habitat: Woodlands, wooded rivers, and timbered swamps.

State Records: Occurs statewide.

NHAL Records: Four breeding season records, all from the early 1980s, are known from the NHAL.

Conservation Concerns: Fragmentation of large forest blocks, stand thinning, lack of needed structural components.

**Pine Siskin (*Carduelis pinus*) - Special Concern, S1B, SZN, Rank B/B**

Brief Description: A small dark heavily streaked finch with a deeply notched tail and sharp bill.

Distribution: Southern Canada to northern Mexico.

Habitat: Conifer swamps, boreal forests, and residential areas.

State Records: Breeds statewide with most of population in northern two tiers of counties and in SE WI.

NHAL Records: One breeding season record, from the mid-1990s, is known from the NHAL.

Conservation Concerns: Canopy opening, fragmentation, logging of nest sites. Altered wetland conifer reproduction resulting from high deer densities, wetland alterations, etc. Conversion of spruce/fir/cedar dominated forests to hardwoods. Management practices that result in seasonal disturbance of nesting habitat.

**Swainson's Thrush (*Catharus ustulatus*) - Special Concern, S2B, SZN, Rank B/B**

Brief Description: A gray-brown spotted thrush with a buffy eye-ring.

Distribution: Breeds in Canada and northern parts of the upper Midwest and northeastern U.S.

Habitat: Spruce and maple dominated forests.

State Records: Wisconsin is along the edge of this species range. Restricted to the northern two tiers of counties in the state. Less than ten breeding records have been verified in the 1990s.

NHAL Records: Almost half the known state records from the 1990s are from the NHAL.

Conservation Concerns: Habitat fragmentation, reduced conifer cover, conversion of forests to plantations.

**Black Tern (*Chlidonias niger*) - Special Concern, S3B, SZN, Rank B/B**

Brief Description: A small tern with a black body.

Distribution: Breeds from the northern U.S. up through middle Canada.

Habitat: Freshwater marshes and lakes.

State Records: Status is currently being assessed.

NHAL Records: One small colony occurs on the NHAL, another near Minocqua.

Conservation Concerns: Water level manipulations, nest predation.

**Northern Harrier (*Circus cyaneus*) - Special Concern, S2N, S3B, Rank B/B**

Brief Description: A medium sized bird of prey pale-gray to brown to cinnamon in color, always with a white patch on rump.

Distribution: Holarctic.

Habitat: Forages in open habitats. Nests on ground on hummocks in large treeless areas such as meadows, shrub carrs, grasslands, sedge meadows, tall marsh, etc.

State Records: In WI statewide, but rare in heavily forested or plowed landscapes. Rare in the south.

NHAL Records: Two known breeding season records have been confirmed on the NHAL in the 1990s.

Conservation Concerns: Succession of grasslands, activities that disturb the ground during the nesting season, activities that concentrate ground predators, wetland alteration, or direct disturbance.

**Evening Grosbeak (*Coccothraustes vespertinus*) - Special Concern, S2B, SZN, Rank B/B**

Brief Description: A chunky starling sized finch with a very large pale bill and large white wing patches.

Distribution: Canada and north-central to northeastern U.S.

Habitat: Boreal forests of spruce and fir or sometimes pine.

State Records: Largely restricted to the northern three tiers of counties.

NHAL Records: Over half the confirmed breeding season records in the 1990s are from the NHAL.

Conservation Concerns: Canopy opening, fragmentation, logging of nest sites. Conversion of spruce/fir/cedar dominated forests to hardwoods. Management practices that result in seasonal disturbance of nesting habitat.

**Yellow Rail (*Coturnicops noveboracensis*) – Threatened, S1B, SZN, Rank B/C**

Brief Description: A small buff colored rail with a short greenish bill. A white wing patch is visible in flight.

Distribution: Breeds locally from the northern central U.S. through Canada.

Habitat: Extensive grassy freshwater marshes and meadows with little shrub encroachment.

State Records: Known from eleven counties since 1935. Probably less than fifty breeding pairs now, primarily on 4 WDNR managed sites. Breeding difficult to document.

NHAL Records: The species has been documented three times on the NHAL in the 1980s. Breeding was not confirmed.

Conservation Concerns: Small population size and isolation. Threats to current and potential habitat, especially fragmentation, succession, and impoundment.

**Black -throated Blue Warbler (*Dendroica caerulescens*) – Special Concern, S3B, SZN, Rank B/B**

Brief Description: A small songbird with breeding males recognized by blue-gray upper parts, black throat and sides and white belly.

Distribution: Eastern and central North America.

Habitat: Northern mesic forests of sugar maple, white pine, yellow birch, and hemlock.

State Records: Uncommon and largely restricted to the northern tier of counties plus a population in Menominee county.

NHAL Records: The species has been documented three times in the 1980s and 1990s.

Conservation Concerns: Canopy opening, fragmentation, logging of nest sites. Altered hemlock reproduction resulting from high deer densities. Management practices that result in seasonal disturbance of nesting habitat.

**Cerulean Warbler (*Dendroica cerulea*) - Threatened, S2S3B, SZN, Rank C/C**

Brief Description: A small songbird with breeding males recognized by blue back, white undersides and a narrow dark neck stripe.

Distribution: Eastern and central United States.

Habitat: Large stands of mature mesic hardwoods and floodplain forest.

State Records: Uncommon and largely restricted to the southern two thirds of the state with occasional breeding season records in the northern third. Has been expanding its range northward.

NHAL Records: The species has been documented three times in the 1980s and 1990s.

Conservation Concerns: Canopy opening, fragmentation, logging of nest sites. Management practices that result in seasonal disturbance of nesting habitat.

**Cape May Warbler (*Dendroica tigrina*) - Special Concern, S3B, SZN, Rank B/B**

Brief Description: A small songbird with breeding males recognized by chestnut cheek patches, yellow underneath, with striped with black.

Distribution: Canada, northeastern and far northern United States.

Habitat: Boreal forests of spruce, fir, tamarack, and occasionally white cedar.

State Records: Uncommon and largely restricted to the northern two tiers of counties.

NHAL Records: The species has been documented two times in the 1990s.

Conservation Concerns: Canopy opening, fragmentation, logging of nest sites. Altered wetland conifer reproduction resulting from high deer densities, wetland alterations, etc. Conversion of spruce/fir/cedar dominated forests to hardwoods. Management practices that result in seasonal disturbance of nesting habitat.

**Yellow-bellied Flycatcher (*Empidonax flaviventris*) - Special Concern, S2B, SZN, Rank C/B**

Brief Description: The decidedly yellowish underparts from throat to belly separate this northern flycatcher from all other eastern U.S. flycatchers.

Distribution: Northeastern and far north central U.S., and Canada.

Habitat: Extensive black spruce, tamarack and white cedar swamps.

State Records: Largely restricted to the northern fifth of the state with occasional breeding season observations elsewhere.

NHAL Records: The species has been documented five times in the 1990s on the NHAL.

Conservation Concerns: Canopy opening, fragmentation, logging of nest sites. Altered wetland conifer reproduction resulting from high deer densities, wetland alterations, etc. Practices that result in seasonal disturbance of nesting habitat.

**Spruce Grouse (*Falcipennis canadensis*) – Threatened, S1S2B, S1S2N, Rank B/A**

Brief Description: A dusky grouse. Males have a black breast and a red skin comb above the eyes. Females are thickly barred. Both sexes have a rusty band on the tip of the tail.

Distribution: Canada and far northern U.S.

Habitat: Conifer forests, muskegs, etc.

State Records: Restricted to the northern third of the state. Observations are infrequent.

NHAL Records: This species as only been documented once in the 1990s on the NHAL.

Conservation Concerns: Misidentification by hunters, loss of conifer forests.

**Merlin (*Falco columbarius*) - Special Concern, S3B, S2N, Rank B/B**

Brief Description: Small falcon with no rufous in tail or back.

Distribution: Circumboreal.

Habitat: Open areas with high densities of small birds. In WI, it is a frequent nester along the south shore of Lake Superior. Occasional nester on larger interior lakes or other open habitats in the northern third of the state. They typically nest in old crow nests found in thick conifer stands.

State Records: Recently has expanded its nesting range to the south for unknown reasons. Over thirty nesting sites have been reported in recent years in Wisconsin.

NHAL Records: Species has only been documented once, in 1969.

Conservation Concerns: Logging of potential nest sites (shoreline conifer stands).

**Bald Eagle (*Haliaeetus leucocephalus*) - Special Concern, S2N, S3S4B; Federally Threatened, Rank A/A**

Brief Description: A very large bird of prey with dark back and undersides. Head white or dark in immature. Adults unmistakable with snowy white heads and tails.

Distribution: North American in distribution. In eastern U.S. generally northern or coastal.

Habitat: Sites with large area of clear surface water. Typically in forested lake complexes or along larger streams in WI.

State Records: Nesting population concentrated in northern third of the state with scattered outliers in the western, southern and central portions.

NHAL Records: Fifty-eight nest sites have been documented in the 1980s and 1990s.

Conservation Concerns: Logging, shoreline development, wetland alteration, disturbance, recreational, boating, or alteration of water quality, toxic compounds.

**Connecticut Warbler (*Oporornis agilis*) - Special Concern, S3B, SZN, Rank B/B**

Brief Description: A small songbird with breeding males recognized by gray hood, yellow and olive body and a white eye ring.

Distribution: South central Canada and north central U.S.

Habitat: Jack pine forests.

State Records: Uncommon and largely restricted to the northern tiers of counties with an outlier in central Wisconsin. Approximately ten breeding season records are known so far.

NHAL Records: The species has been documented only once in the 1990s.

Conservation Concerns: Harvesting/salvaging jack pine has reduced the area of suitable habitat available for this bird. Management practices that result in seasonal disturbance of nesting habitat for habitat fragmentation.

**Osprey (*Pandion haliaetus*) - Threatened, S3S4B, SZN, Rank A/A**

Brief Description: A nearly eagle sized bird of prey with dark back and white undersides. Head white with dark line through eye.

Distribution: Nearly cosmopolitan. In eastern U.S. generally northern or coastal.

Habitat: Sites with large area of clear surface water. Typically in forested lake complexes or along larger streams in WI.

State Records: Nesting population restricted to northern third of the state with scattered outliers in the west and central portions.

NHAL Records: Seventy-nine nest sites have been documented in the 1980s and 1990s.

Conservation Concerns: Logging, shoreline development, wetland alteration, disturbance, recreational, boating, or alteration of water quality, toxic compounds.

**Gray Jay (*Perisoreus canadensis*) - Special Concern, S3B, SZN, Rank C/B**

Brief Description: A large, fluffy gray jay of the northern woods. Larger than a robin with a black patch across the back of the head and a white forehead.

Distribution: Boreal forests of North America.

Habitat: Boreal forests of spruce and fir. Also uses white cedar. Uncommon in pines and hardwoods.

State Records: Uncommon and largely restricted to the northern fifth of the state with occasional breeding season observations elsewhere.

NHAL Records: Approximately one-third of the known breeding records in the 1980s and 1990s are from the NHAL.

Conservation Concerns: Conversion of spruce/fir/cedar dominated forests to hardwoods. Management practices that result in seasonal disturbance of nesting habitat.

**Black-backed Woodpecker (*Picoides arcticus*) – Special Concern, S2B, SZN, Rank B/B**

Brief Description: A medium sized woodpecker with solid black back and barred sides. Males have yellow caps.

Distribution: Far northern north central and northeastern U.S. and Canada.

Habitat: Fir and spruce boreal forests, tamarack bogs, jack pine forests.

State Records: Year round resident of the northern third tier of counties. Can be found occasionally throughout the state, but largely absent from the driftless area.

NHAL Records: The species has been documented three times in the 1990s in the NHAL.

Conservation Concerns: Uncertain.

**Boreal Chickadee (*Poecile hudsonicus*) – Special Concern, S3B, SZN, Rank B/B**

Brief Description: Similar to the abundant black-capped chickadee, but with a dull brown cap and rich brown flanks.

Distribution: Far northern north-central and northeastern U.S. and Canada.

Habitat: Conifer forests.

State Records: Year round resident of the northern third tier of counties. About a dozen breeding records have been verified in the 1990s.

NHAL Records: One-third of the known breeding records in the 1990s are from the NHAL.

Conservation Concerns: Unknown.

**INVERTEBRATES**

**Mottled Darner (*Aeshna clepsydra*) – Special Concern, S2, Rank A/A**

Brief Description: A large blue-gray dragonfly with a cross-striped greenish face and an exceedingly complicated pattern of stripes on the thorax. Thorax completely patterned in brown and blue.

Distribution: Ontario Canada, northeastern U.S., and the upper Midwest.

Habitat: Reed-bordered lakes, deep sterile lakes.

State Records: Collected from seven sites in four counties in the 1990s.

NHAL Records: Collected from six sites on the NHAL in the 1990s.

Conservation Concerns: Specialized ecological/habitat requirements, possibly sensitive to water quality.

**Lake Darner (*Aeshna eremita*) – Special Concern, S3, Rank B/A**

Brief Description: A very large striking blue dragonfly with a black line across face.

Distribution: Canada, Northeastern U.S., the northernmost tier of states in the U.S, and perhaps higher elevations south along the Rockies.

Habitat: Bog or marsh bordered ponds and lakes.

State Records: Collected from eleven sites in eight counties the 1980s and 1990s.

NHAL Records: Collected from three sites on the NHAL in 1990s.

Conservation Concerns: Shoreline modifications.

**Black-tipped darner (*Aeshna tuberculifera*) - Special Concern, S3, Rank B/B**

Brief Description: A large deep blue dragonfly with abdominal segment 10 (the last segment) black

Distribution: Canada, north-central and northeastern U.S.

Habitat: Shallow densely vegetated ponds, including acid bog ponds, peaty acidic lakes, possibly streams.

State Records: Adults have been collected rarely but widely in northern and central to south central WI. Factors limiting distribution in WI are not known.

NHAL Records: There are five known records from the NHAL.

Conservation Concerns: Fish stocking, shoreline modifications water quality degradation, water level alterations.

**A Caddisfly (*Banksiola dossuria*) – Special Concern, SU, Rank B/C**

Brief Description: An aquatic insect recognizable only by taxonomic specialists.

Distribution: Southeastern Canada and Eastern U.S.

Habitat: Bogs, marshes, ponds, sluggish streams, on shore vegetation.

State Records:

NHAL Records: Collected from two sites on the NHAL in 1980s and 1990s.

Conservation Concerns: Uncertain. WI is at western edge of range.

**Bog Fritillary (*Boloria eunomia*) - Special Concern, S3, Rank C/B**

Brief Description: A fritillary butterfly with a nonmetallic white pattern on the undersides; with a submarginal row of black outlined, white spots.

Distribution: Canada, Alaska, western montane and northern most portions of U.S.

Habitat: Open bogs with cranberry and other ericaceous components.

State Records: Known from forty-six sites in seven Wisconsin counties in the 1980s and 1990s. Previously collected in one additional county in the 1970s. All collections have been made in far northern Wisconsin.

NHAL Records: Only known from one site on the NHAL.

Conservation Concerns: Activities that alter natural hydrological or biological properties of the known site. Gypsy moth control measures.

**Freija Fritillary (*Boloria freija*) – Special Concern, S2, Rank B/B**

Brief Description: Above, tawny-orange with strong black pattern of spots and bands. Below, black zig-zag pattern on the hind wing.

Distribution: Canada, northern Great Lakes region, and isolated populations in the Rockies. Also distributed in northern Eurasia.

Habitat: Open leatherleaf bogs, margins of black spruce bogs, and jackpine forests.

State Records: Known from twenty-four sites in ten counties in the 1980s and 1990s. Previously collected in three additional counties in the 1970s. All collections have been made in far northern Wisconsin.

NHAL Records: Only known from 1 site on the NHAL.

Conservation Concerns: Gypsy moth control measures.

**Frigga Fritillary (*Boloria frigga*) – Special Concern, S2, Rank A/B**

Brief Description: Above, orange with black bars and spots. Forewing apex pointed, not squared off. Below, basal off-white patch on hind wing.

Distribution: Holarctic. In North America: south to the northern Great Lakes region, and isolated populations in the western montane.

Habitat: Sphagnum and sedge bogs.

State Records: Known from nine sites in six counties in the 1980s and 1990s.

NHAL Records: Only known from one site on the NHAL.

Conservation Concerns: Destruction of peatland habitats. Gypsy moth control measures.

**A Caenid Mayfly (*Caenis youngi*) - Special Concern, SU, Rank B/B**

Brief Description: A mayfly which can be identified only by a taxonomist familiar with aquatic insects. The wide range of habitats reported suggests there may be more than one species associated with this name.

Distribution: Global Range - Apparently restricted (G3) to Iowa, Michigan, Minnesota, Montana, Wyoming, Alberta and Wisconsin.

Habitat: Lakes or ponds with at least a portion sandy bottomed. Also from small slow moving streams with sand bottoms.

State Records: Only known from nine sites in Wisconsin.

NHAL Records: Known from one site within the NHAL.

Conservation Concerns: Activities that alter natural hydrological or biological properties of the known sites. Water quality degradation.

**Subarctic Bluet (*Coenagrion interrogatum*) – Special Concern, S2, Rank A/B**

Brief Description: A small damselfly. Males are pale blue to almost turquoise, postocular spots are not confluent. Females, head and thorax similar to males, abdomen blue dorsally to tan laterally.

Distribution: Canada, New England, and some northern Midwest and western states.

Habitat: Cold swamps, open bogs, and fens, especially those with abundant marshes.

State Records: Known from three sites in Vilas County in 1967.

NHAL Records: Collected from three sites on the NHAL in 1967.

Conservation Concerns: Shoreline modifications, water quality degradation, water level alterations.

**Robust Dibiraphian Riffle Beetle (*Dibiraphia robusta*) – Special Concern, S2, Rank B/B**

Brief Description: An aquatic beetle

Distribution: WI, MN, ND, Manitoba

Habitat: Lives on submerged wood and rock over sand bottom in lakes or slow streams.

State Records: Few scattered records. Apparently a habitat specialist.

NHAL Records: Collected from one site on the NHAL in 1994.

Conservation Concerns: Uncertain.

**Red-disked Alpine (*Erebia discoidalis*) – Special Concern, S2, Rank B/C**

Brief Description: Lacks eyespots. Large chestnut red patch on forewing. Underside of hindwing gray-brown.

Distribution: Holarctic. In North America south to the northern Great Lakes region and far northern Montana.

Habitat: Sphagnum and spruce bogs.

State Records: Known from five sites in four counties in the 1990s, all from far northern Wisconsin.

NHAL Records: Only one record is known from the NHAL.

Conservation Concerns: Wetland degradation by off-road vehicles. Gypsy moth control measures.

**Splendid Clubtail (*Gomphurus lineatifrons*) – Special Concern, S3, Rank C/B**

Brief Description: A large black and yellow dragonfly with a prominent club at the end of the abdomen that is narrow than the thorax. No yellow spot on top of club.

Distribution: Centered in the Midwest, extending to some of the northern Southern states, western northeastern states, and Mid-Atlantic States.

Habitat: Medium to large fast-flowing streams with good water quality.

State Records: Collected from about thirty waterbodies in twenty counties.

NHAL Records: Collected from eight sites on the NHAL.

Conservation Concerns: Increased sedimentation, impoundments.

**Skillet Clubtail (*Gomphurus ventricosus*) – Special Concern, S3, Rank C/B**

Brief Description: A medium-sized black and yellow dragonfly with a prominent flattened. Yellow spot on top of club.

Distribution: Canada, northeastern U.S., northern Midwest, and some Mid-Atlantic States.

Habitat: Relatively clean medium-large streams with at least moderate current; large lakes.

State Records: Collected from twenty-eight waterbodies in twenty-one counties.

NHAL Records: Collected from one site on the NHAL.

Conservation Concerns: Increased sedimentation, impoundments.

**Green-faced Clubtail (*Gomphus viridifrons*) – Special Concern, S3, Rank C/B**

Brief Description: A small dark dragonfly marked with green with abdomen black on top of segments 8-10. Lacks heavy black face striping, especially along face seam.

Distribution: Midwest, some of the northern Southern states, and western Northeastern states.

Habitat: Rapid medium-large streams with good water quality.

State Records: Collected from thirty-five sites in twenty-seven counties.

NHAL Records: Collected from two sites on the NHAL.

Conservation Concerns: Increased sedimentation, impoundments.

**Citrine Forktail (*Ischnura hastata*) – Special Concern, S2, Rank A/B**

Brief Description: A very small damselfly. Males are distinctive with a bright yellow abdomen. Females are very difficult to distinguish from other members of the genus in the field.

Distribution: A very wide ranging species. Found in Canada, throughout the U.S., the Antilles, Central America, and South America.

Habitat: Dense emergent vegetation along pond margins or near seepage areas and backwaters of sluggish streams. Often found where there is little standing water.

State Records: Only known from three sites in Wisconsin.

NHAL Records: Collected from one site on the NHAL in 1962.

Conservation Concerns: Uncertain.

**A Predacious Diving Beetle (*Lioporeus triangularis*) – Special Concern, SU, Rank B/B**

Brief Description: An aquatic beetle

Distribution: Southeastern U.S. and WI

Habitat: A big river species that lives on wood and under banks over a sand bottom.

State Records: Collected from five sites in four counties

NHAL Records: Collected from one site on the NHAL in 1994.

Conservation Concerns: Uncertain.

**Bog copper (*Lycaena epixanthe*) - Special Concern, S2S3, Rank C/B**

Brief Description: A small butterfly with upper side purple iridescent in males, mouse gray brown in females, underside pale tan or white and hindwing with tiny black spots and a zigzag red-orange border.

Distribution: Global Range - Great Lake area of U.S. and Canada and northeastern U.S.

Habitat: Open bogs with cranberry and other ericaceous components.

State Records: Known from thirty-seven sites in WI.

NHAL Records: Collected at two sites in the 1990s on NHAL.

Conservation Concerns: Activities that alter natural hydrological or biological properties of the known site. Gypsy moth control measures.

**Elfin Skimmer (*Nannothemis bella*) - Special Concern, S3, Rank B/A**

Brief Description: A delicate little (ca 2cm) clear-winged dragonfly. Appearance changes with age. Small thorax, thinly clad with rather long whitish hairs. Legs black.

Distribution: Ontario and Quebec Canada, Alaska, and the eastern half of the U.S.

Habitat: Fens and floating sphagnum bogs.

State Records: Collected from seven sites in Wisconsin.

NHAL Records: Collected from one site on the NHAL in the 1960s.

Conservation Concerns: Uncertain.

**Cyrano Darner (*Nasiaeschna pentacantha*) - Special Concern, S3, Rank B/B**

Brief Description: A large bluish dragonfly with an elongate face. Smallish thorax, brown, brightly marked with blue. Abdomen long, tapering regularly from segment two to the end.

Distribution: Ontario and Quebec Canada, Alaska, and the eastern half of the U.S.

Habitat: Swampy streams, lake coves and ponds with roots or branches in water, or with abundant emergent annual vegetation.

State Records: Collected from ten waterbodies in ten counties in Wisconsin.

NHAL Records: Collected from five waterbodies on the NHAL in the 1990s.

Conservation Concerns: Shoreline modification.

**Jutta Arctic (*Oeneis jutta*) - Special Concern, S3, Rank**

Brief Description: Variable. Above, gray-brown. Both wings with yellow-orange submarginal band (usually interrupted). Variable number of small eyespots, more on forewing than hindwing.

Distribution: Holarctic. In North America the northern Great Lakes region, and south along the western montane region.

Habitat: Black spruce – sphagnum bogs.

State Records: Known from thirty-five sites in the 1990s, all but one from eleven far northern Wisconsin counties.

NHAL Records: Only one record is known from the NHAL.

Conservation Concerns: Water level alterations. Gypsy moth control measures.

**Lake Emerald (*Somatochlora cingulata*) - Special Concern, S1, Rank A/A**

Brief Description: A black medium sized dragonfly with emerald green eyes and with a conspicuous white-ringed abdomen. Triangles of yellow on each side of bronzy green-capped frons nearly meet.

Distribution: Canada and a few northern U.S. states in the Midwest and Northeast.

Habitat: Rocky lake points. Ponds and small boggy-bordered lakes farther north.

State Records: Only known from one site in Wisconsin.

NHAL Records: Collected from one site on the NHAL in 1993 and 1994.

Conservation Concerns: Water quality degradation, water level alterations, shoreline modification, fish stocking, and habitat modifications to promote game fish populations.

**Ski-tailed Emerald (*Somatochlora elongata*) - Special Concern, S2S3, Rank C/B**

Brief Description: A medium sized blackish dragonfly with emerald green eyes and light yellowish markings on the thorax.

Distribution: Global Range - Eastern Canada and United States.

Habitat: Forest streams with intermittent rapids, outlets of lakes and ponds.

State Records: Known from nine WI counties, mostly the northern forested counties with a pocket in Jackson Co. and a historical record from Milwaukee Co. Factors limiting distribution in WI are not known.

NHAL Records: Known from two sites on the NHAL.

Conservation Concerns: Shoreline modifications, water quality degradation, water level alterations.

**Forcipate Emerald (*Somatochlora forcipata*) - Special Concern, S2S3, Rank B/B**

Brief Description: A medium sized darkly colored dragonfly with metallic reflections. Thick growth of brownish hairs cover thorax. Ale stripes of sides appear as two conspicuous, similar, roundish-oval spots of pale yellow.

Distribution: Canada, New England, and some northern Midwest states.

Habitat: Small spring fed woodland streams and pools.

State Records: Only collected from three counties in Wisconsin. There have been collections from nine sites in two counties in the 1980s and 1990s.

NHAL Records: Collected from one waterbody on the NHAL in 1964.

Conservation Concerns: Water level fluctuations.

**Kennedy's Emerald (*Somatochlora kennedyi*) - Special Concern, S3, Rank B/B**

Brief Description: A medium-sized dark dragonfly with emerald green eyes in adult males. Pale stripes on sides ill defined and wide. Legs black, paler basally. Abdomen long and stout. Front of thorax metallic green, with bluish reflections, at either side of which are areas of dull yellow.

Distribution: Canada, New England, and some northern Midwest states.

Habitat: Slow streams through open bogs or marshes. Sedge meadows.

State Records: Collected from seventeen sites in nine counties.

NHAL Records: Collected from one waterbody on the NHAL in 1965.

Conservation Concerns: Water level fluctuations.

**Zebra Clubtail (*Stylurus scudderi*) - Special Concern, S3, Rank C/B**

Brief Description: A large black and yellow dragonfly with end of abdomen widely expanded in males. Yellow rings on black abdomen distinguish it from other large Clubtails.

Distribution: Global Range - Eastern Canada and United States.

Habitat: Cool sandy streams (trout streams) in forested habitats.

State Records: Known from thirteen WI counties in the heavily forested northern part of the state with a pocket in Jackson County. Factors limiting distribution in WI are not known.

NHAL Records: Known from five waterbodies on the NHAL in the 1990s.

Conservation Concerns: Shoreline modifications, water quality degradation, water level alterations.

**FISH**

**Lake Herring (*Coregonus artedii*) - Special Concern, S3, Rank X**

Brief Description: An 11-15" fish weighing up to 2 pounds. Silvery with pink to purple iridescence. Almost round in cross-section, elliptical in lateral view.

Distribution: Canada and the Great Lakes region of the U.S.

Habitat: Deep inland lakes, the Great Lakes.

State Records: Lake Michigan, Lake Superior, and large lakes in the northern third tier of counties and eastern half of the state.

NHAL Records: There are four known records from the NHAL.

Conservation Concerns: Populations subject to large fluctuations. General decline attributed to increased predation by introduced muskellunge, rainbow smelt, and walleye.

**Least Darter (*Etheostoma microperca*) - Special Concern, S3, Rank B/A**

Brief Description: Adults 1.5-2" in length, compressed laterally. Olive -brown back and sides with scattered dark brown specks and zigzag markings, series of small dusky blotches on sides and four short dusky bars radiating from the eye.

Distribution: Great Lakes region, Mississippi River valley as far south as Oklahoma.

Habitat: Weedy portions of lakes and clear streams with sluggish flow.

State Records: Scattered records throughout the state, generally avoids the unglaciated region, and not reported since 1935 from the Lake Superior drainage basin. Bulk of records in southeastern Wisconsin and the Wolf River system.

NHAL Records: Only one occurrence known from the NHAL.

Conservation Concerns: Statewide abundance trends uncertain. Appears to have recently disappeared from several Rock County locations. This species is relatively sensitive to environmental perturbations such as watershed and shoreline development.

**Banded Killifish (*Fundulus diaphanus*) - Special Concern, S3?, Rank X**

Brief Description: Adults between 2-2.5". Body is light olive on the back and sides and yellow-white below with 12 - 20 narrow vertical bars on the body.

Distribution: Northeastern U.S. and far southeastern Canada. Great Lakes region west to eastern North and South Dakota.

Habitat: Shoal waters and estuaries of large lakes. Quiet backwaters and sections of slow current in medium to large streams. Prefers open broad, sandy shallows during the warm season.

State Records: All modern records from the eastern half of Wisconsin.

NHAL Records: There are three known collections from the NHAL.

Conservation Concerns: Species declining in southern Wisconsin, and has been extirpated at several sites. Shoreline development and modification of littoral-zone habitats are probably major factors.

**Longear Sunfish (*Lepomis megalotis*) - Threatened, S2, Rank B/B**

Brief Description: Thin, deep-bodied sunfish. Opercular "ear flap" flexible and much elongated in adults. Black olive to rusty brown, sides lighter, breast and belly yellow to orange red. Back and sides with specks of yellow, orange, emerald and blue.

Distribution: A broad swath from western New England southwest to the Mexican border. Populations in the western Great Lakes regions are apparently isolated.

Habitat: Prefer clear, shallow, moderately warm, still water of streams, rivers or lakes over rubble, gravel and sand with moderate aquatic vegetation.

State Records: Occurs in three widely separated population centers, in southeastern, east-central, and northwestern Wisconsin. Populations in former strongholds in southeastern Wisconsin appear to be declining. Specimens have been found in other river systems, but they are infrequently collected, and are often *Lepomis* sp. hybrids.

NHAL Records: There is only one known collection from the NHAL.

Conservation Concerns: Hybridization in small populations is a concern. They are intolerant to turbid water from heavy agriculture within their range. They resemble other sunfish; they are often caught and kept by young anglers.

**Greater Redhorse (*Moxostoma valenciennesi*) - Threatened, S2S3, Rank C/B**

Brief Description: Largest of the redhorses (*Moxostoma spp.*). Somewhat compressed body, red tail, rows of dark spots on back and sides, large mouth and full lips. Back brown olive, sides golden, belly whitish. Adult size: 18 inches.

Distribution: Great Lakes region of the U.S. and Canada.

Habitat: Clear waters of small to large sized rivers, reservoirs and large lakes at depths of less than 3 feet (1m) over sand, gravel or boulders.

State Records: Widely scattered records from the Mississippi River and Lake Michigan drainage basins. Recent records from southeastern Wisconsin in the Illinois River drainage.

NHAL Records: There are three known collections from the NHAL.

Conservation Concerns: Sensitive to chemical pollutants and turbidity. Carp control programs may also be a threat.

**Pugnose Shiner (*Notropis anogenus*) - Threatened, S2S3, Rank C/A**

Brief Description: Slender, fragile minnow with small and almost vertical upturned mouth, giving a distinctive pugnose appearance. Large eyes. Silvery with yellow cast dorsally, sides and belly silvery. Lead-colored lateral stripe extending from a small dark spot on base of tail, along sides and through eye. Adult length: 1.8 inches.

Distribution: Great Lakes region of the U.S west to eastern North Dakota.

Habitat: Prefer clear, weedy shoals of glacial lakes and streams of low gradient over sand, mud, gravel or marl. Characteristic vegetation includes pondweed, water milfoil, elodea, eelgrass, coontail, bullrush and filamentous algae.

State Records: Majority of records from far northwestern Wisconsin and southeastern Wisconsin. Apparently extirpated from the Rock River drainage. Recently found in the Manitowish River system.

NHAL Records: There are three known collections from the NHAL.

Conservation Concerns: Loss of littoral zone macrophyte communities and lakeshore development.

**Pugnose Minnow (*Opsopoeodus emiliae*) - Special Concern, S3?, Rank C/A**

Brief Description: Adults 2.5" in length. Body color is straw-brown dorsally changing to silvery-yellow on the sides and belly, body is crosshatched in appearance, very blunt snout which is rounded in appearance with small mouth that is nearly vertical.

Distribution: Southeastern U.S. west to eastern Texas, north, following the Mississippi River Valley to central Wisconsin.

Habitat: Pugnose minnows prefer clear, vegetated water, where there is sluggish current. Backwater sloughs, lowland lakes, and connecting streams along the Mississippi flood plain offer ideal habitat.

State Records: Two widely separated population centers within the Mississippi River drainage basin. Found in backwaters of the Mississippi River, within the Red Cedar system of Dunn and Washburn Counties, and isolated areas of the southernmost tier of counties.

NHAL Records: There is only one known collection from the NHAL.

Conservation Concerns: Appears to be intolerant of excessive turbidity and siltation.

## **REPTILES & AMPHIBIANS**

### **Wood Turtle (*Clemmys insculpta*) - Threatened, S3, Rank C/A**

Brief Description: A medium sized semi-terrestrial turtle with the upper shell sculptured into concentric ridges and grooves similar in appearance to wood grain.

Distribution: Canada, north central and northeastern U.S.

Habitat: Restricted to forested areas along fast moving streams. Nests in nearby open sand or gravel.

State Records: Essentially statewide. Rare in the southwest and east-central portions, absent in the southeast.

NHAL Records: There are only three known records from the NHAL.

Conservation Concerns: Lack of secure nesting habitat. Road kills. Harvesting for pet trade and or human consumption. Water quality degradation. Disturbance of nesting areas during incubation period. High densities of mammalian nest predators. Management opportunities might include protection of traditionally used nest sites.

### **Northern Ringneck Snake (*Diadophis punctatus edwardsii*) - Special Concern, S3?, Rank B/B**

Brief Description: Adults are 12-15" long. A slender snake with a yellow, cream, or orange neck ring and bright yellow, orange, or occasionally red belly. The underside is free of markings or may be marked with an irregular row of black spots. Spots are more common where this subspecies intergrades with the prairie ringneck snake (*Diadophis punctatus armyi*). The neck ring may be interrupted, obscure, or occasionally absent.

Distribution: This subspecies ranges from far southeastern Canada and northeastern U.S. west to northeastern Minnesota and south to northern Alabama.

Habitat: Northern Ringneck Snakes prefer to live in moist areas in forests, grasslands, cut over areas, rocky wooded hillsides, or ledges along streams. They are most often seen under flat rocks, logs, or the loose bark of dead trees. They are believed to be highly fossorial.

State Records: Specimens verified from twenty-six counties, distributed mainly above the tension zone. Populations from the southern central and southeastern counties are believed to be extirpated. This subspecies apparently does not extend into the driftless area.

NHAL Records: There is only one known collection from the NHAL.

Conservation Concerns: Uncertain.

### **Four-toed Salamander (*Hemidactylum scutatum*) - Special Concern, SU, Rank B/B**

Brief Description: A small brown to rich red-brown terrestrial salamander with the underside porcelain white with irregular black flecks. Four rather than five toes on the hind feet distinguish this from all other terrestrial WI salamanders.

Distribution: Found in the eastern United States and southeastern Canada.

Habitat: Requires moist, mature, usually deciduous forest with high quality leaf litter and an abundance of downed wood in advanced stages of decomposition. These forests must also contain appropriate breeding sites, which are typically woodland ponds or seeps with abundant mosses. Nesting habitat is usually in sphagnum moss mounds directly adjacent to shallow fresh cool water.

State Records: There are about forty records for the state from twenty-two counties, but most of those from southern WI are old and need to be verified. As a result, this species was recently added to the NHI Working List as status undetermined. Most recent records are from inventories conducted for state forest masterplans in the NW, NE and WC parts of the state. The recent discovery of their breeding habitat has resulted in many of these new records.

NHAL Records: There are three known collections from the NHAL.

Conservation Concerns: Timber harvesting practices resulting in increased light and decreased humidity, canopy openings or reduced downed wood, wetland modification (draining, impoundment, dredging), or alteration of water quality.

### **Bullfrog (*Rana catesbeiana*) - Special Concern, S3S4, Rank C/B**

Brief Description: Largest North American frog. Plain or nearly plain green above, or with a netlike pattern of gray or brown on a green background. No dorsolateral ridges on trunk.

Distribution: Eastern and central North America. Introduced widely outside their range.

Habitat: A wide variety of wetlands and vegetated edges of open water bodies.

State Records: Widely distributed and scattered throughout the state in appropriate habitat. Widely introduced outside its range, and it is difficult to distinguish natural populations from introduced ones.

NHAL Records: There are more than a dozen known records from the NHAL.

Conservation Concerns: Uncertain.

## **MAMMALS**

### **Timber Wolf (*Canis lupus*) - Endangered, S1, Rank B/A**

Brief Description: They have silvery gray-brown backs, light tan underparts, and bushy tails. In winter, their fur becomes darker on the neck, shoulders, and rump. They are approximately twice as large as a coyote.

Distribution: Currently distributed throughout Canada and Alaska, extends south into Minnesota, Michigan, Wisconsin, Montana, Idaho, and Washington.

Habitat: Remote, contiguous, mixed forest blocks. Large conifer swamps often serve as rendezvous sites probably because of availability of dense cover and nearness to water sources.

State Records: As of 1998 there were 47 packs known to inhabit 16 northwest, north-central, and central Wisconsin counties.

NHAL Records: 2-3 packs are known to inhabit the NHAL.

Conservation Concerns: Poaching, mistaken identification by hunters, disease, collision with motor vehicles.

### **Lynx (*Lynx canadensis*) - Special Concern, SA, Rank B/B**

Brief Description: The Canada lynx is a medium-sized cat, similar to the bobcat, but appears somewhat larger. It has longer legs and very large well-furred paws, impressive adaptations for maneuvering through deep winter snow. It also has long tufts on the ears and a short, black-tipped tail.

Distribution: Found throughout Canada and Alaska. It is also be found in some northern regions of the United States, including western Montana and nearby parts of Idaho and Washington, stretching down

through the western montane. Some have also been located in New England, the Great Lakes region, and other states bordering Canada.

Habitat: Mature, dense forests and swamps are preferred. They are also found in more open forests and rocky areas, or tundras.

State Records: Considered a non-breeding accidental wanderer.

NHAL Records:

Conservation Concerns: Could easily be mistaken for the more common bobcat (*Lynx rufus*) by hunters, and traps set for bobcats could accidentally kill individuals.

### **Water Shrew (*Sorex palustris*) - Special Concern, S2, Rank B/B**

Brief Description: A large (3-3.5") blackish-grey shrew, with underside paler, sometimes silvery. Stiff hairs along the sides of the feet distinguish from other midwest shrews.

Distribution: Northern U.S. and Canada. Extends south in the U.S. along the Rockies and the Appalachian Mountains.

Habitat: Marshes, bogs, and cold, small streams with cover along the banks.

State Records: Not common anywhere within range. Collected infrequently in the northern third tier of counties.

NHAL Records: There is only one known collection from the NHAL.

Conservation Concerns: Sensitive to water quality changes.

## **MUSSELS**

### **Elktoe (*Alasmidonta marginata*) - Special Concern, S4, Rank C/B**

Brief Description: Shell elongate, triangular, inflated, and relatively thin. Anterior end rounded, posterior end sharply angled, ending in a blunt, squared point. Posterior ridge sharply angled and prominent, posterior slope broad, flat, and covered with fine ridges. Periostracum yellowish green or bright green with numerous rays and dark green spots present. Posterior slope often lighter than rest of shell. Length to 4 inches (10.2cm).

Distribution: In the U.S. it is distributed in the Ohio-Mississippi River and Susquehanna River systems. In Canada it is in the Great Lakes – St. Lawrence system from Lake Huron to the Ottawa River.

Habitat: Medium-sized streams in gravel or mixed sand and gravel.

State Records: Known from twenty-five waterbodies in Wisconsin. Only common in St. Croix River.

NHAL Records: Known from two sites on the NHAL.

Conservation Concerns: Increased sedimentation, impoundment.

### **Eastern Floater (*Anodonta cataracta*) - Special Concern, SU, Rank B/B**

Brief Description: Elliptical, roundly pointed posteriorly, inflated, thin, fragile, and with inflated beaks that project above the hinge line. Surface smooth except for low concentric wrinkles and green rests.

Distribution: Northeastern North America to the Midwest.

Habitat: Ponds, lakes, and streams of various widths down to small brooks. Most abundant on mud, but also occurs on sand, and less frequently on gravel.

State Records: Only known from one waterbody in Wisconsin.

NHAL Records: The only known population, last seen in 1990, is from the NHAL.

Conservation Concerns: Inventory incomplete, first host unknown.

**Round Pigtoe (*Pleurobema sintoxia*) - Special Concern, S3, Rank C/B**

Brief Description: Shell moderately thick, round, and compressed (medium-sized rivers) to inflated (large rivers). Anterior end rounded, posterior end rounded to bluntly pointed. Periostracum greenish brown, light brown, or reddish brown in juveniles, becoming chestnut or dark brown in adults, with faint green rays visible near the beaks in some shells. Length to 4 inches (10.2 cm).

Distribution: Found throughout most of the Mississippi – Missouri river systems in the U.S. Found in Lake Erie, and tributaries of Lake Erie and Lake St. Clair in southwestern Ontario.

Habitat: Medium to large rivers in mud, sand, or gravel.

State Records: Known from twenty-four waterbodies in Wisconsin

NHAL Records: Known from four waterbodies on the NHAL.

Conservation Concerns: Increased sedimentation, impoundment.

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## APPENDIX H

### A Checklist of Birds of the Northern Highland-American Legion State Forest

The following list includes all known bird species documented since 1939. Species abundance varies annually due to many conditions. Relative abundance represents the average year. Probabilities of sighting a particular species depends on several factors. For instance, Common Loons are readily observed if they are nesting on a lake. However, the chance of seeing a Common Loon is averaged out for all lakes as fairly common. Observability also plays a significant role in whether or not an observer may see a particular bird. An example is the comparative populations of Great Blue Herons and Soras. Great Blue Herons are often observed along streams, lakeshores, or flying about, but their relative abundance is much less than Soras which are seldom seen due to their secretive behavior. Species abundance is listed in each of four different seasons. Abundance is defined as follows:

- A = Abundant – Numerous and easily found in appropriate habitat.
- C = Common – Should be found with little search effort in appropriate habitat.
- F = Fairly Common – Should be found with moderate search effort in appropriate habitat. Birds can be missed due to weather or poor timing of searches.
- U = Uncommon – May be found with considerable search effort in appropriate habitat. Obtaining a thorough understanding of their habits is necessary for most successful encounters.
- R = Rare – Only observed once or twice every one to five or more years.
- \* = Accidental – Records exist, but the chance of observation is virtually nil.

The abundance of birds is on a seasonal basis as follows:

- Sp = March through May
- S = June and July
- F = August through November
- W = December through February

✓	Bird	Sp	S	F	W	Habitat
	Red-throated Loon	r		r		Large Lakes
	Common Loon	f	f	f		Medium and Large Lakes
	Pied-billed Grebe	u	u	r		Shallow lakes and marshes, Powell Marsh
	Horned Grebe	u		u		Large Lakes
	Red-necked Grebe	r				Large Lakes
	Western Grebe			*		Accidental
	American White Pelican			*		Accidental
	Double-crested Cormorant	r	r	r		Large Lakes and Flowages
	American Bittern	u	u	r		Marshes and sedge meadows
	Least Bittern		r			Occasional at Powell Marsh
	Great Blue Heron	c	c	c		Lakes, streams, and flowages
	Great Egret			r		Powell Marsh
	Cattle Egret	r	r	r		Fields and marshes
	Green-backed Heron	u	u	r		Streams and backwaters
	Black-crowned Night Heron			r		Marshes
	White-faced Ibis			*		Old record from Powell Marsh
	Trumpeter Swan	r	r	r		Endangered Species being reintroduced
	Tundra Swan	u		u		Large marshes and sedge meadows
	Mute Swan	r	r	r	u	European escape, winters on Manitowish River
	Greater White-fronted Goose			*		Powell Marsh
	Snow Goose	u		r		Primarily Powell Marsh
	Brant			*		Old record from Vilas County
	Canada Goose	c	f	c	r	Increasing - lakes, wetlands, beaver ponds
	Wood Duck	c	c	f		Beaver ponds and streams
	Green-winged Teal	u	r	u		Ponds and shallow marshes
	American Black Duck	u	u	u	r	Shallow marshes and streams
	Mallard	a	c	a	r	Lakes, wetlands, and parks
	Northern Pintail	u	r	r		Powell Marsh and other large wetlands
	Blue-winged Teal	f	f	f		Ponds, marshes, and streams
	Northern Shoveler	u	r	r		Powell Marsh and other large wetlands
	Gadwall	u	r	r		Most observation at Powell Marsh
	American Widgeon	r	r	r		Often observed with diving ducks on large lakes
	Canvasback	r	r	r		Large lakes and deep marshes
	Redhead	r	r	r		Large lakes and deep marshes
	Ring-necked duck	c	u	c		Large marshes and bog lakes
	Greater Scaup	u		u		Migrant on larger lakes
	Lesser Scaup	c	r	c	r	Large marshes and bog lakes
	Oldsquaw			r		Rare fall visitor to large lakes
	Surf Scoter			r		Rare fall visitor to large lakes
	White-winged Scoter			r		Rare fall visitor to large lakes
	Common Goldeneye	c	r	c	u	Winters on any open water
	Bufflehead	c	r	c		Large lakes and marshes
	Hooded Merganser	f	u	u		Small lakes, beaver ponds, and streams
	Common Merganser	c	u	u	r	Large lakes and large rivers
	Red-breasted Merganser	u	r	u		Large lakes
	Ruddy Duck	r		r		Occasional at Powell Marsh

✓	Bird	Sp	S	F	W	Habitat
	Turkey Vulture	r	r	r		Usually seen soaring or at roadside kills
	Osprey	u	u	u		Most large lakes, common on Rainbow Flowage
	Mississippi Kite			*		Accidental
	Bald Eagle	u	f	u	u	Most large lakes, common on Rainbow Flowage
	Northern Harrier	u	u	r		Open sedge meadows and grasslands
	Sharp-shinned Hawk	u	u	u	r	Forest clearings, edges, and gaps
	Cooper's Hawk	u	u	u	r	Forest clearings, edges, and gaps
	Northern Goshawk	r	r	r	u	Old-growth mixed forest, late successional forest
	Red-shouldered Hawk	r	r	r		Old-growth hemlock/hardwood forest, floodplain forest
	Broad-winged Hawk	c	c	c		Extensive forests
	Red-tailed Hawk	c	f	c	r	Open lands, sedge meadows, recently logged areas
	Golden Eagle	r			r	Open lands, especially Powell Marsh
	American Kestrel	c	c	c	r	Open lands, roadsides, forest edges
	Merlin	r	r	r		Extensive bogs, large undeveloped lake shores
	Peregrine Falcon	r		r		Rare migrant
	Gyr Falcon				r	Extensive open areas
	Ring-necked pheasant	*	*	*	*	Agricultural lands
	Spruce Grouse	r	r	r	r	Extensive bog areas, extensive jack pine areas
	Ruffed Grouse	c	c	c	c	Aspen, alder, early successional forests
	Greater Prairie Chicken	*	*	*	*	Widespread after exploitive logging era, now extirpated
	Sharp-tailed Grouse	r	r	r	r	A few remain at Powell Marsh and in pine barrens
	Yellow Rail	r	r			Regular at Powell Marsh, but difficult to find
	Virginia Rail	u	u	u		Dense cattail/bulrush areas, sedge meadows, alder thickets
	Sora	f	f	u		Dense cattail and bulrush areas, sedge meadows
	American Coot	u	u	u		Deepwater marshes, wild rice lakes in fall
	Sandhill Crane	u	u	r		Extensive sedge meadows and bogs
	Black-bellied Plover	r	r	r		Shortgrass areas and mudflats
	Lesser Golden Plover	r	r	r		Shortgrass areas and mudflats
	Semipalmated Plover	u	r	r		Mudflats
	Killdeer	c	c	c		Mudflats and open areas, especially agricultural land
	Greater Yellowlegs	f	u	u		Mudflats and sedge meadows, esp. Powell and Rainbow Flowage
	Lesser Yellowlegs	f	u	u		Mudflats and sedge meadows, esp. Powell and Rainbow Flowage
	Willet			r		Mudflats and sedge meadows
	Spotted Sandpiper	f	f	u		Lakeshores and rocky streams
	Upland Sandpiper	r	r			Open areas near Sugar Camp
	Semipalmated Sandpiper	r	r	r		Mudflats
	Least Sandpiper	u	r	r		Mudflats and sedge meadows, esp. Powell and Rainbow Flowage
	White-rumped Sandpiper	r	r	r		Mudflats
	Baird's Sandpiper	r	r	r		Shortgrass areas and mudflats
	Pectoral Sandpiper	u	r	r		Mudflats and sedge meadows
	Dunlin	u	r	r		Mudflats and sedge meadows
	Short-billed Dowitcher	r	r	r		Mudflats
	Long-billed Dowitcher	r	r	r		Mudflats
	Common Snipe	f	f	u		Sedge meadows, bogs, and marshes
	American Woodcock	f	f	u		Aspen woods, alder thickets, early successional forest
	Wilson's Phalarope	r	r	r		Sedge meadows, Powell Marsh

✓	Bird	Sp	S	F	W	Habitat
	Red-necked Phalarope			r		Powell Marsh
	Bonaparte's Gull	r		r		Large lakes and mudflats
	Ring-billed Gull	c	c	c	r	Large lakes, parks, golf courses
	Herring Gull	u	r	r		Large lakes, parks, landfills
	Glaucous Gull			*		Accidental
	Caspian Tern	u	r	r		Large lakes
	Common Tern	r	r	r		Large lakes
	Forster's Tern	r	r	r		Large marshes and lakes
	Black Tern	r	u	r		Large marshes, bogs, and shallow lakes--very local
	Rock Dove	f	f	f	f	Developed areas and around buildings
	Mourning Dove	u	u	u	r	Open areas, forest edges, early successional forest, towns
	Black-billed Cuckoo	f	f	u		Forest edges, roadsides. Feeds on caterpillars
	Yellow-billed Cuckoo	r	r			Forest edges, roadsides. Feeds on caterpillars
	Common Barn Owl	*			*	Accidental
	Great Horned Owl	f	f	f	f	Broken forest lands, forest edges near open areas
	Snowy Owl				r	Open areas
	Northern Hawk-Owl				*	Accidental
	Barred Owl	f	f	f	f	Old-growth hemlock/hardwood forest, extensive mature forest
	Great Gray Owl	r	r	r	r	Extensive bog lands near Manitowish
	Long-eared Owl	r	r	r	r	Extensive mature pine/fir forests
	Short-eared Owl	r	r	r	r	Large open areas. Has nested at Powell Marsh
	Boreal Owl				r	Accidental
	Saw-whet Owl	u	u	u	r	Extensive conifer wetlands, mature aspen/fir forest
	Common Nighthawk	u	f	f		Open country, dry forests, meadows, towns
	Whip-Poor-Will	f	f	f		Upland forest
	Chimney Swift	u	u	u		Old-growth forests, developed areas
	Ruby-throated hummingbird	f	f	u		Riparian edges, forest gaps, herbaceous meadows, feeders
	Belted Kingfisher	f	f	u	r	Forages on rivers and lakes, nests in banks
	Red-headed Woodpecker	r	r	r		Oaks, esp. scattered trees in open country
	Red-bellied Woodpecker	r	r	r	r	Oak forests, floodplain forests
	Yellow-bellied Sapsucker	f	f	f		Hemlocks, aspen, birches and most other forests
	Downy Woodpecker	c	c	c	c	Young, especially riparian, forests
	Hairy Woodpecker	c	c	c	c	Mature forests
	Three-toed Woodpecker	r	r	r	r	Irregular in spruce, fir, tamarack forests
	Black-backed Woodpecker	u	u	u	u	Old-growth hemlock, spruce/fir forests, areas of dead conifer
	Northern Flicker	c	c	c		Open country and forest edges. Feeds on ants.
	Pileated Woodpecker	u	u	u	u	Old-growth forests and mature forests
	Olive-sided Flycatcher	u	u	u		Conifer lined stream courses and large conifer bogs
	Eastern Wood-Pewee	c	c	c		Mature forests, pole-sized forests, old-growth forests
	Yellow-bellied Flycatcher	f	u	f		Old-growth and mature cedar swamps and spruce bogs
	Alder Flycatcher	c	f	u		Alder and willow lined streams, and early succession areas
	Least Flycatcher	c	c	c		Mature forests, pole-sized forests, old-growth forests
	Eastern Phoebe	u	u	u		Bridges, buildings, and cliffs, usually near water
	Great Crested Flycatcher	c	c	c		Mature pine-oak forests, old-growth conifers
	Western Kingbird	*	*	*		Accidental
	Eastern Kingbird	c	c	c		Open country, forest edges, and open bogs

✓	Bird	Sp	S	F	W	Habitat
	Horned Lark	u	r	u	r	Open country with sparse vegetation
	Purple Martin	f	u	f		Formerly old-growth forest, now only in Martin houses--declining
	Tree Swallow	a	c	a		Nests in cavities near lakes, streams, and open areas
	Northern Rough-winged Swallow	f	u	f		Nests in banks and cliffs near open country
	Bank Swallow	f	f	f		Nests in banks near open country
	Cliff Swallow	c	c	c		Cliffs and buildings usually near water
	Barn Swallow	c	c	c		Buildings near open country
	Gray Jay	u	u	u	u	Mature spruce, fir, and pine forest, occasional in plantations
	Blue Jay	a	c	a	c	Ubiquitous
	American Crow	c	c	c	f	Ubiquitous
	Common Raven	f	f	f	f	Most forested habitats
	Black-capped Chickadee	a	a	a	a	All forested and shrub habitats
	Boreal Chickadee	u	u	u	u	Mature, large conifer bogs and muskeg
	Tufted Titmouse	*				Accidental
	Red-breasted Nuthatch	c	c	c	c	Conifer forests
	White-breasted Nuthatch	c	c	c	c	Deciduous forest, mature conifer forests
	Brown Creeper	f	r	f	r	Old-growth forests, cedar swamps, and mature forests
	Carolina Wren				*	Accidental
	House Wren	f	f	f		Developed areas, shrubby open country, forest edges & gaps
	Winter Wren	f	f	u		Cedar swamps, conifer bogs, hemlock stands
	Sedge Wren	f	f	f		Sedge meadows, open bogs, old fields with dense grasses
	Marsh Wren	u	u	u		Cattails, bulrushes
	Golden-crowned Kinglet	f	f	f	r	Mature conifer swamps and bogs, old-growth hemlock
	Ruby-crowned Kinglet	f	r	f		Mature upland spruce/fir forests
	Eastern Bluebird	f	u	f		Open areas with scattered trees, young regenerating forests
	Veery	c	c	c		Old-growth hardwoods, mature hardwood / conifers, alders
	Gray-cheeked Thrush	f		f		Migrant only in many different forest types
	Swainson's Thrush	a	u	a		Old-growth hemlock/hardwoods, mature upland conifers
	Hermit Thrush	c	c	c		Found in nearly every forest type, most numerous in dry conifer
	Wood Thrush	u	r	u		Old-growth hardwoods, mature hardwoods
	American Robin	a	a	a		Ubiquitous
	Varied Thrush				*	Accidental
	Gray Catbird	c	c	c		Alder/Willow thickets, forest edges, brushy areas
	Northern Mockingbird	*				Accidental
	Brown Thrasher	f	f	u		Forest edges, open brushy areas
	Water Pipit	r		r		Mudflats, short grass areas such as golf courses
	Bohemian Waxwing				u	Variable - depend on winter fruits
	Cedar Waxwing	c	c	u	r	Variable - most often found in conifer bogs and along rivers
	Northern Shrike	u		u	u	Perches in or near open areas
	Loggerhead Shrike		*			Accidental
	European Starling	c	c	c	c	Developed areas, farms, and near buildings
	Solitary Vireo	f	f	u		Conifer bogs, cedar swamps, and areas with dense fir understory
	Yellow Throated Vireo	u	u	r		Mature hardwoods, especially stands with a large oak component
	Warbling Vireo	f	f	u		Trees adjacent to streams and lakes, ash swamps
	Philadelphia Vireo	u	r	f		Areas with dense brush such as stream borders and forest gaps
	Red-eyed Vireo	a	a	a		All forests except very young stands

✓	Bird	Sp	S	F	W	Habitat
	Blue-winged Warbler	*				Accidental
	Golden-winged Warbler	u	u	u		Young aspen stands, stream borders, large forest gaps
	Tennessee Warbler	c	r	c		Aspen, birch, and, during migration, hardwoods
	Orange-crowned Warbler	u		u		Migrant only, found in shrubby areas
	Nashville Warbler	a	a	c		The most common warbler in conifer bogs and cedar swamps
	Norther Parula	u	u	u		Mature conifer bogs, cedar swamps, and old-growth hemlock
	Yellow Warbler	c	c	r		Alder/willow thickets, dense bog birch, dense upland brush
	Chestnut-sided Warbler	a	a	c		Young aspen stands, oak forest with dense understory, gaps
	Magnolia Warbler	c	f	f		Mature spruce/fir forest and areas with dense fir understory
	Cape May Warbler	c	r	f		Mature spruce/fir forest, large black spruce, cedar swamp
	Black -throated Blue Warbler	u	u	r		Old-growth and mature hardwoods with a dense understory
	Yellow-rumped Warbler	a	c	a		Conifer bogs, cedar swamps, pine plantations, upland spruce/fir
	Black-throated Green Warbler	c	c	f		Old-growth hemlock/hardwoods, mature hardwoods, mature pine
	Blackburnian Warbler	f	u	f		Old-growth hemlock, old-growth pines, cedar & spruce swamps
	Pine Warbler	u	f	u		Canopy of mature pines usually over 50 years old
	Palm Warbler	c	f	c		Black spruce muskeg, and large conifer bogs
	Bay-breasted Warbler	u		f		Migrant in conifer forests
	Blackpoll Warbler	f		f		Migrant in conifer and oak forests
	Cerulean Warbler	r	r	r		Large mature oak forest with an intact canopy
	Black and White Warbler	c	f	f		Many mature forests, most common in cedar & tamarack swamps
	American Redstart	c	u	c		Ash swamps, floodplain forest, old-growth hardwoods, aspen
	Ovenbird	a	a	c		Found in all forests pole size or larger
	Northern Waterthrush	f	u	u		Wet conifer swamps, ash swamps, alder thickets
	Connecticut Warbler	f	f	r		Jack pine barrens/forest, large conifer bogs
	Mourning Warbler	f	f	f		Brushy stream borders, moist forest gaps, young aspen
	Common Yellowthroat	c	c	c		Alder thickets, brushy wetlands, moist upland brush
	Wilson's Warbler	f	*	f		Migrant found in brushy areas
	Canada Warbler	f	u	f		Cedar swamps, conifer bogs, dense forest gaps, young aspen
	Scarlet Tanager	f	f	f		Mature hardwoods, especially stands with a large oak component
	Northern Cardinal	r	r	r	r	Developed areas, deciduous forest, forest edges
	Rose-breasted Grosbeak	c	c	c		Deciduous forest of all ages
	Indigo Bunting	c	c	c		Forest edges, canopy gaps, young aspen
	Painted Bunting	*				Accidental
	Dickeissel	r	r			Old fields
	Rufous-sided Towhee	f	f	u		Jack pine barrens, young pine and aspen, forest edges
	American Tree Sparrow	a		a	u	Open areas and feeders
	Chipping Sparrow	c	c	c		Upland coniferous forest, developed areas
	Clay-colored Sparrow	u	u	u		Jack pine barrens, young pine plantations, brushy old fields
	Field Sparrow	r	r	r		Young pine plantations and brushy old fields
	Vesper Sparrow	u	u	u		Young pine plantations and brushy old fields
	Savannah Sparrow	u	f	u		Powell Marsh, sedge meadows, leatherleaf bogs, old fields
	Grasshopper Sparrow	r	r	r		Open grassy areas
	LeConte's Sparrow	u	f	r		Powell Marsh, wiregrass meadows near Manitowish Waters
	Sharp-tailed Sparrow	r	r			Powell Marsh
	Fox Sparrow	c		c		Migrant along forest edges and brushy areas
	Song Sparrow	a	a	c	r	Brushy wetlands, sedge meadows, alder thickets

✓	Bird	Sp	S	F	W	Habitat
	Lincoln's Sparrow	f	f	f		Black spruce muskeg, dense streamside alder and willow
	Swamp Sparrow	f	f	u		Brushy wetlands, sedge meadows, alder thickets
	White-throated Sparrow	a	c	a		Pole to mature upland forest, mature conifer swamps, alders
	White-crowned Sparrow	u		u		Migrant in brushy areas
	Dark-eyed Junco	c	f	c	r	Breeds in mature spruce/fir forests
	Lapland Longspur	r		r		Open areas
	Snow Bunting			u	u	Open areas
	Bobolink	f	f	u		Powell Marsh and other wet meadows with scattered brush
	Red-winged Blackbird	a	a	a		Any wet or moist open area
	Eastern Meadowlark	u	u	r		Open grassy areas
	Western Meadowlark	r	r	r		Open grassy areas
	Yellow-headed Blackbird	r	r			Primarily found at Powell Marsh
	Rusty Blackbird	c		c		Migrant in brushy wetlands
	Brewer's Blackbird	f	f	r		Sparse open areas
	Common Grackle	a	a	a		Wet open areas and forest edges
	Brown-headed Cowbird	c	c	c		Open areas, forest edges, and forest gaps
	Orchard Oriole		*			Accidental
	Northern Oriole	c	f	c		Deciduous forest and developed areas
	Pine Grosbeak				u	Coniferous forests
	Purple Finch	c	u	f	r	Stream borders, ash swamps, cedar swamps, and aspen/birch
	House Finch	r	r	r	r	Increasing in developed areas
	Red Crossbill	u	u	u	u	Irregular in conifer forests, especially red & white pine
	White-winged Crossbill	u	u	u	u	Irregular in conifer forests, especially spruce & hemlock
	Common Redpoll	u		u	u	Irregular, feeds on birch and alder catkins
	Hoary Redpoll				*	To be looked for in flocks of Common Redpoll
	Pine Siskin	f	u	f	u	Conifer forests
	American Goldfinch	c	c	c	u	Conifer forests
	Evening Grosbeak	u	u	f	f	Coniferous and mixed forests
	House Sparrow	c	c	c	c	Developed areas



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# APPENDIX I

## Wisconsin Natural Heritage Working List

The Wisconsin Natural Heritage Working List contains species known or suspected to be rare in the state and natural communities native to Wisconsin. It includes species legally designated as "Endangered" or "Threatened" as well as species in the advisory "Special Concern" category. Most of the species and natural communities on the list are actively tracked and we encourage data submissions on these species. This list is meant to be dynamic--it is constantly changing as new information regarding the biological status of species becomes available. The Natural Heritage Program welcomes your input on any aspect of this list. Wisconsin's extirpated species list is at the end. **Changes from the previous list (01/98) are bolded.**

### Key

**ELCODE:** Unique 10 digit code for each element (plant, animal, or natural community).

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

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

**Global Rank:** Global element rank. Refer to the Rank Definition Sheet.

**State Rank:** State element rank. Refer to the Rank Definition Sheet.

**US Status:** Federal protection status designated by the Office of Endangered Species, U.S. Fish and Wildlife Service indicating the biological status of a species in the United States. LE = listed endangered; LT = listed threatened; LELT = listed endangered in part of its range, threatened in another part; PE = proposed endangered; PT = proposed threatened; PEPT = proposed endangered in part of its range threatened in another; E(S/A), T(S/A) = Treat as endangered (E) or threatened (T) due to similarity of appearance.

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

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

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

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## Global & State Element Rank Definitions

### Global Element Ranks:

- G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.
- G2 = Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
- G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single state or physiographic region) or because of other factors making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100.
- G4 = Apparently globally secure, though it may be quite rare in parts of its range, especially at the periphery.
- G5 = Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
- GH = Of historical occurrence throughout its range, i.e., formerly part of the established biota, with the expectation that it may be rediscovered.
- GU = Possibly in peril range-wide, but their status is uncertain. More information is needed.
- GX = Believed to be extinct throughout its range (e.g. Passenger pigeon) with virtually no likelihood that it will be rediscovered.
- G? = Not ranked.

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

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

### State Element Ranks

- S1 = Critically imperiled in Wisconsin because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation from the state.
- S2 = Imperiled in Wisconsin because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state.
- S3 = Rare or uncommon in Wisconsin (21 to 100 occurrences).
- S4 = Apparently secure in Wisconsin, with many occurrences.
- S5 = Demonstrably secure in Wisconsin and essentially ineradicable under present conditions.
- SA = Accidental (occurring only once or a few times) or casual (occurring more regularly although not every year); a few of these species (typically long-distance migrants such as

some birds and butterflies) may have even bred on one or more of the occasions when they were recorded.

- SE = An exotic established in the state; may be native elsewhere in North America.
- SH = Of historical occurrence in Wisconsin, perhaps having not been verified in the past 20 years, and suspected to be still extant. Naturally, an element would become SH without such a 20-year delay if the only known occurrence were destroyed or if it had been extensively and unsuccessfully looked for.
- SN = Regularly occurring, usually migratory and typically nonbreeding species for which no significant or effective habitat conservation measures can be taken in Wisconsin. This category includes migratory birds and bats which do not breed in Wisconsin but pass through twice a year or may remain in the winter (or, in a few cases, the summer) and certain lepidoptera which regularly migrate to Wisconsin where they reproduce, but then completely die out every year with no return migration. Species in this category are so widely and unreliably distributed during migration or in winter that no small set of sites could be set aside with the hope of significantly furthering their conservation.
- SZ = Not of significant conservation concern in Wisconsin, invariably because there are no definable occurrences in the state, although the taxon is native and appears regularly in the state. An SZ rank will generally be used for long-distance migrants whose occurrence during their migrations are too irregular (in terms of repeated visitation to the same locations), transitory, and dispersed to be reliably identified, mapped, and protected. Typically, the SZ rank applies to a nonbreeding population.
- SR = Reported from Wisconsin, but without persuasive documentation which would provide a basis for either accepting or rejecting the report. Some of these are very recent discoveries for which the program hasn't yet received first-hand information; others are old, obscure reports that are hard to dismiss because the habitat is now destroyed.
- SRF = Reported falsely (in error) from Wisconsin but this error is persisting in the literature.
- SU = Possibly in peril in the state, but their status is uncertain. More information is needed.
- SX = Apparently extirpated from the state.

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

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